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James Blish

A HERO'S LIFE

CONTENTS

I

Listening automatically for the first sound of possible interruption, Simon de Kuyl emptied his little poisons into the catch basin in his room and ironically watched the wisps of wine-coloured smoke rise from the corroded maw of the drain. He was sorry to see them go; they were old though venemous friends.

He knew without vanity - it was too late for that - that High Earth had no more distinguished a traitor than he. But after only four clockless days on Boadicea, he had already found it advisable to change his name, his methods and his residence. It was a humiliating beginning.

The almost worn-away legend on the basin read:*Julius Boadicea* . Things made on this planet were usually labelled that generally, as though any place in the world were like every other, but this both was and was not true. The present city, Druidsfall, was the usual low jumble of decayed masonry, slightly less ancient slums and blank-faced offices, but the fact that it was also the centre of the treason industry - hence wholly convenient for Simon - gave it character. The traitors had an architectural style of their own, characterized by structures put together mostly of fragmented statues and petrified bodies fitted like puzzle-pieces or maps. Traitors on Boadicea had belonged to an honoured social class for four hundred years, and their edifices made it known.

Luckily custom allowed Simon to stay clear of these buildings after the first formalities and seek out his own bed and breakfast. In the old friendly inns of Druidsfall, the anonymous thumps of the transients - in death, love or trade - are said to make the lodgers start in their beds with their resident guilts. Of course all inns are like that; but nevertheless, that is why the traitors like to quarter there, rather than in the Traitors' Halls: it guarantees them privacy, and at the same time helps them to feel alive. There is undoubtedly something inhibiting about trying to deal within walls pieced together of broken stone corpses.

Here in The Skopolamander, Simon awaited his first contact. This - now that he had dumped his poisons - would fall at the end of his immunity period. Quarantine was perhaps a more appropriate term…

No, the immunity was real, however limited, for as a traitor to High Earth he had special status. High Earth, the Boadiceans thought, was not necessarily Old Earth - but not necessarily not, either. For twelve days Simon would not be killed out of sheer conservatism, at least, though nobody would attempt to deal with him, either.

He had three of those days still to run - a dull prospect, since he had already completed every possible preliminary, and spiced only by the fact that he had yet to figure out how long a day might be. Boadicea's sun was a ninety-minute microvariable, twinned at a distance of a light-year with a bluewhite, Rigel-like star which stood - or had stood throughout historical times - in high Southern latitudes. This gave Druidsfall only four consecutive hours of quasi-darkness at a time, and even during this period the sky was indigo rather than black at its deepest, and more often than not flaring with aurorae. There was one lighting the window now, looking like a curtain of orange and hazy blue fire licking upward along a bone trellis.

Everything in the city, as everywhere upon Boadicea, bespoke the crucial importance of fugitive light, and the fade-out - fade-in weather that went with it, all very strange after the desert glare of High Earth. The day of Simon's arrival had dawned in mist, which cold gales had torn away into slowly pulsating sunlight; then had come clouds and rain which had turned to snow and then to sleet - more weather in a day than the minarets of Novoe Jiddah, Simon's registered home town, saw in a six-month. The fluctuating light and wetness was reflected in Druidsfall most startlingly by its gardens, which sprang up when one's back was turned and did not need to be so much weeded as actually fought. They were constantly in motion to the ninety-minute solar cycle, battering their elaborate heads against back walls which were everywhere crumbling after centuries of such soft, implacable impacts. Half the buildings in Druidsfall glistened with their leaves, which were scaled with so much soft gold that they stuck to anything they were blown against - the wealth of Boadicea was based anciently in the vast amounts of uranium and other power-metals in its soil, from which the plants extracted the inevitable associated gold as radiation shielding for their spuriously tender genes. Everyone one saw in the streets of Druidsfall, or any other such city, was a mutation of some sort - if he was not an out-worlder - but after a day in the winds they were all half yellow, for the gold scales smeared off the flying leaves like butter; everyone was painted with meaningless riches, the very bed-sheets glittered ineradicably with flakes of it, and brunettes -especially among the elaborate hair-styles of the men - were at a premium.

Simon poured water from an amphora into the basin, which promptly hissed like a dragon just out of the egg and blurted a mushroom of cold blue steam which made him cough. Careful! he thought; acid after water, never water after acid - I am forgetting the most elementary lessons. I should have used wine. Time for a drink, in Gro's name!

He caught up his cloak and went out, not bothering to lock the door. He had nothing worth stealing but his honour which was in his right hip pocket. Oh, and of course, High Earth - that was in his left. Besides, Boadicea was rich: one could hardly turn around without knocking over some heap of treasures, artifacts of a millennium which nobody had sorted for a century or even wanted to be bothered to sort. Nobody would think to steal from a poor traitor any object smaller than a king, or preferably a planet.

In the tavern below, Simon was joined at once by a play-woman. 'Are you buying tonight excellence?'

'Why not?' And in fact he was glad to see her. She was blonde and ample, a relief from the sketchy women of the Respectables whom fashion made look as though they suffered from some nervous disease that robbed them of appetite. Besides she would exempt him from the normal sort of Boadicean polite conversation which consisted chiefly of elaborately involuted jokes at which it was considered gauche to laugh. The whole style of Boadicean conversation for that matter was intended to be ignored; gambits were a high art but end-games were a lost one. Simon sighed and signalled for beakers.

'You wear the traitors' clasp,' she said, sitting across from him, 'but not much tree-gold. Have you come to sell us High Earth?'

Simon did not even blink; he knew the query to be a standard opening with any outworlder of his

profession.

'Perhaps. But I'm not on business at the moment.'

'Of course not,' the girl said gravely, her ringers playing continuously with a sort of rosary tasselled with two silver phalluses. 'Yet I hope you prosper. My half-brother is a traitor, but he can find only small secrets to sell - how to make bombs, and the like. It's a thin life; I prefer mine.'

'Perhaps he should swear by another country.'

'Oh, his country is well worth selling, but his custom is poor. Neither buyer nor seller trusts him very far - a matter of style, I suppose. He'll probably wind up betraying some colony for a thousand beans and a fish-ball.'

'You dislike the man - or is it the trade?' Simon said. 'It seems not unlike your own, after all: one sells something one never really owned, and yet one still has it when the transaction is over, as long as both parties keep silent.'

'You dislike women,' the girl said, tranquilly, as a simple observation, not a challenge. 'But all things are loans - not just chastity and trust. Why be miserly. To "possess" wealth is as illusory as to "possess" honour or a woman, and much less gratifying. Spending is better than saving.'

'But there are rank orders in all things, too.' Simon said, lighting a kief stick. He was intrigued in spite of himself. Hedonism was the commonest of philosophies in the civilized galaxy, but it was piquant to hear a playwoman trotting out its mouldy cliches with such fierce solemnity. 'Otherwise we should never know the good from the bad, or care.'

'Do you like boys?'

'No, that's not one of my tastes. Ah: you will say that I don't condemn boy-lovers, and that values are in the end only preferences? I think not. In morals, empathy enters in, eventually.'

'So: you wouldn't corrupt children, and torture revolts you. But Gro made you that way. Some men are not so handicapped. I meet them now and then.' The hand holding the looped beads made a small, unconcious gesture of revulsion.

'I think they are the handicapped, not I - most planets hang their moral imbeciles, sooner or later. But what about treason? You didn't answer that question.'

'My throat was dry… thank you. Treason, well - it's an art, hence again a domain of taste or preference. Style is everything; that's why my half-brother is so inept. If tastes changed he might prosper, as I might had 1 been born with blue hair.'

'You could dye it.'

'What, like the Respectables?' She laughed, briefly but unaffectedly. 'I am what I am; disguises don't become me. Skills, yes - those are another matter. I'll show you, when you like. But no masks.'

Skills can betray you too, Simon thought, remembering that moment at the Traitors' Guild when his proud sash of poison shells had lost him in an instant every inch of altitude over the local professionals that he had hoped to trade on. But he only said again, 'Why not?' It would be as good a way as any to

while away the time; and once his immunity had expired he could never again trust a play woman on Boadicea.

She proved, indeed, very skilful, and the time passed… but the irregular days - the clock in the tavern was on a different time from the one in his room, and neither even faintly agreed with his High Earth based chronometer and metabolism - betrayed him. He awoke one morning/noon/night to fond the girl turning slowly black beside him, in the last embrace of a fungal toxin he would have reserved for the Emperor of Canes Venatici or the worst criminal in human history.

War had been declared. He had been notified that if he still wanted to sell High Earth, he would first have to show his skill at staying alive against the whole cold malice of all the Traitors of Boadicea.

II

He holed up quickly and drastically, beginning with a shot of transduction serum - an almost insanely dangerous expedient, for the stuff not only altered his appearance but his very heredity, leaving his head humming with false memories and traces of character, derived from the unknown donors of the serum, which conflicted not only with his purposes but even with his tastes and motives. Under interrogation he would break down into a babbling crowd of random voices, as bafflingly scrambled as his blood types and his retina - and finger prints, and to the eyes his gross physical appearance would be a vague characterless blur of many roles - some of them derived from the D.N.A. of persons who had died a hundred years ago and at least that many parsecs away in space - but unless he got the anti-serum within fifteen days, he would first forget his mission, then his skills, and at last his very identity. Nevertheless, he judged that the risk had to be taken; for effete though the local traitors seemed to be, they were obviously quite capable of penetrating any lesser cover.

The next problem was how to complete the mission itself - it would not be enough just to stay alive. After all, he was still no ordinary traitor, nor even the usual kind of double agent; his task was to buy Boadicea while seeming to sell High Earth, but beyond that, there was a grander treason in the making for which the combined guilds of both planets might only barely be sufficient - the toppling of the Green Exarch, under whose subtle non-human yoke half of humanity's worlds had not even the latter-day good sense to groan. For such a project, the wealth of Boadicea was a pre-requisite, for the Green Exarch drew tithes from six fallen empires older than man - the wealth of Boadicea, and its reputation as the first colony to break with Old Earth, back in the first days of the Imaginary Drive.

And therein lay the difficulty, for Boadicea, beyond all other colony worlds, had fallen into a kind of autumn cannibalism. In defiance of that saying of Ezra-Tse, the edge was attempting to eat the centre. It was this worship of independence or rather, autonomy, which had not only made treason respectable, but had come nigh on to ennobling it… and was now imperceptibly emasculating it, like the statues one saw everywhere in Druidsfall which had been defaced and sexually mutilated by the grey disease of time and the weather.

Today, though all the Boadiceans proper were colonials in ancestry, they were snobs about their planet's pre-human history as though they had themselves not nearly exterminated the aborigines but were their inheritors. The few shambling Charioteers who still lived stumbled through the streets of Druidsfall loaded with ritual honours, carefully shorn of real power but ostentatiously deferred to on the slightest occasion which might be noticed by anyone from High Earth. In the meantime, the Boadiceans sold each other out with delicate enthusiasm, but against High Earth - which was not necessarily Old Earth, but not necessarily was not, either - all gates were formally locked. .

Formally only, Simon and High Earth were sure; for the habit of treason, like lechery, tends to grow with

what it feeds on, and to lose discrimination in the process. Boadicea, like all forbidden fruits, should be ripe for the plucking, for the man with the proper key to its neglected garden.

The key that Simon had brought with him was now lost; he would have to forge another, with whatever crude tools could be made to fall to hand. The only one accessible to Simon at the moment was the dead playwoman's despised half-brother.

His name, Simon bad found easily enough, was currently Da-Ud tam Altair, and he was Court Traitor to a small religious principate on the Gulf of the Rood, on the edge of The Incontinent, half the world away from Druidsfall. Since one of his duties was that of singing the Rood-Prince to sleep to the accompaniment of a sareh, a sort of gleemans harp (actually a Charioteer instrument ill-adapted to human fingers, and which Da-Ud played worse than most of those who affected it), Simon reached him readily in the guise of a ballad-merchant, selling him twelve-and-a-tilly of ancient High Earth songs Simon had made up while in transit to the principate; it was as easy as giving Turkish Delight to a baby.

After the last mangled chord died, Simon told Da-Ud quietly:

'By the way… well sung, excellence… did you know that the

Guild has murdered your half-sister?'

Da-Ud dropped the fake harp with a noise like a spring-toy coming unwound.

'Jillith? But she was only a playwoman! Why, in Gro's name-'

Then Da-Ud caught himself and stared at Simon with sudden, belated suspicion. Simon looked back, waiting.

'Who told you that? Damn you - are you a Torturer? I haven't - I've done nothing to merit -'

'I'm not a Torturer, and nobody told me,' Simon said. 'She died in my bed, as a warning to me.'

He removed his Clasp from the shoulder of his cloak and clicked it. The little machine flowered briefly into a dazzling actinic glare, and then closed again. While Da-Ud was still covering his streaming eyes, Simon said softly:

'I am the Traitor-in-Chief of High Earth.'

It was not the flash of the badge that was dazzling Da-Ud now. He lowered his hands. His whole plump body was trembling with hate and eagerness.

'What - what do you want of me, excellence? I have nothing to sell but the Rood-Prince… and a poor stick he is. Surely you would not sell me High Earth; I am a poor stick myself.'

'I would sell you High Earth for twenty rivals.'

'You mock me!'

'No, Da-Ud. I came here to deal with the Guild, but they killed Jillith - and that as far as I'm concerned disqualified them from being treated with as civilised professionals, or as human beings at all. She was pleasant and intelligent and I was fond of her - and besides, while I'm perfectly willing to kill under some

conditions, I don't hold with throwing away an innocent life for some footling dramatic gesture.'

'I wholly agree,' Da-Ud said. His indignation seemed to be at least half real. 'But what will you do? What *can* you do?'

'I have to fulfil my mission, any way short of my own death - if I die, nobody will be left to get it done. But I'd most dearly love to cheat, dismay, disgrace the Guild in the process, if it could possibly be managed. I'll need your help. If we live through it, I'll see to it that you'll turn a profit, too; money isn't my first goal here, or even my second now.'

'I'll tackle it,' Da-Ud said at once, though he was obviously apprehensive, as was only sensible. 'What precisely do you propose?'

'First of all, I'll supply you with papers indicating that I've sold you a part - not all - of the major thing I have to sell, which gives the man who holds it a lever in the State Ministry of High Earth. It shows that High Earth has been conspiring against several major powers, all human, for purposes of gaining altitude with the Green Exarch. They won't tell you precisely which worlds, but there will be sufficient information there so that the Exarchy would pay a heavy purse for them - and high Earth an even heavier one to get them back.

'It will be your understanding that the missing information is also for sale, but you haven't got the price.'

'Suppose the Guild doesn't believe that?'

"They'll never believe - excuse me, I must be blunt - that you could have afforded the whole thing; they'll know I sold you*this* much of it only because I have a grudge, and you can tell them so - though I wouldn't expose the nature of the grudge if I were you. Were you unknown to them they might assume that you were me in disguise, but luckily they know you, and, ah, probably tend rather to underestimate you.'

'Kindly put,' Da-Ud said with a grin. 'But that won't prevent them from assuming that I know your whereabouts, or have some way of reaching you. They'll interrogate for that, and of course I'll tell them. I know them, too; it would be impossible not to tell, and I prefer to save myself needless pain.'

'Of course - don't risk interrogation at all, tell them you want to sell*me* out, as well as the secret. That will make sense to them, and I think they must have rules against interrogating a member who offers to sell; most Traitors' Guilds do.'

'True, but they'll observe them only so long as they believe me; that's standard too.'

Simon shrugged, 'Be convincing then,' he said. 'I have already said that this project will be dangerous; presumably you didn't become a traitor for sweet safety's sole sake.'

'No, but not for suicide's either. But I'll abide the course. Where are the documents?'

'Give me access to your Prince's toposcope-scriber and I'll produce them. But first - twenty riyals, please.'

'Minus two riyals for the use of the Prince's property. Bribes, you know.'

'Your sister was wrong, you do have style, in a myopic sort of way. All right, eighteen riyals - and then

let's get on to real business. My time is not my own - not by a century.'

'But how do I reach you thereafter?'

'That information,' Simon said blandly, 'will cost you those other two riyals, and cheap at the price.'

III

The Rood-Prince's brain-dictation laboratory was very far from being up to Guild standards, let alone High Earth's, but Simon was satisfied that the documents he generated there would pass muster. They were utterly authentic, and every experienced traitor had a feeling for that quality, regardless of such technical deficiencies as blurry image registration and irrelevant emotional overtones.

That done, Simon began to consider how he would meet Da-Ud when the game had that much furthered itself. The arrangement he had made with the play woman's half-brother was of course a blind, indeed a double blind, but it had to have the virtues of its imperfections or nothing would be accomplished. Yet Simon was now beginning to find it hard to think; the transduction serum was increasingly taking hold, and there were treasons taking place inside his skull which had nothing to do with Boadicea, the Green Exarch or High Earth. Worse: they seemed to have nothing to do with Simon de Kuyl, either, but instead muttered away about silly little provincial intrigues nothing could have brought him to care about - yet which made him feel irritated, angry, even ill, like a man in the throes of jealousy toward some predecessor and unable to reason them away. Knowing their source, he fought them studiously, but he knew they would get steadily worse, however resolute he was; they were coming out of his genes and his bloodstream, not his once finely honed, now dimming conciousness.

Under the circumstances, he was not going to be able to trust himself to see through very many highly elaborate schemes, so that it would be best to eliminate all but the most necessary. Hence it seemed better, after all, to meet Da-Ud in the Principate as arranged, and save the double dealing for more urgent occasions.

On the other hand, it would be foolish to hang around the Principate, waiting and risking some miscarriage - such as betrayal through a possible interrogation of Da-Ud - when there were things he might be accomplishing elsewhere. Besides, the unvarying foggy warmth and the fragmented garish religiousness of the Principate both annoyed him and exercised pulls of conflicting enthusiasms and loyalties on several of his mask personalities, who had apparently been as unstable even when whole as their bits and pieces had now made him. He was particularly out of sympathy with the motto graven on the lintel of the Rood-Prince's vaguely bird-shaped palace: JUSTICE IS LOVE. The sentiment, obviously descended from some colonial Islamic sect, was excellent doctrine for a culture given to treason, for it allowed the prosecution of almost any kind of betrayal on the grounds that Justice was being pursued; but Simon found it entirely too pat. Besides, he was suspicious of all abstractions which took the form 'A is B', in his opinion, neither justice nor mercy were very closely related to love, let alone being identical with it.

These bagatelles aside it seemed likely to Simon that something might be gained by returning for a while to Druidsfall and haunting the vicinity of the Guild Hall. At the worst, his address would then be unknown to Da-Ud, and his anonymity more complete in a larger city, the Guild less likely to identify him even were it to suspect him - as of course it would - of such boldness. At best, he might pick up some bit of useful information, particularly if Da-Ud's embassy were to create any unusual stir.

For a while he saw nothing unusual which was in itself fractionally reassuring: either the Guild was not alarmed by Da-Ud, or was not letting it show. On several days in succession, Simon saw the Boadicean

Traitor-in-Chief enter and leave, sometimes with an entourage, more often with only a single slave: Valkol The Polite', a portly, jowly man in a black abah decorated only by the Clasp, with a kindly and humorous expression into which were set eyes like two bites of an iceberg. This was normal, although it gave Simon a small,*ambiguous frisson* which was all the more disturbing because he was unsure which of his *personae* he should assign it to: certainly not to his fundamental self, for although Valkol was here the predestined enemy, he was no more formidable that others Simon had defeated (while, it was true, being in his whole and right mind).

Then Simon recognized the 'slave', and ran.

There was no possibility of his identifying*who* the creature was; he was fortunate - in no way he could explain - to be able to penetrate just to*what* it was. The 'slave' was a vombis, or what in one of the oldest languages was called a Proteus, a creature which could imitate perfectly almost any life-form within its size range. Or nearly perfectly; for Simon, like one in perhaps five thousand of his colleagues, was sensitive to them, without ever being able to specify in what particular their imitations of humanity were deficient; other people, even those of the sex opposite to the one the vombis assumed, could find no flaw in them. In part because they do not revert when killed, no human had ever seen their 'real' form - if they had one - though of course there were legends aplenty. The talent might have made them ideal double agents, were it possible to trust them - but that was only an academic speculation since the vombis were wholly creatures of the Green Exarch.

Simon's first impulse, like that of any other human being, had been to kill this one instantly upon recognition, but that course had many obvious drawbacks. Besides, the presence of an agent of the Exarchy so close to the heart of this imbroglio was suggestive and might be put to some use. Of course the vombis might be in Druidsfall on some other business entirely, but Simon would be in no hurry to make so dangerous an assumption. No, it was altogether more likely that the Exarch, who could hardly have heard yet of Simon's arrival and disgrace, was simply aware in general of how crucial Boadicea would be to any scheme of High Earth's - he was above all an efficient tyrant - and had placed his creature here to keep an eye on things.

Yes, that situation might be used, if Simon could just keep his disquietingly percolating brains under control. Among his present advantages was the fact that his disguise was better than that of the vombis, a fact the creature was probably constitutionally incapable of suspecting. With a grim chuckle which he hoped he would not later regret, Simon flew back to the Gulf of the Rood.

Da-Ud met Simon in the Singing Gardens, a huge formal maze not much frequented of late even by lovers, because the Rood-Prince in the throes of some new religious crotchet had let it run wild, so that one had constantly to be fending off the ardour of the flowers. At best it made even simple conversation difficult, and it was rumoured that deep in the heart of the maze, the floral attentions were of a more sinister sort.

Da-Ud was exultant, indeed almost manic in his enthusiasm, which did not advance comprehension either; but Simon listened patiently.

"They bought it like lambs,' Da-Ud said, naming a sacrificial animal of High Earth so casually as to make one of Simon's*personae* shudder inside him. 'I had a little difficulty with the underlings, but not as much as I'd expected, and I got it all the way up to Valkol himself.'

'No sign of any outside interest?'

'No, nothing. I didn't let out any more than I had to until I reached His Politeness, and after that he put the blue seal on everything - wouldn't discuss anything but the weather while anyone else was around. Listen, Simon, I don't want to seem to be telling you your business, but I think I may know the Guild better than you do, and it seems to me that you're underplaying your hand. This thing is worth*money* .'

'I said it was.'

'Yes, but I don't think you've any conception how much. Old Valkol took my asking price without a murmer, in fact so fast that I'd wished I'd asked for twice as much. Just to show you I'm convinced of all this, I'm going to give it all to you.'

'Don't want it,' Simon said. 'Money is of no use to me unless I can complete the mission. All I need now is operating expenses, and I've got enough for that.'

This clearly had been what Da-Ud had hoped he would say, but Simon suspected that had matters gone otherwise, the younger man might indeed have given over as much as half the money. His enthusiasm mounted.

'All right, but that doesn't change the fact that we could be letting a fortune slip here.'

'How much?'

'Oh, at least a couple of megariyals - and I mean*apiece* ,' Da-Ud said grandly. 'I can't imagine an opportunity like that comes around very often, even in the circles you're used to.'

'What would we have to do to earn it?' Simon said with carefully calculated doubt.

'Play straight with the Guild. They want the material badly, and if we don't trick them we'll be protected by their own rules. And with that much money, there are a hundred places in the galaxy where you'd be safe from High Earth for the rest of your life.'

'And what about your half-sister?'

'Well, I'd be sorry to lose that chance, but cheating the Guild wouldn't bring her back, would it? And in a way, wouldn't it be*aesthetically* more satisfying to pay them back for Jillith by being scrupulously fair with them? "Justice is Love", you know, and all that.'

'I don't know,' Simon said fretfully. "The difficulty lies in defining justice, I suppose - you know as well as I do that it can excuse the most complicated treasons. And "What do you mean by love?" isn't easily answerable either. In the end one has to chuck it off as a woman's question, too private to be meaningful in a man's world - let alone in matters of polity. Hmmmm.'

This maundering served no purpose but to suggest that Simon was still trying to make up his mind; actually he had reached a decision several minutes ago. Da-Ud had broken; he would have to be disposed of.

Da-Ud listened with an expression of polite bafflement which did not quite completely conceal a gleam of incipient triumph. Ducking a trumpet-vine which appeared to be trying to crown him with thorns, Simon added at last: 'You may well be right -but we'll have to be mortally careful. There may after all be another agent from High Earth here; in matters of this importance they wouldn't be likely to rest with only

one charge in the chamber. That means you'll have to follow my instructions to the letter, or we'll never live to spend a riyal of the proceeds.'

'You can count on me,' Da-Ud said, tossing his hair out of his eyes. 'I've handled everything well enough this time, haven't I? And after all it was my idea.'

'Certainly; an expert production. Very well. What I want you to do now is go back to Valkol and tell him that I've betrayed you, and sold the other half of the secret to the Rood-Prince.'

'Surely you wouldn't actually do such a thing!'

'Oh, but I would, and I shall - the deed will be done by the time you get back to Druidsfall, and for the same twenty riyals that you paid for your half.'

'But the purpose-?'

'Simple. I cannot come to Druidsfall with my remaining half-if there's another Earthman there, I'd be shot before I got halfway up the steps of the Hall. I want the Guild to consolidate the two halves by what seems to be an unrelated act of aggression, between local parties. You make this clear to them by telling them that I won't actually make the sale to the Rood-Prince until I hear from you that you have the rest of the money. To get the point across at once, when you tell His Politeness that I've "betrayed" you - wink.'

'And how do I get word to you this time?'

'You wear this ring. It communicates with a receiver in my Clasp. I'll take matters from there.'

The ring - which was actually only a ring, which would never communicate anything to anybody - changed hands. Then Da-Ud saluted Simon with solemn glee, and went away to whatever niche in history - and in the walls of the Guild hall of Boadicea -is reserved for traitors without style; and Simon, breaking the stalk of a lyre-bush which had sprung up between his feet, went off to hold his muttering, nattering skull and do nothing at all.

Valkol the Polite - or the Exarch's agent, it hardly mattered which - did not waste any time. From a vantage-point high up on the principate's only suitable mountain, Simon watched their style of warfare with appreciation and some wonder.

Actually, in the manoeuvring itself the hand of the Exarchy did not show, and did not need to; for the whole campaign would have seemed like a token display, like a tournament, had it not been for the few score of casualties which seemed inflicted almost inadvertently. Even among these there were not many deaths, as far as Simon could tell - at least, not by the standards of battle to which he was accustomed. Clearly nobody who mattered got killed, on either side.

The Rood-Prince, in an exhibition of bravado more garish than sensible deployed on the plain before his city several thousand pennon-bearing mounted troopers who had nobody to fight but a rabble of foot soldiers which Druidsfall obviously did not intend to be taken seriously; whereupon the city was taken

from the Gulf side, by a squadron of flying submarines which broke from the surface of the sea on four buzzing wings like so many dragonflies.

These devices particularly intrigued Simon. Some Boadicious genius, unknown to the rest of the galaxy, had solved the orni-thopter problem… though the wings were membranous rather than feathered. Hovering, the machines thrummed their wings through a phase shift of a full 180 degrees, but when they swooped the wings moved in a horizontal figure eight, lifting with a for-ward-and-down stroke, and propelling with the backstroke. A long fish-like tail gave stability, and doubtless had other uses under water.

After the mock battle, the 'thopters landed and the troops withdrew; and then matters took a more sinister turn, manifested by thumping explosions and curls of smoke from inside the Rood palace. Evidently a search was being made for the supposedly hidden documents Simon was thought to have sold, and it was not going well. The sounds of demolition, and the occasional public hangings, could only mean that a maximum interrogation of the Rood-Prince had failed to produce any papers, or any clues to them.

This Simon regretted, as he did the elimination of Da-Ud. He was not normally so ruthless - an outside expert would have called his workmanship in this affair perilously close to being sloppy - but the confusion caused by the transduction serum, now rapidly rising as it approached term, had prevented him from manipulating every factor as subtly as he had originally hoped to do. Only the grand design was still intact now: It would now be assumed that Boadicea had clumsily betrayed the Exarchy leaving the Guild no way out' but to capitulate utterly to Simon… with whatever additional humiliations he judged might not jeopardize the mission, for Jillith's sake

Something abruptly cut off his view of the palace. He snatched his binoculars away from his eyes in alarm.

The object that had come between him and the Gulf was a mounted man - or rather, the idiot-headed apteryx the man was sitting on. Simon was surrounded by a ring of them, their lance-points aimed at his chest, pennons trailing in the dusty sareh-grass. The pennons bore the device of the Rood-Prince; but every lancer in the force was a vombis.

Simon rose resignedly, with a token snarl intended more for himself than for the impassive protean creatures and their fat birds. He wondered why it had never occurred to him before that the vombis might be as sensitive to him as he was to them.

But the answer to that no longer mattered. Sloppiness was about to win its long-postponed reward.

IV

They put him naked into a wet cell a narrow closet completely clad in yellow alabaster, down the sides of which water oozed and beaded all day long, running out into gutters at the edges. He was able to judge when it was day, because there were clouded bull's-eye lenses in each of the four walls which waxed and waned at him with any outside light; the wet cell was a sort of inverted oubliette, thrust high up into Boadicea's air, probably a hypertrophied merlon on one of the towers of the Traitors' Hall. At night, a fifth lens, backed by a sodium vapour lamp, glared down from the ceiling, surrounded by a faint haze of steam where the dew tried to condense on it.

Escape was a useless fantasy. Erected into the sky as it was, the wet cell did not even partake of the usual character of the building's walls, except for one stain in the alabaster which might have been the under side of a child's footprint; otherwise the veinings were mockingly meaningless. The only exit was down, an orifice through which they had inserted him as though he were being born, and now plugged like the bottom of a stopped toilet. Could he have broken through one of the lenses with his bare hands,

he would have found himself naked and torn on the highest point in Druidsfall, with no place to go.

Naked he was. Not only had they pulled all his teeth in search of more poisons, but of course they had also taken his Clasp. He hoped they would fool with the Clasp - it would make a clean death for everybody - but doubtless they had better sense. As for the teeth, they would regrow if he lived, that was one of the few positive advantages of the transduction serum, but in the meantime his bare jaws ached abominably.

They had missed the antidote, which was in a tiny gel capsule in his left earlobe, masquerading as a sebaceous cyst - left, because it is automatic to neglect that side of a man, as though it were only a mirror image of the examiner's right - and that was some comfort. In a few more days now, the gel would dissolve, he would lose his multiple disguise, and then he would have to con

fess, but in the meantime he could manage to be content despite the slimy glaring cold of the cell.

And in the meantime, he practised making virtues of deficiencies : in this instance, calling upon his only inner resources - the diverting mutterings of his other personalities - and trying to guess what they might once have meant. Some said:

'But I mean, like, you know -'

'Wheah they goin'?'

'Yeah.'

'Led's gehdahda heah - he-he-he!'

'Wheah?'

'So anyway, so uh.'

Others:

'It's hard not to recognize a pigeon.'

'But Mother's birthday is July 20.'

'So he knew that the inevitable might happen -'

'It made my scalp creak and my blood curl.'

'Where do you get those crazy ideas?'

And others:

'Acquit Socrates!'

'Back when she was sure she was married to a window-washer.'

'I don't know what you've got under your skirt, but it's wearing white socks.'

'And then she made a noise like a spindizzy going sour.'

And others:

'Pepe Satan, pepe Satan aleppe,'

'Why, so might any man.'

'EVACUATE MARS!'

'And then she sez to me, she sez -'

'… if he would abandon his mind to it.'

'With all of love.'

And… but at that point the plug began to unscrew and from the spargers above him which formerly had kept the dampness running, a heavy gas began to curl. They had tired of waiting for him to weary of himself, and the second phase of his questioning was about to begin.

They questioned him, dressed in a hospital gown so worn that it was more starch than fabric, in the Traitor-in-Chief's private office to begin with - a deceptively bluff, hearty, leather-and-piperacks sort of room, which might have been reassuring to a novice. There were only two of them: Valkol in his usual abah, and the 'slave', now dressed as a Charioteer of the high blood. It was a curious choice of costume, since Charioteers were supposed to be free, leaving it uncertain which was truly master and which slave; Simon did not think it could have been Valkol's idea.

Noticing the direction of his glance, Valkol said, 'I asked this gentleman to join me to assure you, should you be in any doubt, that this interview is serious. I presume you know who he is.'

'I don't know who "he" is,' Simon said, with the faintest of emphasis. 'But it must be representing the Green Exarch, since it's a vombis.'

.The Traitor-in-Chief's lips whitened slightly. Aha, then he hadn't known that! 'Prove it,' he said.

'My dear Valkol,' the creature interposed. 'Pray don't let him distract us over trifles. Such a thing could not be proved without the most elaborate of laboratory tests, as we all know. And the accusation shows what we wish to know, i.e., that he is aware of who I am - otherwise why try to make such an inflammatory charge?'

'Your master's voice,' Simon said. 'Let us by all means proceed - this gown is chilly.'

'This gentleman,' Valkol said, exactly as if he had not heard any of the four proceeding speeches, 'is Chag Sharanee of the Exarchy. Not from the embassy, but directly from the court -he is His Majesty's deputy Fomentor.'

'Appropriate,' Simon murmured.

'We know you now style yourself Simon de Kuyl, but what is more to the point, that you proclaim

yourself the Traitor-in-Chief of High Earth. Documents now in my possession persuade me that that if you are not in fact that officer, you are so close to being he as makes no difference. Possibly the man you replaced, the putative amateur with the absurd belt of poison-shells, was actually he. In any event you are the man we want.'

'Flattering of you.'

'Not at all,' said Valkol the Polite. 'We simply want the remainder of those documents, for which we paid. Where are they?'

'I sold them to the Rood-Prince.'

'He had them not, nor could he be persuaded to remember any such transaction.'

'Of course not,' Simon said with a smile. 'I sold them for twenty riyals; do you think the Rood-Prince would recall any such piddling exchange? I appeared as a bookseller, and sold them to his librarian. I suppose you burned the library - barbarians always do.'

Valkol looked at the vombis. 'The price agrees with the, uh, testimony of Da-Ud tarn Altair. Do you think -?'

'It is possible. But we should take no chances; e.g., such a search would be time-consuming.'

The glitter in Valkol's eyes grew brighter and colder. 'True. Perhaps the quickest course would be to give him over to the Sodality.'

Simon snorted. The Sodality was a lay organization to which Guilds classically entrusted certain functions the Guild lacked time and manpower to undertake, chiefly crude physical torture.

'If I'm really who you think I am,' he said, 'such a course would win you nothing but an unattractive cadaver - not even suitable for masonry repair.'

'True,' Valkol said reluctantly. 'I don't suppose you could be induced - politely - to deal fairly with us, at this late date? After all, we did pay for the documents in question, and not any mere twenty riyals.'

'I haven't the money yet.'

'Naturally not, since the unfortunate Da-Ud was held here with it until we decided he no longer had any use for it. However, if upon the proper oaths -'

'High Earth is the oldest oath-breaker of them all,' the Fomentor said. 'We - viz., the Exarchy - have no more time for such trials. The question must be put.'

'So it would seem. Though 1 hate to handle a colleague thus.'

'You fear High Earth,' the vombis said. 'My dear Valkol, may I remind you -'

'Yes, yes, I know all that,' Valkol snapped to Simon's surprise. 'Nevertheless - Mr de Kuyl, are you*sure* we have no recourse but to send you to the Babble Room?'

'Why not?' Simon said. 'I rather enjoy hearing myself think. In fact, that's what I was doing when you

two interrupted me.'

Simon was naturally far from feeling all the bravado he had voiced, but he had no choice left but to trust to the transduction serum, which was now on the shuddering, giddy verge of depriving all three of them of what they each most wanted. Only Simon could know this, but only he also knew something much worse - that in so far as his distorted time-sense could calculate, the antidote was due to be released into his bloodstream at best in another six hours, at worst within only a few minutes. After that, the Exarchy's creature would be the only victor - and the only survivor.

And when he saw the Guild's toposcope laboratory, he wondered if even the serum would be enough to protect him. There was nothing in the least outmoded about it; Simon had never encountered its like even on High Earth. Exarchy equipment, all too probably.

Nor did the apparatus disappoint him. It drove directly down into his subconscious with the resistless unconcern of a spike penetrating a toy balloon. Immediately, a set of loudspeakers above his supine body burst into multi-voiced life:

'Is this some trick? No one but Berentz had a translation-permit -'

'Now the overdrive my-other must woo and win me -'

'Wie schaifen Sie es, solche Entfernungen bei Unterlichtges-chwindigkeit zurueckzulegen?'

'REMEMBER THOR FIVE!'

'Pok. Pok. Pok.'

'We're so tired of wading in blood, so tired of drinking blood, so tired of dreaming about blood -'

The last voice rose to a scream and all the loudspeakers cut off abruptly. Valkol's face, baffled but not yet worried, hovered over Simon's, peering into his eyes.

'We're not going to get anything out of that,' he told some invisible technician. 'You must have gone too deep; those are the archetypes you're getting, obviously.'

'Nonsense.' The voice was the Fomentor's. 'The archetypes sound nothing like that - for which you should be grateful. In any event we have barely gone beneath the surface of the cortex; see for yourself.'

Valkol's face withdrew. 'Hmm. Well,*something's* wrong. Maybe your probe is too broad. Try it again.'

The spike drove home, and the loudspeakers resumed their mixed chorus.

'Nausentampen. Eddettompic. Berobsilom. Aimkaksetchoc. Sanbetogmow—'

'Dîtes-lui que nous lui ordonnons de revenir, en vertu de la Loi du Grand Tout.'

'Perhaps he should swear by another country.'

'Can't Mommy ladder spaceship think for bye-bye-see-you two windy Daddy bottle seconds straight -'

'Nansima macamba yonso cakosilisia.'

'Stars don't have points. They're round, like balls.'

The sound clicked off again. Valkol said fretfully: 'He can't be resisting. You've got to be doing something wrong, that's all.'

Though the operative part of the statement was untrue, it was apparently also inarguable to the Fomentor. There was quite a long silence, broken only occasionally by small hums and clinks.

While he waited, Simon suddenly felt the beginnings of a slow sense of relief in his left earlobe, as though a tiny but unnatural pressure he had long learned to live with had decided to give way, precisely, in fact, like the opening of a cyst.

That was the end. Now he had but fifteen minutes more in which the toposcope would continue to vomit forth its confusion - its steadily diminishing confusion… and only an hour before even his physical appearance would reorganize, though that would no longer matter in the least.

It was time to exercise the last option - now, before the probe could by-pass his cortex and again prevent him from speaking his own, fully conscious mind. He said:

'Never mind, Valkol. I'll give you what you want.'

'What? By Gro, I'm not going to give you -'

'You don't have to give me anything, I'm not selling anything. You see for yourself that you can't get to the material with that machine. Not with any other like it, I may add. But I exercise my option to turn my coat, under Guild laws; that gives me safe-conduct, and that's sufficient.'

'No,' the Fomentor's voice said. 'It is incredible - he is in no pain and has frustrated the machine; why should he yield? Besides, the secret of his resistance -'

'Hush,' Valkol said. 'I am moved to ask if you*are* a vombis; doubtless the machine would tell us that much. Mr de Kuyl, I respect the option, but I am not convinced yet. The motive, please.'

'High Earth is not enough,' Simon said. 'Remember Ezra- Tse? "The last temptation is the final treason… To do the right thing for the wrong reason." I would rather deal fairly with you, and then begin the long task of becoming honest with myself. But with you only, Valkol - not the Exarchy. I sold the Green Exarch nothing.'

'I see. A most interesting arrangement; I agree. What will you require?'

'Perhaps three hours to get myself unscrambled from the effects of fighting your examination. Then I'll dictate the missing material. At the moment it's quite inaccessible.'

'I believe that, too,' Valkol said ruefully. 'Very well -'

'It is not very well,' the vombis said, almost squalling. 'The arrangement is a complete violation of-'

Valkol turned and looked at the creature so hard that it stopped talking of its own accord. Suddenly

Simon was sure Valkol no longer needed tests to make up his mind what the Formentor was.

'I would not expect you to understand it,' Valkol said in a very soft voice indeed. 'It is a matter of style.'

Simon was moved to a comfortable apartment and left alone, for well more than the three hours he had asked for. By that time his bodily reorganization was complete, though it would take at least a day for all the residual mental effects of the serum to vanish. When the Traitor-in-Chief finally admitted himself, he made no attempt to disguise either his amazement or his admiration.

"The poison man! High Earth is still a world of miracles. Would it be fair to ask what you did with your, uh, over-populated associate?'

'I disposed of him,' Simon said. 'We have traitors enough already. There is your document; I wrote it out by hand, but you can have a toposcope confirmation whenever you like, now.'

'As soon as my technicians master the new equipment-we shot the monster, of course, though I don't doubt the Exarch will resent it.'

'When you see the rest of the material you may not care what the Exarch thinks,' Simon said. 'You will find that I've brought you a high alliance - though it was Gro's own horns getting it to you.'

'I had begun to suspect as much. Mr de Kuyl -1 must assume you are still he, for sanity's sake - that act of surrender was the most elegant gesture I have ever seen. That alone convinced me that you were indeed the Traitor-in-chief of High Earth and no other.'

'Why, so I was,' Simon said. 'But if you will excuse me now, I think I am about to be somebody else.'

With a mixture of politeness and alarm Valkol left him. It was none too soon. He had a bad taste in his mouth which had nothing to do with his ordeals… and, though nobody knew better than he how empty all vengeance is, an inexpungeable memory of Jillith.

Maybe, he thought, 'Justice is Love' after all - not a matter of style, but of spirit. He had expected all these questions to vanish when the antidote took full hold, wiped into the past with the personalities who had done what they had done; but they would not vanish; they were himself.

He had won, but obviously he would never be of use to High Earth again.

In a way, this suited him. A man did not need the transduction serum to be divided against himself. He still had many guilts to accept, and not much left of a lifetime to do it in.

While he was waiting, perhaps he could learn to play the sareh.

A Work of Art INSTANTLY, he remembered dying. He remembered it, how- ever, as if at two removesas though he were remembering a memory, rather than an actual event; as though he him- self had not really been there when he died. Yet the memory was all from his own point of view, not that of some detached and disembodied observer which might have been his soul. He had been most

conscious of the rasping, unevenly drawn movements of the air in his chest. Blurring rapidly, the doctor's face had bent over him, loomed, come closer, and then had vanished as the doctor's head passed below his cone of vision, turned sideways to listen to his lungs. It had become rapidly darker, and then, only then, had he realized that these were to be his last minutes. He had tried dutifully to say Pauline's name, but his memory contained no record of the soundonly of the rattling breath, and of the film of sootiness thickening in the air, blotting out every- thing for an instant. Only an instant, and then the memory was over. The room was bright again, and the ceiling, he noticed with wonder, had turned a soft green. The doctor's head lifted again and looked down at him. It was a different doctor. This one was a far younger man, with an ascetic face and gloaming, almost fey eyes. There was no doubt about it. One of the last conscious thoughts he had had was that of gratitude that the attending physician, there at the end, had not been the one who secretly hated him for his one-time associations with the Nazi hierarchy. The attending doctor, instead, had worn an expression amus- ingly proper for that of a Swiss expert called to the deathbed of an eminent man: a mixture of worry at the prospect of losing so eminent a patient, and complacency at the thought that, at the old man's age, nobody could blame this doctor if he died. At 85, pneumonia is a serious matter, with or without penicillin. "You're all right now," the new doctor said, freeing his patient's head of a whole series of little silver rods which had been clinging to it by a sort of network cap. "Rest a minute and try to be calm. Do you know your name?" He drew a cautious breath. There seemed to be nothing at all the matter with his lungs now; indeed, he felt positively healthy. "Certainly," he said, a little nettled. "Do you know yours?" The doctor smiled crookedly. "You're in character, it ap- pears," he said. "My name is Barkun Kris; I am a mind sculptor. Yours?" "Richard Strauss." "Very good," Dr. Kris said, and turned away. Strauss, however, had already been diverted by a new singularity. Strauss is a word as well as a name in German; it has many meaningsan ostrich, a bouquet; von Wolzogen had had a high old time working all the possible puns into the libretto of Feuersnot. And it happened to be the first German word to be spoken either by himself or by Dr. Kris since that twice-removed moment of death. The language was not French or Italian, either. It was most like English, but not the English Strauss knew; nevertheless, he was having no trouble speaking it and even thinking in it. Well, he thought, I'll be able to conduct The Love of Danae after alt. It isn't every composer who can premiere his own opera posthumously. Still, there was something queer about all this the queerest part of all being that conviction, which would not go away, that he had actually been dead for just a short time. Of course medicine was making great strides, but... "Explain all this," he said, lifting himself to one elbow. The bed was different, too, and not nearly as comfortable as the one in which he had died. As for the room, it looked more like a dynamo shed than a sickroom. Had modern med- icine taken to reviving its corpses on the floor of the Sie- manns-Schakert plant? "In a moment," Dr. Kris said. He finished rolling some machine back into what Strauss impatiently supposed to be its place, and crossed to the pallet. "Now. There are many things you'll have to take for granted without attempting to understand them. Dr. Strauss. Not everything in the world today is explicable in terms of your assumptions. Please bear that in mind." "Very well. Proceed." "The date," Dr. Kris said, "is 2161 by your calendar or, in other words, it is now two hundred and twelve years after your death. Naturally, you'll realize that by this time nothing remains of your body but the bones. The body you have now was volunteered for your use. Before you look into a mirror to see what it's like, remember that its physical difference from the one you were used to is all in your favor. It's in perfect health, not unpleasant for other people to look at, and its physiological age is about fifty." A miracle? No, not in this new age, surely. It was simply a work of science. But what a science! This was Nietzsche's eternal recurrence and the immortality of the superman combined

into one. "And where is this?" the composer said. "In Port York, part of the State of Manhattan, in the United States. You will find the country less changed in some respects than I imagine you anticipate. Other changes, of course, will seem radical to you; but it's hard for me to predict which ones will strike you that way. A certain resilience on your part will bear cultivating." "I understand," Strauss said, sitting up. "One question, please; is it still possible for a composer to make a living in this century?" "Indeed it is," Dr. Kris said, smiling. "As we expect you to do. It is one of the purposes for which we'vebrought you back." "I gather, then," Strauss said somewhat dryly, "that there is still a demand for my music. The critics in the old days" "That's not quite how it is," Dr. Kris said. "I understand some of your work is still played, but frankly I know very little about your current status. My interest is rather" A door opened somewhere, and another man came in. He was older and more ponderous than Kris and had a certain air of academicism; but he too was wearing the oddly tailored surgeon's gown, and looked upon Kris's patient with the glowing eyes of an artist. "A success, Kris?" he said. "Congratulations." "They're not in order yet," Dr. Kris said. "The final proof is what counts. Dr. Strauss, if you feel strong enough, Dr. Seirds and I would like to ask you some questions. We'd like to make sure your memory is clear." "Certainly. Go ahead." "According to our records," Kris said, "you once knew a man whose initials were RKL; this was while you were conducting at the Vienna Stoatsoper." He made the double "a" at least twice too long, as though German were a dead language he was striving to pronounce in some "classical" accent. "What was his name, and who was he?" "That would be Kurt Listhis first name was Richard, but he didn't use it. He was assistant stage manager." The two doctors looked at each other. "Why did you offer to write a new overture to The Woman Without a Shadow, and give the manuscript to the City of Vienna?" "So I wouldn't have to pay the garbage removal tax on the Maria Theresa villa they had given me." "In the back yard of your house at Garmisch-Partenkirchen there was a tombstone. What was written on it?" Strauss frowned. That was a question he would be happy to be unable to answer. If one is to play childish jokes upon oneself, it's best not to carve them in stone, and put the carving where you can't help seeing it every time you go out to tinker with the Mercedes. "It says," he replied wearily, "Sacred to the memory of Guntram, Minnesinger, slain in a horrible way by his father's own symphony or' chestra." "When was Guntram premised?" "Inlet me see1894, I believe." "Where?" "In Weimar." "Who was the leading lady?" "Pauline de Ahna." "What happened to her afterward?'" "I married her. Is she . . ." Strauss began anxiously. "No," Dr. Kris said. "I'm sorry, but we lack the data to reconstruct more or less ordinary people." The composer sighed. He did not know whether to be worried or not. He had loved Pauline, to be sure; on the other hand, it would be pleasant to be able to live the new life without being forced to take off one's shoes every time one entered the house, so as not to scratch the polished hardwood floors. And also pleasant, perhaps, to have two o'clock in the afternoon come by without hearing Pauline's everlasting, "Richardjetzt komponiertl" "Next question," he said. For reasons which Strauss did not understand, but was content to take for granted, he was separated from Drs. Kris and Seirds as soon as both were satisfied that the composer's memory was reliable and his health stable. His estate, he was given to understand, had long since been broken upa sorry end for what had been one of the principal fortunes of Europebut he was given sufficient money to set up lodgings and resume an active life. He was provided, too, with introductions which proved valuable. It took longer than he had expected to adjust to the changes that had taken place in music alone. Music was, he quickly began to suspect, a dying art, which would soon have a status not much above that held by flower arranging back in what he thought of as his own century. Certainly it couldn't be denied that the trend toward fragmentation, already visible back in his own time, had proceeded almost to completion in 2161. He paid no more attention to American popular

tunes than he had bothered to pay in his previous life. Yet it was evident that their assembly-line production methods all the ballad composers openly used a slide-rule-like device called a Hit Machinenow had their counterparts almost throughout serious music. The conservatives these days, for instance, were the twelve- tone composersalways, in Strauss's opinions, a dryly me- chanical lot, but never more so than now. Their gods Berg, Schoenberg, von Webernwere looked upon by the concert-going public as great masters, on the abstruse side perhaps, but as worthy of reverence as any of the Three B's. There was one wing of the conservatives, however, which had gone the twelve-tone procedure one better. These men composed what was called "stochastic music," put together by choosing each individual note by consultation with tables of random numbers. Their bible, their basic text, was a vol- ume called Operational Aesthetics, which in turn derived from a discipline called information theory; and not one word of it seemed to touch upon any of the techniques and customs of composition which Strauss knew. The ideal of this group was to produce music which would be "universal"that is, wholly devoid of any trace of the composer's individuality, wholly a musical expression of the universal Laws of Chance. The Laws of Chance seemed to have a style of their own, all right; but to Strauss it seemed the style of an idiot child being taught to hammer a flat piano, to keep him from getting into trouble. By far the largest body of work being produced, however, fell into a category misleadingly called "science-music." The term reflected nothing but the titles of the works, which dealt with space flight, time travel, and other subjects of a romantic or an unlikely nature. There was nothing in the least sci- entific about the music, which consisted of a m61ange of cliches and imitations of natural sounds, in which Strauss was horrified to see his own time-distorted and diluted image. The most popular form or science-music was a nine-minute composition called a concerto, though it bore no re- semblance at all to the classical concerto form; it was instead a sort of free rhapsody after Rachmaninofflong after. A typical one"Song of Deep Space" it was called, by some- body named H. Valerion Krafftbegan with a loud assault on the tam-tam, after which all the strings rushed up the scale in unison, followed at a respectful distance by the harp and one clarinet in parallel 6/4's. At the top of the scale cymbals were hashed together, forte possibile, and the whole orchestra launched itself into a major-minor, wailing sort of melody; the whole orchestra, that is, except for the French horns, which were plodding back down the scale again in what was evidently supposed to be a countermelody. The second phrase of the theme was picked up by a solo trumpet with a suggestion of tremolo; the orchestra died back to its roots to await the next cloudburst, and at this pointas any four- year-old could have predictedthe piano entered with the second theme. Behind the orchestra stood a group of thirty women, ready to come in with a wordless chorus intended to suggest the eeriness of Deep Spacebut at this point, too, Strauss had already learned to get up and leave. After a few such ex- periences he could also count upon meeting in the lobby Sindi Noniss, the agent to whom Dr. Kris had introduced him, and who was handling the reborn composer's outputwhat there was of it thus far. Sindi had come to expect these walkouts on the part of his client, and patiently awaited them, stand- ing beneath a bust of Gian Carlo Menotti; but he liked them less and less, and lately had been greeting them by turning alternately red and white like a toti-potent barber pole. "You shouldn't have done it," he burst out after the Krafft incident. "You can't just walk out on a new Krafft composition. The man's the president of the Interplanetary Society for Contemporary Music. How am I ever going to persuade them that you're a contemporary if you keep snubbing them?" "What does it matter?" Strauss said. "They don't know me by sight." "You're wrong; they know you very well, and they're watching every move you make. You're the first major com- poser the mind sculptors ever tackled, and the ISCM would be glad to turn you back with a rejection slip." "Why?" "Oh," said Sindi, "there are lots of reasons. The sculptors are snobs; so are the ISCM boys. Each of them

wants to prove to the other that their own art is the king of them all. And then there's the competition; it would be easier to flunk you than to let you into the market. I really think you'd better go back in. I could make up some excuse" "No," Strauss said shortly. "I have work to do." "But that's just the point, Richard. How are we going to get an opera produced without the ISCM? It isn't as though you wrote theremin solos, or something that didn't cost "I have work to do," he said, and left. And he did: work which absorbed him as had no other project during the last thirty years of his former life. He had scarcely touched pen to music paperboth had been aston- ishingly hard to findwhen he realized that nothing in his long career had provided him with touchstones by which to judge what music he should write now. The old tricks came swarming back by the thousands, to be sure: the sudden, unexpected key changes at the crest of a melody; the interval stretching; the piling of divided strings, playing in the high harmonics, upon the already tottering top of a climax; the scurry and bustle as phrases were passed like lightning from one choir of the orchestra to another; the flashing runs in the brass, the chuckling in the clarinets, the snarling mixtures of colors to emphasize dramatic tension all of them. But none of them satisfied him now. He had been content with them for most of a lifetime, and had made them do an astonishing amount of work. But now it was time to strike out afresh. Some of the tricks, indeed, actively repelled him: where had he gotten the notion, clung to for decades, that violins screaming out in unison somewhere in the stratosphere was a sound interesting enough to be worth repeating inside a single composition, let alone in all of them? And nobody, he reflected contentedly, ever approached such a new beginning better equipped. In addition to the past lying available in his memory, he had always had a technical armamentarium second to none; even the hostile critics had granted him that. Now that he was, in a sense, composing his first operahis first after fifteen of them!he had every opportunity to make it a masterpiece. And every such intention. There were, of course, many minor distractions. One of them was that search for old-fashioned score paper, and a pen and ink with which to write on it. Very few of the modern composers, it developed, wrote their music at all. A large bloc of them used tape, patching together snippets of tone and sound snipped from other tapes, superimposing one tape on another, and varying the results by twirling an ela- borate array of knobs this way or that. Almost all the com- posers of 3-V scores, on the other hand, wrote on the sound track itself, rapidly scribbling jagged wiggly lines which, when passed through a photocell-audio circuit, produced a noise reasonably like an orchestra playing music, overtones and all. The last-ditch conservatives who still wrote notes on paper, did so with the aid of a musical typewriter. The device, Strauss had to admit, seemed perfected at last; it had manuals and stops like an organ, but it was not much more than twice as large as a standard letter-writing typewriter, and produced a neat page. But he was satisfied with his own spidery, highly-legible manuscript and refused to abandon it, badly though the one pen nib he had been able to buy coarsened it. It helped to tie him to his past. Joining the ISCM had also caused him some bad moments, even after Sindi had worked him around the political road blocks. The Society man who examined his qualifications as a member had run through the questions with no more interest than might have been shown by a veterinarian examining his four thousandth sick calf. "Had anything published?" "Yes, nine tone poems, about three hundred songs, "Not when you were alive," the examiner said, somewhat disquietingly. "I mean since the sculptors turned you out again." "Since the sculptorsah, I understand. Yes, a string quartet, two song cycles, a" "Good. Alfie, write down 'songs.' Play an instrument?" "Piano." "Hm." The examiner studied his fingernails. "Oh, well. Do you read music? Or do you use a Scriber, or tape clips? Or a Machine?" "I read." "Here." The examiner sat Strauss down in front of a view- ing lectern, over the lit surface of which an endless belt of translucent paper was traveling. On the paper was an im- mensely magnified sound track. "Whistle me the tune of that, and name the instruments it sounds

like." "I don't read that Musiksticheln," Strauss said frostily, "or write it, either. I use standard notation, on music paper." "Alfie, write down 'Reads notes only.' " He laid a sheet of grayly printed music on the lectern above the ground glass. "Whistle me that." "That" proved to be a popular tune called "Vangs, Snifters and Store-Credit Snooky" which had been written on a Hit Machine in 2159 by a guitar-faking politician who sang it at campaign rallies. (In some respects, Strauss reflected, the United States had indeed not changed very much.) It had become so popular that anybody could have whistled it from the title alone, whether he could read the music or not. Strauss whistled it, and to prove his bona fides added, "It's in the key of B flat." The examiner went over to the green-painted upright piano and hit one greasy black key. The instrument was horribly out of tunethe note was much nearer to the standard 440/cps A than it was to B flatbut the examiner said, "So it is. Alfie, write down, 'Also read flats.' All right, son, you're a member. Nice to have you with us; not many people can read that old-style notation any more. A lot of them think they're too good for it." "Thank you," Strauss said. "My feeling is, if it was good enough for the old masters, it's good enough for us. We don't have people like them with us these days, it seems to me. Except for Dr. Krafft, of course. They were great back in the old daysmen like Shilkrit, Steiner, Tiomkin, and Pearl . . . and Wilder and Jannsen. Real goffin." "Dock gewiss," Strauss said politely. But the work went forward. He was making a little income now, from small works. People seemed to feel a special interest in a composer who had come out of the -mind sculp- tors' laboratories; and in addition the material itself, Strauss was quite certain, had merits of its own to help sell it. It was the opera which counted, however. That grew and grew under his pen, as fresh and new as his new life, as founded in knowledge and ripeness as his long full memory. Finding a libretto had been troublesome at first. While it was possible that something existed that might have served among the current scripts for 3-Vthough he doubted it he found himself unable to tell the good from the bad through the fog cast over both by incomprehensibly tech- nical production directions. Eventually, and for only the third time in his whole career, he had fallen back upon a play written in a language other than his own, andfor the first timedecided to set it in that language. The play was Christopher Fry's Venus Observed, in all ways a perfect Strauss opera libretto, as he came gradually to realize. "Though nominally a comedy, with a complex farcical plot, it was a verse play with considerable depth to it, and a number of characters who cried out to be brought by music into three dimensions, plus a strong undercurrent of autum- nal tragedy, of leaf-fall and apple-fallprecisely the kind of contradictory dramatic mixture which von Hofmannsthal had supplied him with in The Knight of the Rose, in Ariadne at Naxos, and in Arabella. Alas for von Hofmannsthal, but here was another long- dead playwright who seemed nearly as gifted; and the musi- cal opportunities were immense. There was, for instance, the fire which ended act two; what a gift for a composer to whom orchestration and counterpoint were as important as air and water! Or take the moment where Perpetua shoots the apple from the Duke's hand; in that one moment a single passing reference could add Rossini's marmoreal William Tell to the musical texture as nothing but an ironic footnotel And the Duke's great curtain speech, beginning: Shall I be sorry for myself? In Mortality's name I'll be sorry for myself. Branches and boughs. Brown hills, the valleys faint with brume, A burnish on the lake . .. There was a speech for a great tragic comedian, in the spirit of Falstaff; the final union of laughter and tears, punc- tuated by the sleepy comments of Reedbeck, to whose son- orous snore (trombones, no less than five of them, con sor- dini?) the opera would gently end. . . . What could be better? And yet he had come upon the play only by the unlikeliest series of accidents. At first he had planned to do a straight knockabout farce, in the idiom of The Silent Woman, just to warm himself up. Remembering that Zweig had adapted that libretto for him, in the old days, from a play by Ben Jonson, Strauss had begun to search out English plays of the period just after Jonson's, and

had promptly run aground on an awful specimen in heroic couplets called Venice Preserv'd, by one Thomas Otway. The Fry play had directly followed the Otway in the card catalogue, and he had looked at it out of curiosity; why should a Twentieth Century playwright be punning on a title from the Eighteenth? After two pages of the Fry play, the minor puzzle of the pun disappeared entirely from his concern. His luck was running again; he had an opera. Sindi worked miracles in arranging for the performance. The date of the premiere was set even before the score was finished, reminding Strauss pleasantly of those heady days when Fuerstner had been snatching the conclusion of Elek- tra off his work table a page at a time, before the ink was even dry, to rush it to the engraver before publication dead- line. The situation now, however, was even more complicated, for some of the score had to be scribed, some of it taped, some of it engraved in the old way, to meet the new techniques of performance; there were moments when Sindi seemed to be turning quite gray. But Venus Observed was, as usual, forthcoming complete from Strauss's pen in plenty of time. Writing the music in first draft had been hellishly hard work, much more like being reborn than had been that confused awakening in Barkun Kris's laboratory, with its overtones of being dead instead; but Strauss found that he still retained all of his old ability to score from the draft almost effortlessly, as undis- turbed by Sindi's half-audible worrying in the room with him as he was by the terrifying supersonic bangs of the rockets that bulleted invisibly over the city. When he was finished, he had two days still to spare before the beginning of rehearsals. With those, furthermore, he would have nothing to do. The techniques of performance in this age were so completely bound up with the electronic arts as to reduce his own experiencehe, the master Kapell- meister of them allto the hopelessly primitive. He did not mind. The music, as written, would speak for itself. In the meantime he found it grateful to forget the months'-long preoccupation with the stage for a while. He went back to the library and browsed lazily through old poems, vaguely seeking texts for a song or two. He knew better than to bother with recent poets; they could not speak to him, and he knew it. The Americans of his own age, he thought, might give him a clue to understanding this America of 2161; and if some such poem gave birth to a song, so much the better. The search was relaxing and he gave himself up to enjoy- ing it. Finally he struck a tape that he liked: a tape read in a cracked old voice that twanged of Idaho as that voice had twanged in 1910, in Strauss's own ancient youth. The poet's name was Pound; he said, on the tape . . . the souls of alt men great At times pass through us, And we are melted into them, and are not Save reflexions of their souls. Thus I am Dante for a space and am One Frangois Villon, ballad-lord and thief Or am such holy ones I may not write, Lest Blasphemy be writ against my name; This for an instant and the flame is gone. 'Tis as in midmost us there glows a sphere Translucent, molten gold, that is the "I" And into this some form projects itself: Christus, or John, or eke the Florentine; And as the clear space is not if a form's Imposed thereon, So cease we from all being for the time, And these, the Masters of the Soul, live on. He smiled. That lesson had been written again and again, from Plato onward. Yet the poem was a history of his own case, a sort of theory for the metempsychosis he had under- gone, and in its formal way it was moving. It would be fitting to make a little hymn of it, in honor of his own rebirth, and of the poet's insight. A series of solemn, breathless chords framed themselves in his inner ear, against which the words might be intoned in a high, gently bending hush at the beginning . . . and then a dramatic passage in which the great names of Dante and Villon would enter ringing like challenges to Time. . . . He wrote for a while in his notebook before he returned the spool to its shelf. These, he thought, are good auspices. And so the night of the premiere arrived, the audience pouring into the hall, the 3-V cameras riding on no visible supports through the air, and Sindi calculating his share of his client's earnings by a complicated game he played on his fingers, the basic law of which seemed to be that one plus one equals ten. The hall filled to the roof with people from every class,

as though what was to come would be a circus rather than an opera. There were, surprisingly, nearly fifty of the aloof and aristocratic mind sculptors, clad in formal clothes which were exaggerated black versions of their surgeon's gowns. They had bought a bloc of seats near the front of the audi- torium, where the gigantic 3-V figures which would shortly fill the "stage" before them (the real singers would perform on a small stage in the basement) could not but seem monstrously out of proportion; but Strauss supposed that they had taken this into account and dismissed it. There was a tide of whispering in the audience as the sculptors began to trickle in, and with it an undercurrent of excitement the meaning of which was unknown to Strauss. He did not attempt to fathom it, however; he was coping with his own mounting tide of opening-night tension, which, despite all the years, he had never quite been able to shake. The sourceless, gentle light in the auditorium dimmed, and Strauss mounted the podium. There was a score before him, but he doubted that he would need it. Directly before him, poking up from among the musicians, were the inevitable 3-V snouts, waiting to carry his image to the singers in the basement. The audience was quiet now. This was the moment. His baton swept up and then decisively down, and the prelude came surging up out of the pit. For a little while he was deeply immersed in the always tricky business of keeping the enormous orchestra together and sensitive to the flexing of the musical web beneath his hand. As his control firmed and became secure, however, the task became slightly less demanding, and he was able to pay more attention to what the whole sounded like. There was something decidedly wrong with it. Of course there were the occasional surprises as some bit of orchestral color emerged with a different Klang than he had expected; that happened to every composer, even after a lifetime of experience. And there were moments when the singers, en- tering upon a phrase more difficult to handle than he had calculated, sounded like someone about to fall off a tightrope (although none of them actually fluffed once; they were as fine a troupe Of voices as he had ever had to work with). But these were details. It was the over-all impression that was wrong. He was losing not only the excitement of the premiereafter all, that couldn't last at the same pitch all eveningbut also his very interest in what was coming from the stage and the pit. He was gradually tiring; his baton arm becoming heavier; as the second act mounted to what should have been an impassioned outpouring of shining tone, he was so bored as to wish he could go back to his desk to work on that song. Then the act was over; only one more to go. He scarcely heard the applause. The twenty minutes' rest in his dressing room was just barely enough to give him the necessary strength. And suddenly, in the middle of the last act, he understood. There was nothing new about the music. It was the old Strauss all over againbut weaker, more dilute than ever. Compared with the output of composers like Krafft, it doubt- less sounded like a masterpiece to this audience. But he knew. The resolutions, the determination to abandon the old clich~s and mannerisms, the decision to say something new they had all come to nothing against the force of habit. Being brought to life again meant bringing to life as well all those deeply graven reflexes of his style. He had only to pick up his pen and they overpowered him with easy automatism, no more under his control than the jerk of a finger away from a flame. His eyes filled; his body was young, but he was an old man, an old man. Another thirty-five years of this? Never. He had said all this before, centuries before. Nearly a half century condemned to saying it all over again, in a weaker and still weaker voice, aware that even this debased century would come to recognize in him only the burnt husk of greatness?no; never, never. He was aware, dully, that the opera was over. The audience was screaming its joy. He knew the sound. They had screamed that way when Day of Peace had been premiered, but they had been cheering the man he had been, not the man that Day of Peace showed with cruel clarity he had become. Here the sound was even more meaningless: cheers of ignorance, and that was all. He turned slowly. With surprise, and with a surprising sense of relief, he saw that the cheers were not, after all, for him. They were for Dr.

Barkun Kris. Kris was standing in the middle of the bloc of mind sculptors, bowing to the audience. The sculptors nearest him were shaking his hand one after the other. More grasped at it as he made his way to the aisle, and walked forward to the podium. When he mounted the rostrum and took the com- poser's limp hand, the cheering became delirious. Kris lifted his arm. The cheering died instantly to an intent hush. "Thank you," he said clearly. "Ladies and gentlemen, be- fore we take leave of Dr. Strauss, let us again tell him what a privilege it has been for us to hear this fresh example of his mastery. I am sure no farewell could be more fitting." The ovation lasted five minutes, and would have gone another five if Kris had not cut it off. "Dr. Strauss," he said, "in a moment, when I speak a certain formulation to you, you will realize that your name is Jerom Bosch, born in our century and with a life in it all your own. The superimposed memories which have made you assume the mask, the persona, of a great composer will be gone. I tell you this so that you may understand why these people here share your -applause with me." A wave of assenting sound. 'The art of mind sculpturethe creation of artificial per- sonalities for aesthetic enjoymentmay never reach such a pinnacle again. For you should understand that as Jerom Bosch you had no talent for music at all; indeed, we searched a long time to find a man who was utterly unable to carry even the simplest tune. Yet we were able to impose upon such unpromising material not only the personality, but the genius, of a great composer. That genius belongs entirely to youto the persona that thinks of itself as Richard Strauss. None of the credit goes to the man who volunteered for the sculpture. That is your triumph, and we salute you for it." Now the ovation could no longer be contained. Strauss, with a crooked smile, watched Dr. Kris bow. This mind sculp- turing was a suitably sophisticated kind of cruelty for this age; but the impulse, of course, had always existed. It was the same impulse that had made Rembrandt and Leonardo turn cadavers into art works. It deserved a suitably sophisticated payment under the lex talionis: an eye for an eye, a tooth for a toothand a failure for a failure. No, he need not tell Dr. Kris that the "Strauss" he had created was as empty of genius as a hollow gourd. The joke would always be on the sculptor, who was incapable of hear- ing the hollowness of the music now preserved on the 3-V tapes. But for an instant a surge of revolt poured through his blood stream. I am I, he thought. I am Richard Strauss until I die, and will never be Jerom Bosch, who was utterly unable to carry even the simplest tune. His hand, still holding the baton, came sharply up, though whether to deliver or to ward off a blow he could not tell. He let it fall again, and instead, at last, bowednot to the audience, but to Dr. Kris. He was sorry for nothing, as Kris turned to him to say the word that would plunge him back into oblivion, except that he would now have no chance to set that poem to music.

Beep JOSEF PABER lowered his newspaper slightly. Finding the girl on the park bench looking his way, he smiled the agonizingly embarrassed smile of the thoroughly married nobody caught bird-watching, and ducked back into the paper again. He was reasonably certain that he looked the part of a middle-aged, steadily employed, harmless citizen enjoying a Sunday break in the bookkeeping and family routines. He was also quite certain, despite his official instructions, that it wouldn't make the slightest bit of difference if he didn't. These boy-meets-girl assignments always came off. Jo had never tackled a single one that had required him. As a matter of fact, the newspaper, which he was supposed to be using only as a blind, interested him a good deal more than his job did. He had only barely begun to suspect the obvious ten years ago when the Service had snapped him up; now, after a decade as an agent, he was still fascinated to see how smoothly the really important situations came off. The dangerous situationsnot boy-meets-girl. This affair

of the Black Horse Nebula, for instance. Some days ago the papers and the commentators had begun to mention reports of disturbances in that area, and Jo's practiced eye had picked up the mention. Something big was cooking. Today it had boiled overthe Black Horse Nebula had suddenly spewed ships by the hundreds, a massed armada that must have taken more than a century of effort on the part of a whole star cluster, a production drive conducted in the strictest and most fanatical kind of secrecy. . . . And, of course, the Service had been on the spot in plenty of time. With three times as many ships, disposed with mathematical precision so as to enfilade the entire armada the moment it broke from the nebula. The battle had been a massacre, the attack smashed before the average citizen could even begin to figure out what it had been aimed at and good had triumphed over evil once more. Of course. Furtive scuffings on the gravel drew his attention briefly. He looked at his watch, which said 14:58:03. That was the time, according to his instructions, when boy had to meet girl. He had been given the strictest kind of orders to let nothing interfere with this meetingthe orders always issued on boy- meets-girl assignments. But, as usual, he had nothing to do but observe. The meeting was coming off on the dot, without any prodding from Jo. They always did. Of course. With a sigh, he folded his newspaper, smiling again at the coupleyes, it was the right man, tooand moved away, as if reluctantly. He wondered what would happen were he to pull away the false mustache, pitch the newspaper on the grass, and bound away with a joyous whoop. He suspected that the course of history would not be deflected by even a second of arc, but he was not minded to try the experiment. The park was pleasant. The twin suns warmed the path and the greenery without any of the blasting heat which they would bring to bear later in the summer. Randolph was altogether the most comfortable planet he had visited in years. A little backward, perhaps, but restful, too. It was also slightly over a hundred light-years away from Earth. It would be interesting to know how Service head- quarters on Earth could have known in advance that boy would meet girl at a certain spot on Randolph, precisely at 14:58:03. Or how Service headquarters could have ambushed with micrometric precision a major interstellar fleet, with no more preparation than a few days' buildup in the newspapers and video could evidence. The press was free, on Randolph as everywhere. It reported the news it got. Any emergency concentration of Service ships in the Black Horse area, or anywhere else, would have been noticed and reported on. The Service did not forbid such reports for "security" reasons or for any other reasons. Yet there had been nothing to report but that (a) an armada of staggering size had erupted with no real warning from the Black Horse Nebula, and that (b) the Service had been ready. By now, it was a commonplace that the Service was always ready. It had not had a defect or a failure in well over two centuries. It had not even had a fiasco, the alarming-sounding technical word by which it referred to the possibility that a boy-meets-girl assignment might not come off. Jo hailed a hopper. Once inside he stripped himself of the mustache, the bald spot, the forehead creasesall the make- up which had given him his mask of friendly innocuousness. The hoppy watched the whole process in the rear-view mirror. Jo glanced up and met his eyes. "Pardon me, mister, but I figured you didn't care if I saw you. You must be a Service man." "That's right. Take me to Service HQ, will you?" "Sure enough." The hoppy gunned his machine. It rose smoothly to the express level. "First time I ever got close to a Service man. Didn't hardly believe it at first when I saw you taking your face off. You sure looked different." "Have to, sometimes," Jo said, preoccupied. "I'll bet. No wonder you know all about everything before it breaks. You must have a thousand faces each, your own mother wouldn't know you, eh? Don't you care if I know about your snooping around in disguise?" Jo grinned. The grin created a tiny pulling sensation across one curve of his cheek, just next to his nose. He stripped away the overlooked bit of tissue and examined it critically. "Of course not. Disguise is an elementary part of Service work. Anyone could guess that. We don't use it often, as a matter of factonly on

very simple assignments." "Oh." The hoppy sounded slightly disappointed, as melo- drama faded. He drove silently for about a minute. Then, speculatively: "Sometimes I think the Service must have time-travel, the things they pull. . . . Well, here you are. Good luck, mister." "Thanks." Jo went directly to Krasna's office. Krasna was a Randolpher. Earth-trained, and answerable to the Earth office, but otherwise pretty much on his own. His heavy, muscular face wore the same expression of serene confidence that was characteristic of Service officials everywhereeven some that, technically speaking, had no faces to wear it. "Boy meets girl," Jo said briefly. "On the nose and on the spot." "Good work, Jo. Cigarette?" Krasna pushed the box across his desk. "Nope, not now. Like to talk to you, if you've got time." Krasna pushed a button, and a toadstoollike chair rose out of the floor behind Jo. "What's on your mind?" "Well," Jo said carefully. "I'm wondering why you patted me on the back just now for not doing a job." "You did a job." "I did not," Jo said flatly. "Boy would have met girl, whether I'd been here on Randolph or back on Earth, The course of true love always runs smooth. It has in all my boy-meets-girl cases, and it has in the boy-meets-girl cases of every other agent with whom I've compared notes." "Well, good," Krasna said, smiling. "That's the way we like to have it run. And that's the way we expect it to run. But, Jo, we like to have somebody on the spot, somebody with a reputation for resourcefulness, just in case there's a snag. There almost never is, as you've observed. Butif there were?" Jo snorted. "If what you're trying to do is to establish preconditions for the future, any interference by a Service agent would throw the eventual result farther off the track. I know that much about probability." "And what makes you think that we're trying to set up the future?" "It's obvious even to the hoppies on your own planet; the one that brought me here told me he thought the Service had time-travel. It's especially obvious to all the individuals and governments and entire populations that the Service has bailed out of serious messes for centuries, with never a single failure." Jo shrugged. "A man can be asked to safeguard only a small number of boy-meets-girl cases before he realizes, as an agent, that what the Service is safeguarding is the future children of those meetings. Ergothe Service knows what those children are to be like, and has reason to want their future existence guaranteed. What other conclusion is possible?" Krasna took out a cigarette and lit it deliberately; it was obvious that he was using the maneuver to cloak his response. "None," he admitted at last. "We have some foreknowl- edge, of course. We couldn't have made our reputation with espionage alone. But we have obvious other advantages: genetics, for instance, and operations research, the theory of games, the Dirac transmitterit's quite an arsenal, and of course there's a good deal of prediction involved in all those things." "I see that," Jo said. He shifted in his chair, formulating all he wanted to say. He changed his mind about the cigarette and helped himself to one. "But these things don't add up to infallibilityand that's a qualitative difference, Kras. Take this affair of the Black Horse armada. The mo- ment the armada appeared, we'll assume, Earth heard about it by Dirac, and started to assemble a counteramiada. But it takes finite time to bring together a concentration of ships and men, even if your message system is instantaneous. "The Service's counterarmada was already on hand. It had been building there for so long and with so little fuss that nobody even noticed it concentrating until a day or so before the battle. Then planets in the area began to sit up and take notice, and be uneasy about what was going to break. But not very uneasy; the Service always winsthat's been a statistical fact for centuries. Centuries, Kras. Good Lord, it takes almost as long as that, in straight preparation, to pull some of the tricks we've pulled! The Dirac gives us an advantage of ten to twenty-five years in really extreme cases out on the rim of the Galaxy, but no more than that." He realized that he had been fuming away on the cigarette until the roof of his mouth was scorched, and snubbed it out angrily. "That's a very different thing," he said, "than knowing in a

general way how an enemy is likely to behave, or what kind of children the Mendelian laws say a given couple should have. It means that we've some way of reading the future in minute detail. That's in flat contradiction to every- thing I've been taught about probability, but I have to believe what I see." Krasna laughed. "That's a very able presentation," he said. He seemed genuinely pleased. "I think you'll remember that you were first impressed into the Service when you began to wonder why the news was always good. Fewer and fewer people wonder about that nowadays; it's become a part of their expected environment." He stood up and ran a hand through his hair. "Now you've carried yourself through the next stage. Congratulations, Jo. You've just been promoted!" "I have?" Jo said incredulously. "I came in here with the notion that I might get myself fired." "No. Come around to this side of the desk, Jo, and I'll play you a little history." Krasna unfolded the desktop to expose a small visor screen. Obediently Jo rose and went around the desk to where he could see the blank surface. "I had a standard indoctrination tape sent up to me a week ago, in the expectation that you'd be ready to see it. Watch." Krasna touched the board. A small dot of light appeared in the center of the screen and went out again. At the same time, there was a small beep of sound. Then the tape began to unroll and a picture clarified on the screen. "As you suspected," Krasna said conversationally, "the Service is infallible. How it got that way is a story that started several centuries back. Dana Ljeher father had been a Hollander, her mother born in the Celebessat down in the chair which Captain Robin Weinbaum had indicated, crossed her legs, and waited, her blue-black hair shining under the lights. Weinbaum eyed her quizzically. The conqueror Resident who had given the girl her entirely European name had been paid in kind, for his daughter's beauty had nothing fair and Dutch about it. To the eye of the beholder, Dana Lje seemed a particularly delicate virgin of Bali, despite her Western name, clothing and assurance. The combination had already proven piquant for the millions who watched her television column, and Weinbaum found it no less charming at first hand. "As one of your most recent victims," he said, "I'm not sure that I'm honored, Miss Lje. A few of my wounds are still bleeding. But I am a good deal puzzled as to why you're visiting me now. Aren't you afraid that I'll bite back?" "I had no intention of attacking you personally, and I don't think I did," the video columnist said seriously. "It was just pretty plain that our intelligence had slipped badly in the Erskine affair. It was my job to say so. Obviously you were going to get hurt, since you're head of the bureau but there was no malice in it." "Cold comfort," Weinbaum said dryly. "But thank you, nevertheless." The Eurasian girl shrugged. "That isn't what I came here about, anyway. Tell me, Captain Weinbaumhave you ever heard of an outfit calling itself Interstellar Information?" Weinbaum shook his head. "Sounds like a skip-tracing firm. Not an easy business, these days." "That's just what I thought when I first saw their letter- head," Dana said. "But the letter under it wasn't one that a private-eye outfit would write. Let me read part of it to you." Her slim fingers burrowed in her inside jacket pocket and emerged again with a single sheet of paper. It was plain typewriter bond, Weinbaum noted automatically: she had brought only a copy with her, and had left the original of the letter at home. The copy, then, would be incomplete probably seriously. "It goes like this: 'Dear Miss Lje: As a syndicated video commentator with a wide audience and heavy responsibilities, you need the best sources of information available. We would like you to test our service, free of charge, in the hope of proving to you that it is superior to any other source of news on Earth. Therefore, we offer below several predictions concerning events to come in the Hercules and the so-called "Three Ghosts" areas. If these predictions are fulfilled 100 per centno lesswe ask that you take us on as your cor- respondents for those areas, at rates to be agreed upon later. If the predictions are wrong in any respect, you need not consider us further.' " "H'm," Weinbaum said slowly. "They're confident cusses and that's an odd juxtaposition. The Three Ghosts make up only a little solar system, while the Hercules area could include the

entire star clusteror maybe even the whole constellation, which is a hell of a lot of sky. This outfit seems to be trying to tell you that it has thousands of field correspondents of its own, maybe as many as the government itself. If so, I'll guarantee that they're bragging." "That may well be so. But before you make up your mind, let me read you one of the two predictions." The letter rustled in Dana Lje's hand. '"At 03:16:10, on Year Day, 2090, the Hess-type interstellar liner Brindisi will be attacked in the neighborhood of the Three Ghosts system by four' " Weinbaum sat bolt upright in his swivel chair. "Let me see that letter!" he said, his voice harsh with repressed alarm. "In a moment," the girl said, adjusting her skirt com- posedly. "Evidently I was right in riding my hunch. Let me go on reading: 'by four heavily armed vessels flying the lights of the navy of Hammersmith II. The position of the liner at that time will be at coded co-ordinates 88-A-theta- 88-aleph-D and-per-se-and. It will' " "Miss Lje," Weinbaum said. "I'm sorry to interrupt you again, but what you've said already would justify me in jailing you at once, no matter how loudly your sponsors might scream. I don't know about this Interstellar Information outfit, or whether or not you did receive any such letter as the one you pretend to be quoting. But I can tell you that you've shown yourself to be in possession of information that only yours truly and four other men are supposed to know. It's already too late to tell you that everything you say may be held against you; all I can say now is, it's high time you clammed up!" "I thought so," she said, apparently not disturbed in the least. "Then that liner is scheduled to hit those co-ordinates, and the coded time co-ordinate corresponds with the predicted Universal Time. Is it also true that the Brindisi will be carrying a top-secret communication device?" "Are you deliberately trying to make me imprison you?" Weinbaum said, gritting his teeth. "Or is this just a stunt, designed to show me that my own bureau is full of leaks?" "It could turn into that," Dana admitted. "But it hasn't, yet. Robin, I've been as honest with you as I'm able to be. You've had nothing but square deals from me up to now. I wouldn't yellow-screen you, and you know it. If this un- known outfit has this information, it might easily have gotten it from where it hints that it got it: from the field." "Impossible." "Why?" "Because the information in question hasn't even reached my own agents in the field yetit couldn't possibly have leaked as far as Hammersmith II or anywhere else, let alone to the Three Ghosts system! Letters have to be carried on ships, you know that. If I were to send orders by ultrawave to my Three Ghosts agent, he'd have to wait three hundred and twenty-four years to get them. By ship, he can get them in a little over two months. These particular orders have only been under way to him five days. Even if somebody has read them on board the ship that's carrying them, they couldn't possibly be sent on to the Three Ghosts any faster than they're traveling now." Dana nodded her dark head. "All right. Then what are we left with but a leak in your headquarters here?" "What, indeed," Weinbaum said grimly. "You'd better tell me who signed this letter of yours." "The signature is J. Shelby Stevens." Weinbaum switched on the intercom. "Margaret, look in the business register for an outfit called Interstellar Informa- tion and find out who owns it." Dana Lje said, "Aren't you interested in the rest of the prediction?" "You bet I am. Does it tell you the name of this com- munications device?" "Yes," Dana said. "What is it?" "The Dirac communicator." Weinbaum groaned and turned on the intercom again. "Margaret, send in Dr. Wald. Tell him to drop everything and gallop. Any luck with the other thing?" "Yes, sir," the intercom said. "It's a one-man outfit, wholly owned by a J. Shelby Stevens, in Rico City. It was first registered this year." "Arrest him, on suspicion of espionage." The door swung open and Dr. Wald came in, all six and a half feet of him. He was extremely blond, and looked awkward, gentle, and not very intelligent. "Thor, this young lady is our press nemesis, Dana Lje. Dana, Dr. Wald is the inventor of the Dirac communicator, about which you have so damnably much information." "It's out already?" Dr. Wald said, scanning the girl with grave deliberation. "It is, and lots morelots more. Dana, you're a good girl at heart, and for some

reason I trust you, stupid though it is to trust anybody in this job. I should detain you until Year Day, videocasts or no videocasts. Instead, I'm just going to ask you to sit on what you've got, and I'm going to explain why." "Shoot." "I've already mentioned how slow communication is be- tween star and star. We have to carry all our letters on ships, just as we did locally before the invention of the telegraph. The overdrive lets us beat the speed of light, but not by much of a margin over really long distances. Do you understand that?" "Certainly," Dana said. She appeared a bit nettled, and Weinbaum decided to give her the full dose at a more rapid pace. After all, she could be assumed to be better informed than the average layman. "What we've needed for a long time, then," he said, "is some virtually instantaneous method of getting a message from somewhere to anywhere. Any time lag, no matter how small it seems at first, has a way of becoming major as longer and longer distances are involved. Sooner or later we must have this instantaneous method, or we won't be able to get messages from one system to another fast enough to hold our jurisdiction over outlying regions of space." "Wait a minute," Dana said. "I'd always understood that ultrawave is faster than light." "Effectively it is; physically it isn't. You don't understand that?" She shook her dark head. "In a nutshell," Weinbaum said, "ultrawave is radiation, and all radiation in free space is limited to the speed of light. The way we hype up ultrawave is to use an old application of wave-guide theory, whereby the real transmission of energy is at light speed, but an imaginary thing called "phase velocity" is going faster. But the gain in speed of transmis- sion isn't largeby ultrawave, for instance, we get a message to Alpha Centauri in one year instead of nearly four. Over long distances, that's not nearly enough extra speed." "Can't it be speeded further?" she said, frowning. "No. Think of the ultrawave beam between here and Centaurus III as a caterpillar. The caterpillar himself is moving quite slowly, just at the speed of light. But the pulses which pass along his body are going forward faster than he isand if you've ever watched a caterpillar, you'll know that that's true. But there's a physical limit to the number of pulses you can travel along that caterpillar, and we've already reached that limit. We've taken phase velocity as far as it will go. "That's why we need something faster. For a long time our relativity theories discouraged hope of anything faster even the high-phase velocity of a guided wave didn't con- tradict those theories; it just found a limited, mathematically imaginary loophole in them. But when Thor here began looking into the question of the velocity of propagation of a Dirac pulse, he found the answer. The communicator he developed does seem to act over long distances, any distance, instantaneouslyand it may wind up knocking relativity into a cocked hat." The girl's face was a study in stunned realization. "I'm not sure I've taken in all the technical angles," she said. "But if I'd had any notion of the political dynamite in this thing" "you'd have kept out of my office," Weinbaum said grimly. "A good thing you didn't. The Brindisi is carrying a model of the Dirac communicator out to the periphery for a final test; the ship is supposed to get in touch with me from out there at a given Earth time, which we've calculated very elaborately to account for the residual Lorentz and Milne transformations involved in overdrive flight, and for a lot of other time phenomena that wouldn't mean anything at all to you. "If that signal arrives here at the given Earth time, then aside from the havoc it will create among the theoretical physicists whom we decide to let in on itwe will really have our instant communicator, and can include all of oc- cupied space in the same time zone. And we'll have a terrific advantage over any lawbreaker who has to resort to ultra- wave locally and to letters carried by ships over the long haul." "Not," Dr. Wald said sourly, "if it's already leaked out." "It remains to be seen how much of it has leaked," Weinbaum said. "The principle is rather esoteric, Thor, and the name of the thing alone wouldn't mean much even to a trained scientist. I gather that Dana's mysterious informant didn't go into technical details . . . or did he?" "No," Dana said. 'Tell the truth, Dana. I know that you're

suppressing some of that letter." The girl started slightly. "All rightyes, I am. But nothing technical. There's another part of the prediction that lists the number and class of ships you will send to protect the Brindisithe prediction says they'll be sufficient, by the way and I'm keeping that to myself, to see whether or not it comes true along with the rest. If it does, I think I've hired myself a correspondent." "If it does," Weinbaum said, "you've hired yourself a jailbird. Let's see how much mind reading J. Whatsit Stevens can do from the subcellar of Fort Yaphank." 3 Weinbaum let himself into Stevens's cell, locking the door behind him and passing the keys out to the guard. He sat down heavily on the nearest stool. Stevens smiled the weak benevolent smile of the very old, and laid his book aside on the bunk. The book, Weinbaum knewsince his office had cleared itwas only a volume of pleasant, harmless lyrics by a New Dynasty poet named Nims. "Were our predictions correct, Captain?" Stevens said. His voice was high and musical, rather like that of a boy soprano. Weinbaum nodded. "You still won't tell us how you did it?" "But I already have," Stevens protested. "Our intelligence network is the best in the Universe, Captain. It is superior even to your own excellent organization, as events have shown." "Its results are superior, that I'll grant," Weinbaum said glumly. "If Dana Lje had thrown your letter down her disposal chute, we would have lost the Brindisi and our Dirac transmitter both. Incidentally, did your original letter predict accurately the number of ships we would send?" Stevens nodded pleasantly, his neatly trimmed white beard thrusting forward slightly as he smiled. "I was afraid so," Weinbaum leaned forward. "Do you have the Dirac transmitter, Stevens?" "Of course, Captain. How else could my correspondents report to me with the efficiency you have observed?" "Then why don't our receivers pick up the broadcasts of your agents? Dr. Wald says it's inherent in the principle that Dirac 'casts are picked up by all instruments tuned to receive them, bar none. And at this stage of the game there are so few such broadcasts being made that we'd be almost certain to detect any that weren't coming from our own operatives." "I decline to answer that question, if you'll excuse the impoliteness," Stevens said, his voice quavering slightly. "I am an old man, Captain, and this intelligence agency is my sole source of income. If I told you how we operated, we would no longer have any advantage over your own service, except for the limited freedom from secrecy which we have. I have been assured by competent lawyers that I have every right to operate a private investigation bureau, properly licensed, upon any scale that I may choose; and that I have the right to keep my methods secret, as the so-called 'intellectual assets' of my firm. If you wish to use our services, well and good. We will provide them, with absolute guarantees on all information we furnish you, for an appropriate fee. But our methods are our own property." Robin Weinbaum smiled twistedly. "I'm not a naive man, Mr. Stevens," he said. "My service is hard on naivete. You know as well as I do that the government can't allow you to operate on a free-lance basis, supplying top-secret informa- tion to anyone who can pay the price, or even free of charge to video columnists on a 'test' basis, even though you arrive at every jot of that information independently of espionage which I still haven't entirely ruled out, by the way. If you can duplicate this Brindisi performance at will, we will have to have your services exclusively. In short, you become a hired civilian arm of my own bureau." "Quite," Stevens said, returning the smile in a fatherly way. "We anticipated that, of course. However, we have contracts with other governments to consider; Erskine, in particular. If we are to work exclusively for Earth, neces- sarily our price will include compensation for renouncing our other accounts." "Why should it? Patriotic public servants work for their government at a loss, if they can't work for it any other way." "I am quite aware of that. I am quite prepared to renounce my other interests. But I do require to be paid." "How much?" Weinbaum said, suddenly aware that his fists were clenched so tightly that they hurt. Stevens appeared to consider, nodding his flowery white poll in senile deliberation. "My associates would have to be consulted.

Tentatively, however, a sum equal to the present appropriation of your bureau would do, pending further negotiations." Weinbaum shot to his feet, eyes wide. "You old buc- caneer! You know damned well that I can't spend my entire appropriation on a single civilian service! Did it ever occur to you that most of the civilian outfits working for us are on cost-plus contracts, and that our civilian executives are being paid just a credit a year, by their own choice? You're demanding nearly two thousand credits an hour from your own government, and claiming the legal protection that the government affords you at the same time, in order to let those fanatics on Erskine run up a higher bid!" "The price is not unreasonable," Stevens said. "The service is worth the price." "That's where you're wrong! We have the discoverer of the machine working for us. For less than half the sum you're asking, we can find the application of the device that you're trading onof that you can be damned sure." "A dangerous gamble. Captain." "Perhaps. We'll soon see!" Weinbaum glared at the placid face. "I'm forced to tell you that you're a free man, Mr. Stevens. We've been unable to show that you came by your information by any illegal method. You had classified facts in your possession, but no classified documents, and it's your privilege as a citizen to make guesses, no matter how educated. "But we'll catch up with you sooner or later. Had you been reasonable, you might have found yourself in a very good position with us, your income as assured as any political income can be, and your person respected to the hilt. Now, however, you're subject to censorshipyou have no idea how humiliating that can be, but I'm going to see to it that you find out. There'11 be no more newsbeats for Dana Lje, or for anyone else. I want to see every word of copy that you file with any client outside the bureau. Every word that is of use to me will be used, and you'll be paid the statutory one cent a word for itthe same rate that the FBI pays for anonymous gossip. Everything I don't find useful will be killed without clearance. Eventually we'll have the modifica- tion of the Dirac that you're using, and when that happens, you'll be so flat broke that a pancake with a harelip could spit right over you." Weinbaum paused for a moment, astonished at his own fury. Stevens's clarinetlike voice began to sound in the window- less cavity. "Captain, I have no doubt that you can do this to me, at least incompletely. But it will prove fruitless. I will give you a prediction, at no charge. It is guaranteed, as are all our predictions. It is this: You will never find that mod- ification. Eventually, I will give it to you, on my own terms, but you will never find it for yourself, nor will you force it out of me. In the meantime, not a word of copy will be filed with you; for, despite the fact that you are an arm of the government, I can well afford to wait you out." "Bluster," Weinbaum said. "Fact. Yours is the blusterloud talk based on nothing more than a hope. I, however, know whereof I speak. . . . But let us conclude this discussion. It serves no purpose; you will need to see my points made the hard way. Thank you for giving me my freedom. We will talk again under different circumstances onlet me see; ah, yes, on June 9 of the year 2091. That year is, I believe, almost upon us." Stevens picked up his book again, nodding at Weinbaum, his expression harmless and kindly, his hands showing the marked tremor of paralysis agitans. Weinbaum moved help- lessly to the door and flagged the turnkey. As the bars closed behind him, Stevens's voice called out: "Oh, yes; and a Happy New Year, Captain." Weinbaym blasted his way back into his own office, at least twice as mad as the proverbial nest of hornets, and at the same time rather dismally aware of his own probable future. If Stevens's second prediction turned out to be as phenomenally accurate as his first had been, Capt. Robin Weinbaum would soon be peddling a natty set of second- hand uniforms. He glared down at Margaret Soames, his receptionist She glared right back; she had known him too long to be intimidated. "Anything?" he said. "Dr. Wald's waiting for you in your office. There are some field reports, and a couple of Diracs on your private tape. Any luck with the old codger?" "That," he said crushingly, "is Top Secret." "Poof. That means that nobody still knows the answer but J. Shelby Stevens." He collapsed suddenly. "You're so right. That's just what it

does mean. But we'll bust him wide open sooner or later. We've got to." "You'll do it," Margaret said. "Anything else for me?" "No. Tip off the clerical staff that there's a half holiday today, then go take in a stereo or a steak or something your- self. Dr. Wald and I have a few private wires to pull . . . and unless I'm sadly mistaken, a private bottle of aquavit to empty." "Right," the receptionist said. "Tie one on for me, Chief. I understand that beer is the best chaser for aquavitI'll have some sent up." "If you should return after I am suitably squiffed," Wein- baum said, feeling a little better already, "I will kiss you for your thoughtfulness. That should keep you at your stereo at least twice through the third feature." As he went on through the door of his own office, she said demurely behind him, "It certainly should." As soon as the door closed, however, his mood became abruptly almost as black as before. Despite his comparative youthhe was now only fifty-fivehe had been in the service a long time, and he needed no one to tell him the possible consequences which might flow from possession by a private citizen of the Dirac communicator. If there was ever to be a Federation of Man in the Galaxy, it was within the power of J. Shelby Stevens to ruin it before it had fairly gotten started. And there seemed to be nothing at all that could be done about it. "Hello, Thor," he said glumly. "Pass the bottle." "Hello, Robin. I gather things went badly. Tell me about it." Briefly, Weinbaum told him. "And the worst of it," he finished, "is that Stevens himself predicts that we won't find the application of the Dirac that he's using, and that even- tually we'll have to buy it at his price. Somehow I believe himbut I can't see how it's possible. If I were to tell Congress that I was going to spend my entire appropriation for a single civilian service, I'd be out on my ear within the next three sessions." "Perhaps that isn't his real price," the scientist suggested. "If he wants to barter, he'd naturally begin with a demand miles above what he actually wants." "Sure, sure . . . but frankly, Thor, I'd hate to give the old reprobate even a single credit if I could get out of it." Weinbaum sighed. "Well, let's see what's come in from the field." Thor Wald moved silently away from Weinbaum's desk while the officer unfolded it and set up the Dirac screen. Stacked neatly next to the ultraphonea device Weinbaum had been thinking of, only a few days ago, as permanently outmodedwere the tapes Margaret had mentioned. He fed the first one into the Dirac and turned the main toggle to the position labeled START. Immediately the whole screen went pure white and the audio speakers emitted an almost instantly end-stopped blare of sounda beep which, as Weinbaum already knew, made up a continuous spectrum from about 30 cycles per second to well above 18,000 cps. Then both the light and the noise were gone as if they had never been, and were replaced by the familiar face and voice of Weinbaum's local ops chief in Rico City. "There's nothing unusual in the way of transmitters in Stevens's offices here," the operative said without preamble. "And there isn't any local Interstellar Information staff, except for one stenographer, and she's as dumb as they come. About all we could get from her is that Stevens is 'such a sweet old man.' No possibility that she's faking it; she's genuinely stupid, the kind that thinks Betelgeuse is something Indians use to darken their skins. We looked for some sort of list or code table that would give us a line on Stevens's field staff, but that was another dead end. Now we're main- taining a twenty-four-hour Dinwiddie watch on the place from a joint across the street. Orders?" Weinbaum dictated to the blank stretch of tape which followed: "Margaret, next time you send any Dirac tapes in here, cut that damnable beep off them first. Tell the boys in Rico City that Stevens has been released, and that I'm proceeding for an Order In Security to tap his ultraphone and his local linesthis is one case where I'm sure we can persuade the court that tapping's necessary. Alsoand be damned sure you code thistoll them to proceed with the tap immediately and to maintain it regardless of whether or not the court O.K.s it. I'll thumbprint a Full Respon- sibility Confession for them. We can't afford to play pat- a-cake with Stevensthe potential is just too damned big. And oh, yes,

Margaret, send the message by carrier, and send out general orders to everybody concerned not to use the Dirac again except when distance and time rule every other medium out. Stevens has already admitted that he can receive Dirac 'casts." He put down the mike and stared morosely for a moment at the beautiful Eridanean scrollwood of his desktop. Wald coughed inquiringly and retrieved the aquavit. "Excuse me, Robin," he said, "but I should think that would work both ways." "So should 1. And yet the fact is that we've never picked up so much as a whisper from either Stevens or his agents. I can't think of any way that could be pulled, but evidently it can." "Well, let's rethink the problem, and see what we get," Wald said. "I didn't want to say so in front of the young lady, for obvious reasons1 mean Miss Lje, of course, not Margaretbut the truth is that the Dirac is essentially a simple mechanism in principle. I seriously doubt that there's any way to transmit a message from it which can't be detectedand an examination of the theory with that proviso in mind might give us something new." "What proviso?" Weinbaum said. Thor Wald left him behind rather often these days. "Why, that a Dirac transmission doesn't necessarily go to all communicators capable of receiving it. If that's true, then the reasons why it is true should emerge from the theory." "I see. O.K., proceed on that line. I've been looking at Stevens's dossier while you were talking, and it's an absolute desert. Prior to the opening of the office in Rico City, there's no dope whatever on J. Shelby Stevens. The man as good as rubbed my nose in the fact that he's using a pseud when I first talked to him. I asked him what the T in his name stood for, and he said, 'Oh, let's make it Jerome.' But who the man behind the pseud is . . ." "Is it possible that he's using his own initials?" "No," Weinbaum said. "Only the dumbest ever do that, or transpose syllables, or retain any connection at all with their real names. Those are the people who are in serious emotional trouble, people who drive themselves into an- onymity, but leave clues strewn all around the landscape those clues are really a cry for help, for discovery. Of course we're working on that anglewe can't neglect anything but J. Shelby Stevens isn't that kind of case, I'm sure." Weinbaum stood up abruptly. "O.K., Thorwhat's first on your technical program?" "Well . . . I suppose we'll have to start with checking the frequencies we use. We're going on Dirac's assumption and it works very well, and always hasthat a positron in motion through a crystal lattice is accompanied by de Broglie waves which are transforms of the waves of an electron in motion somewhere else in the Universe. Thus if we control the frequency and path of the positron, we control the placement of the electronwe cause it to appear, so to speak, in the circuits of a communicator somewhere else. After that, reception is just a matter of amplifying the bursts and reading the signal." Wald scowled and shook his blond head. "If Stevens is getting out messages which we don't pick up, my first as- sumption would be that he's worked out a fine-tuning circuit that's more delicate than ours, and is more or less sneaking his messages under ours. The only way that could be done, as far as I can see at the moment, is by something really fantastic in the way of exact frequency control of his positron gun. If so, the logical step for us is to go back to the beginning of our tests and rerun our diffractions to see if we can refine our measurements of positron frequencies." The scientist looked so inexpressibly gloomy as he offered this conclusion that a pall of hopelessness settled over Wein- baum in sheer sympathy. "You don't look as if you expected that to uncover anything new." "I don't. You see, Robin, things are different in physics now than they used to be in the twentieth century. In those days, it was always presupposed that physics was limitless the classic statement was made by Weyl, who said that 'It is the nature of a real thing to be inexhaustible in content.* We know now that that's not so, except in a remote, as- sociational sort of way. Nowadays, physics is a defined and self-limited science; its scope is still prodigious, but we can no longer think of it as endless. "This is better established in particle physics than in any other branch of the science. Half of the trouble physicists of the last century had with Euclidean geometryand

hence the reason why they evolved so many recomplicated theories of relativityis that it's a geometry of lines, and thus can be subdivided infinitely. When Cantor proved that there really is an infinity, at least mathematically speaking, that seemed to clinch the case for the possibility of a really infinite physical universe, too." Wald's eyes grew vague, and he paused to gulp down a slug of the licorice-flavored aquavit which would have made Weinbaum's every hair stand on end. "I remember," Wald said, "the man who taught me theory of sets at Princeton, many years ago. He used to say: 'Cantor teaches us that there are many kinds of infinities. There was a crazy old mani' " Weinbaum rescued the bottle hastily. "So go on, Thor." "Oh." Wald biinked. "Yes. Well, what we know now is that the geometry which applies to ultimate particles, like the positron, isn't Euclidean at all. It's Pythagoreana geometry of points, not lines. Once you've measured one of those points, and it doesn't matter what kind of quantity you're measuring, you're down as far as you can go. At that point, the Universe becomes discontinuous, and no further refinement is possible. "And I'd say that our positron-frequency measurements have already gotten that far down. There isn't another el- ement in the Universe denser than plutonium, yet we get the same frequency values by diffraction through plutonium crystals that we get through osmium crystalsthere's not the slightest difference. If J. Shelby Stevens is operating in terms of fractions of those values, then he's doing what an organist would call 'playing in the cracks'which is certainly some- thing you can think about doing, but something that's in actuality impossible to do. Hoop." "Hoop?" Weinbaum said. "Sorry. A hiccup only." "Oh. Well, maybe Stevens has rebuilt the organ?" "If he has rebuilt the metrical frame of the Universe to accommodate a private skip-tracing firm," Wald said firmly, "I for one see no reason why we can't countercheck him hoopby declaring the whole cosmos null and void." "All right, all right," Weinbaum said, grinning. "I didn't mean to push your analogy right over the edge1 was just asking. But let's get to work on it anyhow. We can't just sit here and let Stevens get away with it. if this frequency angle turns out to be as hopeless as it seems, we'll try something else." Wald eyed the aquavit bottle owlishly. "It's a very pretty problem," he said. "Have I ever sung you the song we have in Sweden called 'Nat-og-Dag?' " "Hoop," Weinbaum said, to his own surprise, in a high falsetto. "Excuse me. No. Let's hear it." The computer occupied an entire floor of the Security building, its seemingly identical banks laid out side by side on the floor along an advanced pathological state of Peano's "space-filling curve." At the current business end of the line was a master control board with a large television screen at its center, at which Dr. Wald was stationed, with Weinbaum looking, silently but anxiously, over his shoulder. The screen itself showed a pattern which, except that it was drawn in green light against a dark gray background, strongly resembled the grain in a piece of highly polished mahogany. Photographs of similar patterns were stacked on a small table to Dr. Wald's right; several had spilled over onto the floor. "Well, there it is," Wald sighed at length. "And I won't struggle to keep myself from saying 1 told you so.' What you've had me do here, Robin, is to reconfirm about half the basic postulates of particle physicswhich is why it took so long, even though it was the first project we started." He snapped off the screen. "There are no cracks for J. Shelby to play in. That's definite." "If you'd said 'That's flat,' you would have made a joke," Weinbaum said sourly. "Look . . . isn't there still a chance of error? If not on your part, Thor, then in the computer? After all, it's set up to work only with the unit charges of modern physics; mightn't we have to disconnect the banks that con- tain that bias before the machine will follow the frac- tional-charge instructions we give it?" " 'Disconnect,' he says," Wald groaned, mopping his brow reflectively. "The bias exists everywhere in the machine, my friend, because it functions everywhere on those same unit charges. It wasn't a matter of subtracting banks; we had to add one with a bias all its own, to countercorrect the cor- rections the computer would otherwise apply to the instruc- tions. The technicians thought I was

crazy. Now, five months later, I've proved it." Weinbaum grinned in spite of himself. "What about the other projects?" "All donesome time back, as a matter of fact. The staff and I checked every single Dirac tape we've received since you released J. Shelby from Yaphank, for any sign of inter- modulation, marginal signals, or anything else of the kind. There's nothing. Robin, absolutely nothing. That's our net result, all around." "Which leaves us just where we started," Weinbaum said. "All the monitoring projects came to the same dead end; I strongly suspect that Stevens hasn't risked any further calls from his home office to his field staff, even though he seemed confident that we'd never intercept such callsas we haven't. Even our local wire tapping hasn't turned up anything but calls by Stevens's secretary, making appointments for him with various clients, actual and potential. Any information he's selling these days he's passing on in personand not in his office, either, because we've got bugs planted all over that and haven't heard a thing." 'That must limit his range of operation enormously," Wald objected. Weinbaum nodded. "Without a doubtbut he shows no signs of being bothered by it. He can't have sent any tips to Erskine recently, for instance, because our last tangle with that crew came out very well for us, even though we had to use the Dirac to send the orders to our squadron out there. If he overheard us, he didn't even try to pass the word. Just as he said, he's sweating us out" Weinbaum paused. "Wait a minute, here comes Margaret. And by the length of her stride, I'd say she's got something particularly nasty on her mind." "You bet I do," Margaret Soames said vindictively. "And it'll blow plenty of lids around here, or I miss my guess. The 1. D. squad has finally pinned down J. Shelby Stevens. They did it with the voice-comparator alone." "How does that work?" Wald said interestedly. "Blink microphone," Weinbaum said impatiently. "Isolates inflections on single, normally stressed syllables and matches them. Standard 1. D. searching technique, on a case of this kind, but it takes so long that we usually get the quarry by other means before it pays off. Well, don't stand there like a dummy, Margaret. Who is he? " 'He,' " Margaret said, "is your sweetheart of the video waves, Miss Dana Lje." "They're crazy!" Wald said, staring at her. Weinbaum came slowly out of his first shock of stunned disbelief. "No, Thor," he said finally. "No, it figures. If a woman is going to go in for disguises, there are always two she can assume outside her own sex: a young boy, and a very old man. And Dana's an actress; that's no news to us." "Butbut why did she do it, Robin?" "That's what we're going to find out right now. So we wouldn't get the Dirac modification by ourselves, ehl Well, there are other ways of getting answers besides particle physics. Margaret, do you have a pick-up order out for that girl?" "No," the receptionist said. "This is one chestnut I wanted to see you pull out for yourself. You give me the authority, and I send the ordernot before." "Spiteful child. Send it, then, and glory in my gritted teeth. Come on, Thorlet's put the nutcracker on this chestnut." As they were leaving the computer floor, Weinbaum stopped suddenly in his tracks and began to mutter in an almost inaudible voice. Wald said, "What's the matter, Robin?" "Nothing. I keep being brought up short by those pre- dictions. What's the date?" "M'm . . . June 9. Why?" "It's the exact date that 'Stevens' predicted we'd meet again, damn it! Something tells me that this isn't going to be as simple as it looks." If Dana L)'e had any idea of what she was in forand considering the fact that she was 'J. Shelby Stevens' it had to be assumed that she didthe knowledge seemed not to make her at all fearful. She sat as composedly as ever before Weinbaum's desk, smoking her eternal cigarette, and waited, one dimpled knee pointed directly at the bridge of the officer's nose. "Dana," Weinbaum said, "this time we're going to get all the answers, and we're not going to be gentle about it. Just iii case you're not aware of the fact, there are certain laws relating to giving false information to a security officer, under which we could heave you in prison for a minimum of fifteen years. By application of the statutes on using communications to defraud, plus various local laws against transvestism, pseudonymity and so on, we could probably pile up

enough additional short sentences to keep you in Yaphank until you really do grow a beard. So I'd advise you to open up." "I have every intention of opening up," Dana said. "I know, practically word for word, how this interview is going to proceed, what information I'm going to give you, just when I'm going to give it to youand what you're going to pay me for it. I knew all that many months ago. So there would be no point in my holding out on you." "What you're saying, Miss Lje," Thor Wald said in a re- signed voice, "is that the future is fixed, and that you can read it, in every essential detail." "Quite right. Dr. Wald. Both those things are true." There was a brief silence. "All right," Weinbaum said grimly. "Talk." "All right, Captain Weinbaum, pay me," Dana said calmly. Weinbaum snorted. "But I'm quite serious," she said. "You still don't know what I know about the Dirac communicator. I won't be forced to tell it, by threat of prison or by any other threat. You see, I know for a fact that you aren't going to send me to prison, or give me drugs, or do anything else of that kind. I know for a fact, instead, that you are going to pay meso I'd be very foolish to say a word until you do. After all, it's quite a secret you're buying. Once I tell you what it is, you and the entire service will be able to read the future as I do, and then the information will be valueless to me." Weinbaum was completely speechless for a moment. Finally he said, "Dana, you have a heart of purest brass, as well as a knee with an invisible gunsight on it. I say that I'm not going to give you my appropriation, regardless of what the future may or may not say about it. I'm not going to give it to you because the way my governmentand yours runs things makes such a price impossible. Or is that really your price?" "It's my real price . . . but it's also an alternative. Call it my second choice. My first choice, which means the price I'd settle for, comes in two parts: (a) to be taken into your service as a responsible officer; and, (b) to be married to Captain Robin Weinbaum." Weinbaum sailed up out of his chair. He felt as though copper-colored flames a foot long were shooting out of each of his ears. "Of all the" he began. There his voice failed completely. From behind him, where Wald was standing, came some- thing like a large, Scandinavian-model guffaw being choked into insensibility. Dana herself seemed to be smiling a little. "You see," she said, "I don't point my best and most accurate knee at every man I meet." Weinbaum sat down again, slowly and carefully. "Walk, do not run, to nearest exit," he said. "Women and childlike security officers first. Miss L]'e, are you trying to sell me the notion that you went through this elaborate hanky-panky beard and allout of a burning passion for my dumpy and underpaid person?" "Not entirely," Dana L]'e said. "I want to be in the bureau, too, as I said. Let me confront you, though. Captain, with a fact of life that doesn't seem to have occurred to you at all. Do you accept as a fact that I can read the future in detail, and that that, to be possible at all, means that the future is fixed?" "Since Thor seems able to accept it, I suppose I can too provisionally." "There's nothing provisional about it," Dana said firmly. "Now, when I first came upon thisuh, this gimmickquite a while back, one of the first things that I found out was that I was going to go through the 'J. Shelby Stevens' mas- querade, force myself onto the staff of the bureau, and marry you, Robin. At the time, I was both astonished and com- pletely rebellious. I didn't want to be on the bureau staff; I liked my free-lance life as a video commentator. I didn't want to marry you, though I wouldn't have been averse to living with you for a whilesay a month or so. And above all, the masquerade struck me as ridiculous. "But the facts kept staring me in the face. I was going to do all those things. There were no alternatives, no fanciful 'branches of time,' no decision-points that might be altered to make the future change. My future, like yours, Dr. Wald's, and everyone else's, was fixed. It didn't matter a snap whether or not I had a decent motive for what I was going to do; I was going to do it anyhow. Cause and effect, as I could see for myself, just don't exist. One event follows an- other because events are just as indestructible in space-time as matter and energy are. "It was the bitterest of all pills. It will take me many years to swallow it completely, and you too. Dr. Wald

will come around a little sooner, I think. At any rate, once I was intellectually convinced that all this was so, I had to protect my own sanity. I knew that I couldn't alter what I was going to do, but the least I could do to protect myself was to supply myself with motives. Or, in other words, just plain rationali- zations. That much, it seems, we're free to do; the conscious- ness of the observer is just along for the ride through time, and can't alter eventsbut it can comment, explain, invent. That's fortunate, for none of us could stand going through motions which were truly free of what we think of as personal significances. "So I supplied myself with the obvious motives. Since I was going to be married to you and couldn't get out of it, I set out to convince myself that I loved you. Now I do. Since I was going to join the bureau staff, I thought over all the advantages that it might have over video commentating, and found that they made a respectable list. Those are my motives. "But I had no such motives at the beginning. Actually, there are never motives behind actions. All actions are fixed. What we called motives evidently are rationalizations by the helpless observing consciousness, which is intelligent enough to smell an event comingand, since it cannot avert the event, instead cooks up reasons for wanting it to happen." "Wow," Dr. Wald said, inelegantly but with considerable force. "Either 'wow' or 'balderdash' seems to be called for1 can't quite decide which," Weinbaum agreed. "We know that Dana is an actress, Thor, so let's not fall off the apple tree quite yet. Dana, I've been saving the really hard question for the last. That question is: How? How did you arrive at this modification of the Dirac transmitter? Remember, we know your background, where we didn't know that of *J. Shelby Stevens.' You're not a scientist. There were some fairly high- powered intellects among your distant relatives, but that's as close as you come." "I'm going to give you several answers to that question," Dana Lje said. "Pick the one you like best. They're all true, but they tend to contradict each other here and there. 'To begin with, you're right about my relatives, of course. If you'll check your dossier again, though, you'll discover that those so-called 'distant' relatives were the last surviving members of my family besides myself. When they died, sec- ond and fourth and ninth cousins though they were, then- estates reverted to me, and among their effects I found a sketch of a possible instantaneous communicator based on de Broglie-wave inversion. The material was in very rough form, and mostly beyond my comprehension, because I am, as you say, no scientist myself. But I was interested; I could see, dimly, what such a thing might be worthand not only in money. "My interest was fanned by two coincidencestfie kind of coincidences that cause-and-effect just can't allow, but which seem to happen all the same in the world of un- changeable events. For most of my adult life, I've been in communications industries of one kind or another, mostly branches of video. I had communications equipment around me constantly, and I had coffee and doughnuts with com- munications engineers every day. First I picked up the jargon; then, some of the procedures; and eventually a little real knowledge. Some of the things I learned can't be gotten any other way. Some other things are ordinarily available only to highly educated people like Dr. Wald here, and came to me by accident, in horseplay, between kisses, and a hun- dred other waysall natural to the environment of a video network." Weinbaum found, to his own astonishment, that the "be- tween kisses" clause did not sit very well in his chest. He said, with unintentional brusqueness: "What's the other coincidence?" "A leak in your own staff." "Dana, you ought to have that set to music." "Suit yourself." "I can't suit myself," Weinbaum said petulantly. "I work for the government. Was this leak direct to you?" "Not at first. That was why I kept insisting to you in person that there might be such a leak, and why I finally began to hint about it in public, on my program. I was hoping that you'd be able to seal it up inside the bureau before my first rather tenuous contact with it got lost. When I didn't succeed in provoking you into protecting yourself, I took the risk of making direct contact with the leak myselfand the first piece of secret information that came to me

through it was the final point I needed to put my Dirac communicator together. When it was all assembled, it did more than just communicate. It predicted. And I can tell you why." Weinbaum said thoughtfully, "I don't find this very hard to accept, so far. Pruned of the philosophy, it even makes some sense of the 'J. Shelby Stevens' affair. I assume that by letting the old gentleman become known as somebody who knew more about the Dirac transmitter than I did, and who wasn't averse to negotiating with anybody who had money, you kept the leak working through yourather than trans- mitting data directly to unfriendly governments." "It did work out that way," Dana said. "But that wasn't the genesis or the purpose of the Stevens masquerade. I've already given you the whole explanation of how that came about." "Well, you'd better name me that leak, before the man gets away." "When the price is paid, not before. It's too late to prevent a getaway, anyhow. In the meantime, Robin, I want to go on and tell you the other answer to your question about how I was able to find this particular Dirac secret, and you didn't. What answers I've given you up to now have been cause-and- effect answers, with which we're all more comfortable. But I want to impress on you that all apparent cause-and-effect relationships are accidents. There is no such thing as a cause, and no such thing as an effect. I found the secret because I found it; that event was fixed; that certain circumstances seem to explain why I found it, in the old cause-and-effect terms, is irrelevant. Similarly, with all your superior equip- ment and brains, you didn't find it for one reason, and one reason alone: because you didn't find it. The history of the future says you didn't." "I pays my money and I takes no choice, eh?" Weinbaum said ruefully. "I'm afraid soand I don't like it any better than you do." "Thor, what's your opinion of all this?" "It's just faintly flabbergasting," Wald said soberly. "How- ever, it hangs together. The deterministic universe which Miss Lje paints was a common feature of the old relativity theories, and as sheer speculation has an even longer history. I would say that, in the long run, how much credence we place in the story as a whole will rest upon her method of, as she calls it, reading the future. If it is demonstrable beyond any doubt, then the rest becomes perfectly crediblephilos- ophy and all. If it doesn't, then what remains is an admirable job of acting, plus some metaphysics which, while self-con- sistent, is not original with Miss Lje." "That sums up the case as well as if I'd coached you, Dr. Wald," Dana said. "I'd like to point out one more thing. If I can read the future, then 'J. Shelby Stevens' never had any need for a staff of field operatives, and he never needed to send a single Dirac message which you might intercept. All he needed to do was to make predictions from his readings, which he knew to be infallible; no private espionage network had to be involved." "I see that," Weinbaum said dryly. "All right, Dana, let's put the proposition this way: / do not believe you. Much of what you say is probably true, but in totality I believe it to be false. On the other hand, if you're telling the whole truth, you certainly deserve a place on the bureau staffit would be dangerous as hell not to have you with usand the marriage is a more or less minor matter, except to you and me. You can have that with no strings attached; I don't want to be bought, any more than you would. "So: if you will tell me where the leak is, we will consider that part of the question closed. I make that condition not as a price, but because I don't want to get myself engaged to somebody who might be shot as a spy within a month." "Fair enough," Dana said. "Robin, your leak is Margaret Soames. She is an Erskine operative, and nobody's bubble- brain. She's a highly trained technician." "Well, I'll be damned," Weinbaum said in astonishment. "Then she's already flown the coopshe was the one who first told me we'd identified you. She must have taken on that job in order to hold up delivery long enough to stage an exit." "That's right. But you'll catch her, day after tomorrow. And you are now a hooked fish, Robin." There was another suppressed burble from Thor Wald. "I accept the fate happily," Weinbaum said, eying the gunsight knee. "Now, if you will tell me how you work your swami trick, and if it backs up everything you've said to the letter, as you claim, I'll see to it that you're also taken into the

bureau and that all charges against you are quashed. Otherwise, I'll probably have to kiss the bride between the bars of a cell." Dana smiled. "The secret is very simple. It's in the beep." Weinbaum's jaw dropped. "The beep? The Dirac noise?" "That's right. You didn't find it out because you considered the beep to be just a nuisance, and ordered Miss Soames to cut it off all tapes before sending them in to you. Miss Soames, who had some inkling of what the beep meant, was more than happy to do so, leaving the reading of the beep exclusively to 'J. Shelby Stevens'who she thought was going to take on Erskine as a client." "Explain," Thor Wald said, looking intense. "Just as you assumed, every Dirac message that is sent is picked up by every receiver that is capable of detecting it Every receivermcluding the first one ever built, which is yours, Dr. Wald, through the hundreds of thousands of them which will exist throughout the Galaxy in the twenty-fourth century, to the untold millions which will exist in the thirtieth century, and so on. The Dirac beep is the simultaneous re- ception of every one of the Dirac messages which have ever been sent, or ever wilt be sent. Incidentally, the cardinal number of the total of those messages is a relatively small and of course finite number; it's far below really large finite numbers such as the number of electrons in the universe, even when you break each and every message down into individual 'bits' and count those." "Of course," Dr. Wald said softly. "Of course! But, Miss Lje . . . how do you tune for an individual message? We tried fractional positron frequencies, and got nowhere." "I didn't even know fractional positron frequencies existed," Dana confessed. "No, it's simpleso simple that a lucky layman like me could arrive at it. You tune individual messages out of the beep by time lag, nothing more. All the messages arrive at the same instant, in the smallest fraction of time that exists, something called a 'chronon.' " "Yes," Wald said. "The time it takes one electron to move from one quantum-level to another. That's the Pythagorean point of time measurement." "Thank you. Obviously no gross physical receiver can re- spond to a message that brief, or at least that's what I thought at first. But because there are relay and switching delays, various forms of feedback and so on, in the apparatus itself, the beep arrives at the output end as a complex pulse which has been 'splattered' along the time axis for a full second or more. That's an effect which you can exaggerate by recording the 'splattered' beep on a high-speed tape, the same way you would record any event that you wanted to study in slow motion. Then you tune up the various failure- points in your receiver, to exaggerate one failure, minimize aB the others, and use noise-suppressing techniques to cut out the background." Thor Wald frowned. "You'd still have a considerable garble when you were through. You'd have to sample the messages" "Which is just what I did; Robin's little lecture to me about the ultrawave gave me that hint. I set myself to find out how the ultrawave channel carries so many messages at once, and I discovered that you people sample the incoming pulses every thousandth of a second and pass on one pip only when the wave deviates in a certain way from the mean. I didn't really believe it would work on the Dirac beep, but it turned out just as well: 90 percent as intelligible as the original transmission after it came through the smearing device. I'd already got enough from the beep to put my plan in motion, of coursebut now every voice message in it was available, and crystal-clear: If you select three pips every thousandth of second, you can even pick up an intel- ligible transmission of musica little razzy, but good enough to identify the instruments that are playingand that's a very close test of any communications device." "There's a question of detail here that doesn't quite follow," said Weinbaum, for whom the technical talk was becoming a little too thick to fight through. "Dana, you say that you knew the course this conversation was going to takeyet it isn't being Dirac-recorded, nor can I see any reason why any summary of it would be sent out on the Dirac after- wards." "That's true, Robin. However, when I leave here, I will make such a transcast myself, on my own Dirac. Obviously I willbecause I've already picked it up, from the beep." "In other words, you're going to call yourself upmonths ago." "That's it," Dana said. "It's not as

useful a technique as you might think at first, because it's dangerous to make such broadcasts while a situation is still developing. You can safely 'phone back' details only after the given situation has gone to completion, as a chemist might put it. Once you know, however, that when you use the Dirac you're dealing with time, you can coax some very strange things out of the instrument." She paused and smiled. "I have heard," she said conver- sationally, "the voice of the President of our Galaxy, in 3480, announcing the federation of the Milky Way and the Magellanic Clouds. I've heard the commander of a world- line cruiser, traveling from 8873 to 8704 along the world line of the planet Hathshepa, which circles a star on the rim of NGC 4725, calling for help across eleven million light-yearsbut what kind of help he was calling for, or will be calling for, is beyond my comprehension. And many other things. When you check on me, you'll hear these things tooand you'll wonder what many of them mean. "And you'll listen to them even more closely than I did, in the hope of finding out whether or not anyone was able to understand in time to help." Weinbaum and Wald looked dazed. Her voice became a little more somber. "Most of the voices in the Dirac beep are like thatthey're cries for help, which you can overhear decades or centuries before the senders get into trouble. You'll feel obligated to answer every one, to try to supply the help that's needed. And you'll listen to the succeeding messages and say: 'Did wewill we get there in time? Did we understand in time?' "And in most cases you won't be sure. You'll know the future, but not what most of it means. The farther into the future you travel with the machine, the more incomprehen- sible the messages become, and so you're reduced to telling yourself that time will, after all, have to pass by at its own pace, before enough of the surrounding events can emerge to make those remote messages clear. "The long-run effect, as far as I can think it through, is not going to be that of omniscienceof our consciousness being extracted entirely from the time stream and allowed to view its whole sweep from one side. Instead, the Dirac in effect simply slides the bead of consciousness forward from the present a certain distance. Whether it's five hundred of five thousand years still remains to be seen. At that point the law of diminishing returns sets inor the noise factor begins to overbalance the information, take your choiceand the observer is reduced to traveling in time at the same old speed. He's just a bit ahead of himself." "You've thought a great deal about this," Wald said slowly. "I dislike to think of what might have happened had some less conscientious person stumbled on the beep." "That wasn't in the cards," Dana said. In the ensuing quiet, Weinbaum felt a faint, irrational sense of let-down, of something which had promised more than had been deliveredrather like the taste of fresh bread as compared to its smell, or the discovery that Thor Wald's Swedish "folk song" Nat-og-Dag was only Cole Porter's Night and Day in another language. He recognized the feeling: it was the usual emotion of the hunter when the hunt is over, the born detective's professional version of the past coitum tristre. After looking at the smiling, supple Dana Lje a moment more, however, he was almost content. "There's one more thing," he said. "I don't want to be insufferably skeptical about thisbut I want to see it work. Thor, can we set up a sampling and smearing device such as Dana describes and run a test?" "In fifteen minutes," Dr. Wald said. "We have most of the unit in already assembled form on our big ultrawave receiver, and it shouldn't take any effort to add a high- speed tape unit to it. I'll do it right now." He went out. Weinbaum and Dana looked at each other for a moment, rather like strange cats. Then the security officer got up, with what he knew to be an air of somewhat grim determination, and seized his fiancee's hands, anticipating a struggle. That first kiss was, by intention at least, mostly pro forma. But by the time Wald padded back into the office, the letter had been pretty thoroughly superseded by the spirit. The scientist harrumphed and set his burden on the desk. "This is all there is to it," he said, "but I had to hunt all through the library to find a Dirac record with a beep still on it. Just a moment more while I make connections. . . ." Weinbaum used the time to bring

his mind back to the matter at hand, although not quite completely. Then two tape spindles began to whir like so many bees, and the end- stopped sound of the Dirac beep filled the room. Wald stopped the apparatus, reset it, and started the smearing tape very slowly in the opposite direction. A distant babble of voices came from the speaker. As Weinbaum leaned forward tensely, one voice said clearly and loudly above the rest: "Hello, Earth bureau. Lt. T. L. Matthews at Hercules Station NGC 6341, transmission date 13-22-2091. We have the last point on the orbit curve of your dope-runners plotted, and the curve itself points to a small system about twenty- five light-years from the base here; the place hasn't even got a name on our charts. Scouts show the home planet at least twice as heavily fortified as we anticipated, so we'll need another cruiser. We have a 'can-do' from you in the beep for us, but we're waiting as ordered to get it in the present NGC 6341 Matthews out." After the first instant of stunned amazementfor no amount of intellectual willingness to accept could have prepared him for the overwhelming fact itselfWeinbaum had grabbed a pencil and begun to write at top speed. As the voice signed out he threw the pencil down and looked ex- citedly at Dr. Wald. "Seven months ahead," he said, aware that he was grinning like an idiot. "Thor, you know the trouble we've had with that needle in the Hercules haystack! This orbit-curve trick must be something Matthews has yet to dream upat least he hasn't come to me with it yet, and there's nothing in the situation as it stands now that would indicate a closing time of six months for the case. The computers said it would take three more years." "It's new data," Dr. Wald agreed solemnly. "Well, don't stop there, in God's name! Let's hear some morel" Dr. Wald went through the ritual, much faster this time. "The speaker said: "Nausentampen. Eddettompic. Berobsilom. Airnkaksetchoc. Sanbetogmow. Datdectamset. Domatrosmin. Out." "My word," Wald said. "What's all that?" "That's what I was talking about," Dana Lje said. "At least half of what you get from the beep is just as incom- prehensible. I suppose it's whatever has happened to the English language, thousands of years from now." "No, it isn't," Weinbaum said. He had resumed writing, and was still at it, despite the comparative briefness of the transmission. "Not this sample, anyhow. That, ladies and gentlemen, is codeno language consists exclusively of four-syllable words, of that you can be sure. What's more, ' it's a version of our code. I can't break it down very far it takes a full-time expert to read this stuffbut I get the date and some of the sense. It's March 12, 3022, and there's some kind of a mass evacuation taking place. The message seems to be a routing order." "But why will we be using code?" Dr. Wald wanted to know. "It implies that we think somebody might overhear ussomebody else with a Dirac. That could be very messy." "It could indeed," Weinbaum said. "But we'll find out, I imagine. Give her another spin, Thor." "Shall I try for a picture this time?" Weinbaum nodded. A moment later, he was looking squarely into the green-skinned face of something that looked like an animated traffic signal with a helmet on it. Though the creature had no mouth, the Dirac speaker was saying quite clearly, "Hello, Chief. This is Thammos NGC 2287, transmission date Gor 60, 302 by my calendar, July 2, 2973 by yours. This is a lousy little planet. Everything stinks of oxygen, just like Earth. But the natives accept us and that's the important thing. We've got your genius safely born. Detailed report coming later by paw. NGC 2287 Thammos out." "I wish I knew my New General Catalogue better," Wein- baum said. "Isn't that M 41 in Canis Major, the one with the red star in the middle? And we'll be using non-humanoids there! What was that creature, anyhow? Never mind, spin her again." Dr. Wald spun her again. Weinbaum, already feeling a little dizzy, had given up taking notes. That could come later, all that could come later. Now he wanted only scenes and voices, more and more scenes and voices from the future. They were better than aquavit, even with a beer chaser. 4 THE INDOCTRINATION tape ended, and Krasna touched a button. The Dirac screen darkened, and folded silently back into the desk. "They didn't see their way through to us, not by a long shot," he said. "They didn't see, for instance, that when one section of the government

becomes nearly all-knowing no matter how small it was to begin withit necessarily becomes all of the government that there is. Thus the bureau turned into the Service and pushed everyone else out. "On the other hand, those people did come to be afraid that a government with an all-knowing arm might become a rigid dictatorship. That couldn't happen and didn't happen, because the more you know, the wider your field of possible operation becomes and the more fluid and dynamic a society you need. How could a rigid society expand to other star systems, let alone other galaxies? It couldn't be done." "I should think it could," Jo said slowly. "After all, if you know in advance what everybody is going to do . . ." "But we don't, Jo. That's just a popular fictionor, if you like, a red herring. Not all of the business of the cosmos is carried on over the Dirac, after all. The only events we can ever overhear are those which are transmitted as a message. Do you order your lunch over the Dirac? Of course you don't. Up to now, you've never said a word over the Dirac in your life. "And there's much more to it than that. All dictatorships are based on the proposition that government can somehow control a man's thoughts. We know now that the conscious- ness of the observer is the only free thing in the Universe. Wouldn't we look foolish trying to control that, when our entire physics shows that it's impossible to do so? That's why the Service is in no sense a thought police. We're inter- ested only in acts. We're an Event Police." "But why?" Jo said. "If all history is fixed, why do we bother with these boy-meets-girl assignments, for instance? The meetings will happen anyhow." "Of course they will," Krasna agreed immediately. "But look, Jo. Our interests as a government depend upon the future. We operate as if the future is as real as the past, and so far we haven't been disappointed: the Service is 100 per cent successful. But that very success isn't without its warnings. What would happen if we stopped supervising events? We don't know, and we don't dare take the chance. Despite the evidence that the future is fixed, we have to take on the role of the caretaker of inevitability. We believe that nothing can possibly go wrong . . . but we have to act on the philosophy that history helps only those who help themselves. "That's why we safeguard huge numbers of courtships right through to contract, and even beyond it. We have to see to it that every single person who is mentioned in any Dirac 'cast gets born. Our obligation as Event Police is to make the events of the future possible, because those events are crucial to our societyeven the smallest of them. It's an enormous task, believe me, and it gets bigger and bigger every day. Apparently it always will." "Always?" Jo said. "What about the public? Isn't it going to smell this out sooner or later? The evidence is piling up at a terrific rate." "Yes and no," Krasna said. "Lots of people are smelling it out right now, just as you did. But the number of new people we need in the Service grows fasterit's always ahead of the number of laymen who follow the clues to the truth." Jo took a deep breath. "You take all this as if it were as commonplace as boiling an egg, Kras," he said. "Don't you ever wonder about some of the things you get from the beep? That 'cast Dana Lje picked up from Canes Venatici, for instance, the one from the ship that was traveling back- ward in time? How is that possible? What could be the purpose? Is it" "Pace, pace," Krasna said. "I don't know and I don't care. Neither should you. That event is too far in the future for us to worry about. We can't possibly know its context yet, so there's no sense in trying to understand it. If an Englishman of around 1600 had found out about the Amer- ican Revolution, he would have thought it a tragedy; an Englishman of 1950 would have a very different view of it. We're in the same spot. The messages we get from the really far future have no contexts as yet." "I think I see," Jo said. "I'll get used to it in time, I suppose, after I use the Dirac for a while. Or does my new rank authorize me to do that?" "Yes, it does. But, Jo, first I want to pass on to you a rule of Service etiquette that must never be broken. You won't be allowed anywhere near a Dirac mike until you have it burned into your memory beyond any forgetfulness." "I'm listening, Kras, believe me." "Good. This is the rule: The date of a Serviceman's death must never be

mentioned in a Dirac 'cast." Jo biinked, feeling a little chilly. The reason behind the rule was decidedly tough-minded, but its ultimate kindness was plain. He said, "I won't forget that. I'll want that pro- tection myself. Many thanks, Kras. What's my new assign- ment?" "To begin with," Krasna said, grinning, "as simple a job as I've ever given you, right here on Randolph. Skin out of here and find me that cab driverthe one who mentioned time-travel to you. He's uncomfortably close to the truth; closer than you were in one category. "Find him, and bring him to me. The Service is about to take in a new raw recruiti"

Bindlestiff By James Bush It was inevitable that, occasionally, one of the cruising cities of space would turn criminal. And they made vicious, deadly enemies! I. E yEN to the men of the flying city, the Rift was awesome beyond all human experience. Loneliness was natural between the stars, and starmen were used to it—the stardensity of the average cluster was more than enough to give a veteran Okie claustrophobia; but the enormous empty loneliness of the Rift was unique. To the best of Mayor Amalfi's knowledge, no Okie city had ever crossed the Rift before. The City Fathers, who knew everything, agreed. Amalfi was none too sure that it was wise, for once, to be a pioneer. Ahead and behind, the walls of the Rift shimmered, a haze of stars too far away to resolve into individual points of light. The walls curved gently toward a starry floor, so many parsecs "beneath" the keel of the city that it seemed to be hidden in a rising haze of star dust. "Above," there was nothing; a nothing as final as the slamming of a door—it was the intergalactic gap. The Rift was, in effect, a valley cut in the face of the galaxy. A few stars swam in it, light-millennia apart—stars which the tide of human colonization could never have reached. Only on the far side was there likely to be any inhabited planet, and, consequently, work for a migratory city. On the near side there were the Earth police. They would not chase Amalfi's city across the Rift; they were busy consolidating their conquests of Utopia and the Duchy of Gort, barbarian planets whose ties with Earth were being forcibly reestablished. But they would be happy to see the city turn back —there was a violation of a Vacate order still on the books, and a little matter of a trick— Soberly, Amalfi contemplated the oppressive chasm which the screens showed him. The picture came in by ultrawave from a string of proxy-robots, the leader of which was already parsecs out across the gap. And still the far wall was featureless, just beginning to show a faintly granular texture which gave promise of resolution into individual stars at top magnification. "I hope the food holds out," he muttered. "I never expected the cops to chase us this far." Beside him, Mark Hazieton, the city manager, drummed delicately upon the arm of his chair. "No reason why it shouldn't," he said lazily. "Of course the oil's low, but the Chiorella crop is flourishing. And I doubt that we'll be troubled by mutation in the tanks. Aren't ultronic nexi supposed to vary directly with star-density?" "Sure," Amalfi said, irritated. "We won't starve if everything goes right. If we hadn't been rich enough to risk crossing, I'd of let us be captured and paid the fine instead. But we've never been as long as a year without planet-fall before, and this crossing is going to take all of the four years the Fathers predicted. The slightest accident, and we'll be beyond help." "There'll be no accident," Hazleton said confidently. "There's fuel decomposition—we've never had a flash-fire but there's always a first time. And if the Twenty-third Street spindizzy conks out again—" He stopped abruptly. Through the corner~ of his eye, a minute pinprick of brightness poked insistently into his brain. When he looked directly at the screen, it was still there. He pointed. "Look—is that a cluster? No, it's too small. If that's a freefloating star, it's close." He snatched up a phone. "Give me Astronomy. Hello, Jake. Can you figure me the distance of a star from the

source of an ultraphone broadcast?” “Why, yes,” the phone said. “Wait, and I’ll pick up your image. Ah—I see what you mean; something at 10:00 o’clock center, can’t tell what yet. Dinwiddie pickups on your proxies? Intensity will tell the tale.” The astronomer chuckled like a parrot on the rim of a cracker barrel. “Now if you’ll just tell me how many proxies you have, and how far they—” “Five. Full interval.” “Hm-m-m. Big correction.” There was a long, itching silence. “Amalfi?” “Yeah.” “About ten parsecs, give or take 0.4. I’d say you’ve found a floater, my boy.” “Thanks.” Amalfi put the phone back and drew a deep breath. “What a relief.” “You won’t find any colonists on a star that isolated,” Hazleton reminded him. “I don’t care. It’s a landing point, possibly a fuel or even a food source. Most stars have planets; a freak like this might not, or it might have dozens. Just cross your fingers.” He stared at the tiny sun, his eyes aching from sympathetic strain. A star in the middle of the Rift—almost certainly a wild star, moving at four hundred or five hundred k.p.s. It occurred to him that a people living on a planet of that star might remember the moment when it burst through the near wall and embarked upon its journey into the emptiness. “There might be people there,” he said. “The Rift was swept clean of stars once, somehow. Jake claims that that’s an overdramatic way of putting it, that the mean motions of the stars probably opened the gap naturally. But either way that sun must be a recent arrival, going at quite a clip, since it’s moving counter to the general tendency. It could have been colonized while it was still passing through a populated area. Runaway stars tend to collect hunted criminals as they go by, Mark.” “Possibly,” Hazleton admitted. “By the way, that image is coming in from your lead proxy, ‘way out across the valley. Don’t you have any outriggers? I ordered them sent.” “Sure. But I don’t use them except for routine. Cruising the Rift lengthwise would be suicide. We’ll take a look if you like.” He touched the board. On the screen, the far wall was wiped away. Nothing was left but thin haze; down at that end, the Rift turned, and eventually faded out into a nh of emptiness, soaking into the sands of the stars. “Nothing there. Lots of nothing.” Amalfi moved the switch again. On the screen, apparently almost within hallooing distance, a city was burning. SPACE flight got its start, as a war weapon, amid the collapse of the great Western culture of Earth. In the succeeding centuries it was almost forgotten. The new culture, that vast planar despotism called by historiographers the Bureaucratic State, did not think that way. Not that the original Soviets or their successors forbade space travel. They simply never thought of it. Space flight had been a natural, if late, result of Western thought-patterns, which had always been ambitious for the infinite, but the geometrically flat dialectic of the succeeding culture could not include it. Where the West had soared from the rock like a sequoia, the Soviets spread like lichens, tightening their grip, satisfied to be at the very bases of the pillars of sunlight the West had sought to ascend. The coming of the spindizzy—the antigravity generator, or gravitron—spelled the doom of the flat culture, as the leveling menace of the nuclear reactor had cut down the soaring West. Space flight returned; not, this time, as a technique of tiny ships and individual adventure, but as a project of cities.

There was no longer any reason why a man-carrying vehicle to cross space needed to be small, cramped, organized foreand-aft, penurious of weight. The spindizzy could lift any- thing, and protect it, too. Most important, its operation was rooted in a variation of the value of c as a limit. The overdrive, the meteor screen, and antigravity had all avrived in one compact package, labeled “G = (2PC)2/(BU)2.” Every culture has its characteristic mathematic, in which histoniographers can see its inevitable form. This one, couched in the algebra of the Magian culture, pointing toward the matrix-mechanics of the new Nomad era, was a Western discovery. Blackett had found the essential relationship between gravity and magnetism, and Dirac had explained why it had not been detected before. Yet despite all of the minority groups butchered or “concentrated” by the Bureaucratic State, only the pure mathematicians went unsuspected about the destruction of that State, innocent

even in their own minds of revolutionary motives. The exodus began. At first it was logical enough. The Aluminum Trust, the Thorium Trust, the Germanium Trust put their plants aloft bodily, to mine the planets. The Steel Trust made it possible for the rest, for it had turned Mars into the Pittsburgh of the solar system, and lulled the doubts of the State. But the Thorium Trust's Plant No. 8 never came back. The revolution against the planar culture began as simply as that. The first of the Okie cities soared away from the solar system, looking for work among the colonists—colonists left stranded among the stars by the ebb tide of Western civilization. The new culture began among these nomad cities, and before long Earth was virtually deserted. But Earth laws, though much changed, survived. It was still possible to make a battleship, and the Okies were ungainly. Steam shovels, by and large, had been more characteristic of the West than tanks had been, but in a fight between the two the outcome was predictable; that situation never changed. The cities were the citizens—but there were still police. AND in the Rift, where there were no police, a city was burning. It was all over in a few minutes. The city bucked and toppled in a maelstrom of lightning. Feeble flickers of resistance spat around its edges—and then it no longer had any edges. Sections of it broke off, and melted like wraiths. From its ardent center, a few hopeless life ships shot out into the gap; whatever was causing the destruction let them go. No conceivable life ship could live long enough to cross the Rift. Amalfi cut in the audio circuit, filling the control room with a howl of static. Far behind the wild blasts of sound, a tiny voice was shouting desperately: "Rebroadcast if anyone hears us. Repeat: we have the fuelless drive. We're destroying our model and evacuating our passenger. Pick him up if you can. We're being blown up by a bindlestiff. Rebroadcast if—" Then there was nothing left but the skeleton of the city, glowing whitely, evaporating in the blackness. The pale, innocent light of the guide-beam for a Bethe blaster played over it, but it was still impossible to see who was wielding the weapon. The Dinwiddie circuits in the proxy were compensating for the glare, so that nothing was coming through to the screen that did not shine with its own light. The terrible fire died slowly, and the stars brightened. As the last spark flared and went out, a shadow loomed against the distant starwall. Hazieton drew his breath in sharply. "Another city! So some outfits really do go bindlestiff. And we thought we were the first out here!" Amalfi nodded, feeling a little sick. That one city should destroy another was bad enough. But it was even more of a wrench to realize that the whole scene was virtually ancient history. Ultrawave transmission was faster than light, but by no means instantaneous; the dark city had destroyed its smaller counterpart nearly two years ago, and must now be beyond pursuit. It was even beyond identification, for no orders could be sent now to the proxy which would result in any action until another two years had passed. "You'd think some heavy thinker on Earth would've figured out a way to make Diracs compact enough to be mounted in a proxy," he grumbled. "They haven't got anything better to do back there." Hazleton had no difficulty in penetrating to the speech's real meaning. He said, "Maybe we can still smoke 'em out, boss." "Not a chance. We can't afford a side jaunt." "Well, I'll send out a general warning on the Dirac," Hazie ton said. "It's barely possible that the cops will be able to invest the Rift before the 'stiff gets out." "That'll trap us neatly, won't it? Besides, that bindlestiff isn't going to leave the Rift." "Eh? How do you know?" "Did you hear what the SOS said about a fuelless drive?" "Sure," Hazieton said uneasily, "but the guy who knows how to build it must be dead by now, even if he escaped the burning." "We can't be sure of that—and that's the one thing that the 'stiff has to make sure of. If they get ahold of it, 'stiffs won't be a rarity any more. There'll be widespread piracy throughout the galaxy!" "That's a big statement, Amalfi." "Think, Mark. Pirates died out a thousand years ago on Earth when sailing ships were replaced by fueled ships. The fueled ships were faster—but couldn't themselves become pirates, because they had to touch civilized ports

regularly to coal up. We're in the same state. But if that bindlestiff can actually get its hands on a fuelless drive—" Hazleton stood up, kneading his hands uneasily. "I see what you mean. Well, there's only one place where a life ship could go out here, and that's the wild star. So the 'stiff is probably there, too, by now." He looked thoughtfully at the screen, now glittering once more only with anonymous stars. "Shall I send out the warning or not?" "Yes, send it out. It's the law. But I think it's up to us to deal with the 'stiff; we're familiar with ways of manipulating strange cultures, whereas the cops would just smash things up if they did manage to get here in time." "Check. Our course as before, then." "Necessarily." Still the city manager did not go. "Boss," he said at last, "that outfit is heavily armed. They could muscle in on us with no trouble." "Mark, I'd call you yellow if I didn't know you were just lazy," Amalfi growled. He stopped suddenly and peered up the length of Hazleton's figure to his long, horselike face. "Or are you leading up to something?" Hazleton grinned like a small boy caught stealing jam. "Well, I did have something in mind. I don't like 'stiffs, especially killers. Are you willing to entertain a small scheme?" "Ah," Amalfi said, relaxing. "That's better. Let's hear it." II. THE wild star, hurling itself through the Rift on a course that would not bring it to the far wall for another ten thousand Earth years, carried with it six planets, of which only one was even remotely Earthlike. That planet shone deep, chlorophyll green on the screens long before it had grown enough to assume a recognizable disk shape. The proxies called in now, arrived one by one, circling the new world like a swarm of ten-meter footballs, eying it avidly. It was everywhere the same: savagely tropical, in the throes of a geological period roughly comparable to Earth's Carboniferous era. Plainly, the only planet would be nothing but a way station; there would be no work for pay there. Then the proxies began to pick up weak radio signals. Nothing, of course, could be made of the language; Amalfi turned that problem over to the City Fathers at once. Nevertheless, he continued to listen to the strange gabble while he warped the city into an orbit. The voices sounded ritualistic, somehow. The City Fathers said: "THIS LANGUAGE IS A VARIANT OF PATTERN G, BUT THE SITUATION IS AMBIGUOUS. GENERALLY WE WOULD SAY THAT THE RACE WHICH SPEAKS IT IS INDIGENOUS TO THE PLANET, A RARE CASE BUT BY NO MEANS UNHEARD OF. HOWEVER, THERE ARE TRACES OF FORMS WHICH MIGHT BE DEGENERATES OF ENGLISH, AS WELL AS STRONG EVIDENCES OF DIALECT MIXTURES SUGGESTING A TRIBAL SOCIETY. THIS LATTER FACT IS NOT CONSONANT WITH THE POSSESSION OF RADIO NOR WITH THE UNDERLYING SAMENESS OF THE PATTERN. UNDER THE CIRCUMSTANCES WE MUST POSITIVELY FORBID ANY MACHINATIONS BY MR. HAZLETON ON THIS VENTURE." "I didn't ask them for advice," Amalfi said. "And what good is a lesson in etymology at this point? Still, Mark, watch your step—" "Remember Thor V," Hazleton said, mimicking the mayor's father-bear voice to perfection. "All right. Do we land?" For answer, Amalfi grasped the space stick, and the city began to settle. Amalfi was a true child of space, a man with an intuitive understanding of the forces and relationships which were involved in astronautics; in delicate situations he invariably preferred to dispense with instruments. Sensitively he sidled the city downward, guiding himself mainly by the increasingly loud chanting in his earphones. At four thousand meters there was a brief glitter from amid the dark-green waves of the treetops. The proxies converged upon it slowly, and on the screens a turreted roof showed; then two, four, a dozen. There was a city there—a homebody, grown from the earth. Closer views showed it to be walled, the wall standing just inside a clear ring where nothing grew; the greenery between the towers was camouflage. At three thousand, a flight of small ships burst from the city like frightened birds, trailing feathers of flame. "Gunners!" Hazleton snapped into his mike. "Posts!" Amalfi shook his head, and continued to bring his city closer to the ground. The fire-tailed birds wheeled around them, dipping and flashing, weaving a pattern in smoky plumes; yet an Earthman would have thought, not of birds, but of the nuptial flight of drone bees. Amalfi, who had never seen a bird or a bee,

nevertheless sensed the ceremony in the darting cortege. With fitting solemnity he brought the city to a stop beside its jungle counterpart, hovering just above the tops of the giant cycads. Then, instead of clearing a landing area with the usual quick scythe of the mesotron rifles, he polarized the spindizzy screen. The base and apex of the Okie city grew dim. What happened to the giant ferns and horsetails directly beneath it could not be seen—they were flattened into synthetic fossils in the muck in a split second—but those just beyond the rim of the city were stripped of their fronds and splintered, and farther out, in a vast circle, the whole forest bowed low away from the city to a clap of sunlit thunder. Unfortunately, the Twenty-third Street spindizzy, always the weakest link, blew out at the last minute and the city dropped the last five meters in free fall. It arrived on the surface of the planet rather more cataclysmically than Amalfi had intended. Hazleton hung on to his bucket seat until City Hall had stopped swaying, and then wiped blood from his nose with a judicious handkerchief. "That," he said, "was one dramatic touch too many. I'd best go have that spindizzy fixed again, just in case." Amalfi shut off the controls with a contented gesture. "If that bindlestiff should show," he said, "they'll have a tough time amassing any prestige here for a while. But go ahead, Mark, it'll keep you busy." THE mayor eased his barrel-shaped bulk into the lift shaft and let himself be slithered through the friction fields to the street. Outside, the worn facade of City Hall shone with sunlight, and the City's motto—MOW YOUR LAWN, LAIW? —was clear even under its encrustation of verdigris. Amalfi was glad that the legend could not be read by the local folk—it would have spoiled the effect. Suddenly he was aware that the chanting he had been hearing for so long through the earphones was thrilling through the air around him. Here and there, the sober, utilitarian faces of the Okie citizens were turning to look down the street, and traces of wonder, mixed with amusement and an unaccountable sadness, were in those faces. Amalfi turned. A procession of children was coming toward him: children wound in mummylike swatches of cloth down to their hips, the strips alternately red and white. Several free-swinging panels of many-colored fabric, as heavy as silk, swirled about their legs as they moved. Each step was followed by a low bend, hands outstretched and fluttering, heads rolling from shoulder to shoulder, feet moving in and out, toe-heel-toe, the whole body turning and turning again. Bracelets of objects like dried pods rattled at wrists and bare ankles. Over it all the voices chanted like water flutes. Amalfi's first wild reaction was to wonder why the City Fathers had been puzzled about the language. These were human children. Nothing about them showed any trace of alienage. Behind them, tall black-haired men moved in less agile pro- cession, sounding in chorus a single word which boomed through the skirl and pitter of the children's dance at widespaced intervals. The men were human, ~too; their hands, stretched immovably out before them, palms up, had five fingers, with fingernails on them; their beards had the same topography as human beards; their chests, bared to the sun by a symbolical rent which was torn at the same place in each garment, and marked identically by a symbolical wound rubbed on with red chalk, showed ribs where ribs ought to be, and the telltale tracings of clavicles beneath the skin. About the women there might have been some doubt. They came at the end of the procession, all together in a huge cage drawn by lizards. They were all naked and filthy and sick, and could have been any kind of animal. They made no sound, but only stared out of purulent eyes, as indifferent to the Okie city and its owners as to their captors. Occasionally they scratched, reluctantly, wincing from their own claws. The children deployed around Amalfi, evidently picking him out as the leader because he was the biggest. He had expected as much; it was but one more confirmation of their humanity. He stood still while they made a circle and sat down, still chanting and shaking their wrists. The men, too, made a circle, keeping their faces toward Amalfi, their hands outstretched. At last that reeking cage was drawn into the double ring, virtually to Amalfi's feet. Two male attendants unhitched the docile lizards and led them away.

Abruptly the chanting stopped. The tallest and most impressive of the men came forward and bent, making that strange gesture with fluttering hands over the street. Before Amalfi quite realized what was intended, the stranger had straightened, placed some heavy object in his hand, and retreated, calling aloud the single word the men had been intoning before. Men and children responded together in one terrific shout, and then there was silence.
Amalfi was alone in the middle of the circle, with the cage. He looked down at the thing in his hand. It was—a key. M IRAMON shifted nervously in the chair, the great black sawtoothed feather stuck in his topknot bobbing uncer tainly. It was a testimony of his confidence in Amalfi that he sat in it at all, for in the beginning he had squatted, as was customary on his planet. Chairs were the uncomfortable prerogatives of the gods. "I myself do not believe in the gods," he explained to Amalfi, bobbing the feather. "It would be plain to a technician, you understand, that your city was simply a product of a technology superior to ours, and you yourselves to be men such as we are. But on this planet religion has a terrible force, a very immediate force. It is not expedient to run counter to public sentiment in such matters."
Amalfi nodded. "From what you tell me, I can believe that. Your situation is unique. What, precisely, happened 'way back then?" Miramon shrugged. "We do not know," he said. "It was nearly eight thousand years ago. There was a high civilization here then—the priests and the scientists agree on that. And the climate was different; it got cold regularly every year, I am told, although how men could survive such a thing is difficult to understand. Besides, there were many more stars—the ancient drawings show thousands of them, though they fail to agree on the details." "Naturally. You're not aware that your sun is moving at a terrific rate?" "Moving?" Miramon laughed shortly. "Some of our more mystical scientists have that opinion—they maintain that if the planets move, so must the sun. It is an imperfect analogy, in my opinion. Would we still be in this trough of nothingness if we were moving?" "Yes, you would—you are. You underestimate the size of the Rift. It's impossible to detect any parallax at this distance, though in a few thousand years you'll begin to suspect it. But while you were actually among the stars, your ancestors could see it very well, by the changing positions of the neighboring suns." Miramon looked dubious. "I bow to your superior knowledge, of course. But, be that as it may—the legends have it that for some sin of our people, the gods plunged us into this starless desert, and changed our climate to perpetual heat. This is why our priests say that we are in Hell, and that to be put back among the cool stars again, we must redeem our sins. We have no Heaven as you have defined the term—when we die, we die damned; we must win 'salvation' right here in the mud. The doctrine has its attractive features, under the circumstances." Amalfi meditated. It was reasonably clear, now, what had happened, but he despaired of explaining it to Miramon—hard common sense sometimes has a way of being impenetrable. This planet's axis had a pronounced tilt, and the concomitant amount of libration. That meant that, like Earth, it had a Draysonian cycle: every so often, the top wabbled, and then resumed spinning at a new angle. The result, of course, was a disastrous climatic change. Such a thing happened on Earth roughly once every twenty-five thousand years, and the first one in recorded history had given birth to some extraordinary silly legends and faiths—sillier than those the Hevians entertained, on the whole. Still, it was miserable bad luck for them that a Draysonian overturn had occurred almost at the same time that the planet had begun its journey across the Rift. It had thrown a very high culture, a culture entering its ripest phase, back forcibly into the Interdestructional phase without the slightest transition. The planet of He was a strange mixture now. Politically the regression had stopped just before barbarism—a measure of the lofty summits this race had scaled at the time of the catastrophe—and was now in reverse, clawing through the stage of warring city-states. Yet the basics of the scientific techniques of eight thousand years ago had not been forgotten; now they were exfoliating, bearing "new" fruits. Properly, city-states should fight each other with swords,

not with missile weapons, chemical explosives, and supersonics—and flying should be still in the dream stage, a dream of flapping wings at that; not already a jet-propelled fact. Astronomical and geological accident had mixed history up for fair. " HAT would have happened to me if I'd unlocked that cage?" Amalfi demanded suddenly. Miramon looked sick. "Probably you would have been killed —or they would have tried to kill you, anyhow," he said, with considerable reluctance. "That would have been releasing Evil again upon us. The priests say that it was women who brought about the sins of the Great Age. In the bandit cities, to be sure, that savage creed is no longer maintained—which is one reason why we have so many deserters to the bandit cities. You can have no idea of what it is like to do your duty to the race each year as our law requires. Madness!" He sounded very bitter. "This is why it is hard to make our people see how suicidal the bandit cities are. Everyone on this world is weary of fighting the jungle, sick of trying to rebuild the Great Age with handfuls of mud, of maintaining social codes which ignore the presence of the jungle—but most of all, of serving in the Temple of the Future. In the bandit cities the women are clean, and do not scratch one." "The bandit cities don't fight the jungle?" Amalfi asked. "No. They prey on those who do. They have given up the religion entirely—the first act of a city which revolts is to slay its priests. Unfortunately, the priesthood is essential; and our beast-women must be borne, since we cannot modiQy one tenet without casting doubt upon all—or so they tell us. It is only the priesthood which keeps us fighting, only the priesthood which teaches us that it is better to be men than mud-puppies. So we —the technicians—follow the rituals with great strictness, stupid though some of them are, and consider it a matter of no moment that we ourselves do not believe in the gods." "Sense in that," Amalfi admitted. Miramon, in all conscience, was a shrewd apple. If he was representative of as large a section of Hevian thought as he believed himself to be, much might yet be done on this wild and untamed world. "It amazes me that you knew to accept the key as a trust," Miramon said. "It was precisely the proper move—but how could you have guessed that?"

Amalfi grinned. "That wasn't hard. I know how a man looks when he's dropping a hot potato. Your priest made all the gestures of a man passing on a sacred trust, but he could hardly wait until he'd got it over with. Incidentally, some of those women are quite presentable now that Dee's bathed 'em and Medical has taken off the under layers. Don't look so alarmed, we won't tell your priests—I gather that we're the foster fathers of He from here on out."

"You are thought to be emissaries from the Great Age," Miramon agreed gravely. "What you actually are, you have not said." "True. Do you have migratory workers here? The phrase comes easily in your language; yet I can't see how—" "Surely, surely. The singers, the soldiers, the fruit-pickers—all go from city to city, selling their services." Suddenly the Hevian got it. "Do you . . . do you imply . . . that your resources are for sale? For sale to us?" "Exactly, Miramon." "But how shall we pay you?" Miramon gasped. "All of what we call wealth, all that we have, could not buy a length of the cloth in your sash!" Amalfi thought about it, wondering principally how much of the real situation Miramon could be expected to understand. It occurred to him that he had persistently underestimated the Hevian so far; it might be profitable to try the full dose—and hope that it wasn't lethal. "TT'S this way," Amalfi said. "In the culture we belong to, a .1 certain metal, called germanium, serves for money. You have enormous amounts of it on your planet, but it's very hard to obtain, and I'm sure you've never even detected it. One of the things we would like is your permission to mine for that metal." Miramon's pop-eyed skepticism was comical. "Permission?" he squeaked. "Please, Mayor Amalfi—is your ethical code as foolish as ours? Why do you not mine this metal without permission and be done with it?"

"Our law enforcement agencies would not allow it. Mining your planet would make us rich—almost unbelievably rich. Our assays show, not only fabulous amounts of germanium, but also the presence of certain drugs in your jungle—drugs which are known to be anti-agapics—" "Sir?" "Sorry, I

mean that, used properly, they cure death.” Miramon rose with great dignity. “You are mocking me,” he said. “I will return at a later date and perhaps we may talk again.” “Sit down, please,” Amalfi said contritely. “I had forgotten that death is not everywhere known to be a disease. It was conquered so long ago—before space flight, as a matter of fact. But the pharmaceuticals involved have always been in very short supply, shorter and shorter as man spread throughout the galaxy. Less than a two-thousandth of one percent of our present population can get the treatment now, and an ampoule of any anti-agapic, even the most inefficient ones, can be sold for the price the seller asks. Not a one of the anti-agapics has ever been synthesized, so if we could harvest here—” “That is enough, it is not necessary that I understand more,” Miramon said. He squatted again, reflectively. “All this makes me wonder if you are not from the Great Age after all. Well— this is difficult to think about reasonably. Why would your culture object to your being rich?” “It wouldn’t, as long as we got it honestly. We shall have to show that we worked for our riches. We’ll need a written agreement. A permission.” “That is clear,” Miramon said. “You will get it, I am sure. I cannot grant it myself. But I can predict what the priests will ask you to do to earn it.” “What, then? This is just what I want to know. Let’s have it.” “First of all, you will be asked for the secret of this . . . this cure for death. They will want to use it on themselves, and hide it from the rest of us. Wisdom, perhaps; it would make for more desertions otherwise—but I am sure they will want it.” “They can have it, but we’ll see to it that the secret leaks out. The City Fathers know the therapy. What next?” “You must wipe out the jungle.” Amalfi sat back, stunned. Wipe out the jungle! Oh, it would be easy enough to lay waste almost all of it—even to give the Hevians energy weapons to keep those wastes clear—but sooner or later, the jungle would come back. The weapons would disintegrate in the eternal moisture, the Hevians would not take proper care of them, would not be able to repair them —how would the brightest Greek have repaired a shattered X-ray tube, even if he had known how? The technology didn’t exist. No, the jungle would come back. And the cops would come to He to see whether or not the Okie city had fulfilled its contract —and would find the planet as raw as ever. Good-by to riches. This was jungle climate. There would be jungles here until the next Draysonian catastrophe, and that was that. “Excuse me,” he said, and reached for the control helmet. “Give me the City Fathers,” he said into the mouthpiece. “SPEAK,” the spokesman vodeur said after a while. “How would you go about wiping out a jungle?” There was a moment’s silence. “SODIUM FLUOSILICATE SPRAY WOULD SERVE. IN A WET CLIMATE IT WOULD CREATE FATAL LEAF-BLISTER. ALSO THERE IS A FORGOTTEN COMPOUND, 2,4-D WHICH WOULD SERVE FOR STUBBORN SECTIONS. OF COURSE THE JUNGLE WOULD RETURN.” “That’s what I meant. Any way to make the job stick?” “NO, UNLESS THE PLANET EXHIBITS DRAYSONIANISM” “What?” “NO, UNLESS THE PLANET EXHIBITS DRAYSONIANISM. IN THAT CASE ITS AXIS MIGHT BE REGULARIZED. IT HAS NEVER BEEN TRIED, BUT THEORETICALLY IT IS QUITE SIMPLE; A BILL TO REGULARIZE EARTH’S AXIS WAS DEFEATED BY THREE VOTES IN THE EIGHTY-SECOND COUNCIL, OWING TO THE OPPOSITION OF THE CONSERVATION LOBBY.” “Could the city handle it?” “NO. THE COST WOULD BE PROHIBITIVE. MAYOR AMALFI, ARE YOU CONTEMPLATING TIPPING THIS PLANET? WE FORBID IT! EVERY INDICATION SHOWS—” Amalfi tore the helmet from his head and flung it across the room. Miramon jumped up in alarm. “Hazleton!” The city manager shot through the door as if he had been kicked through it on roller skates. “Here, boss—what’s the—” “Get down below and turn off the City Fathers—fast, before they catch on and do something! Quick, man—” Hazleton was already gone. On the other side of the control room, the phones of the helmet squawked dead data in italic capitals. Then, suddenly, they went silent. The City Fathers had been turned off, and Amalfi was ready to move a world. III. THE fact that the City Fathers could not be consulted—for the first time in two centuries—made the job more difficult than it need have been, barring their conservatism. Tipping the planet, the crux of the job, was simple enough in essence; the spindizzy could handle it. But the side-effects

of the medicine might easily prove to be worse than the disease. The problem was seismological. Rapidly whirling objects have a way of being stubborn about changing their positions. If that energy were overcome, it would have to appear somewhere else—the most likely place being multiple earthquakes. Too, very little could be anticipated about the gravities of the task. The planet's revolution produced, as usual, a sizable magnetic field. Amalfi did not know how well that field would take to being tipped with relation to the space-lattice which it distorted, nor just what would happen when the spindizzies polarized the whole gravity field. During "moving day" the planet would be, in effect, without magnetic moment of its own, and since the Calculator was one of the City Fathers, there was no way of finding out where the energy would reappear, in what form, or in what intensity. He broached the latter question to Hazleton. "If we were dealing with an ordinary case, I'd say it would show up as velocity," he pointed out. "In which case we'd be in for an involuntary junket. But this is no ordinary case. The mass involved is . . . well, it's planetary, that's all. What do you think, Mark?"

"I don't know what to think," Hazleton admitted. "When we move the city, we change the magnetic moment of its component atoms; but the city itself doesn't revolve, and doesn't have a gross magnetic moment. Still—we could control velocity; suppose the energy reappears as heat, instead? There'd be nothing left but a cloud of gas." Amalfi shook his head. "That's a bogey. The gyroscopic resistance may show up as heat, sure, but not the magnetogravitic. I think we'd be safe to expect it to appear as velocity, just as in ordinary spindizzy operation. Figure the conversation equivalency and tell me what you get." Hazleton bent over his slide rule, the sweat standing out along his forehead and above his mustache in great heavy droplets. Amalfi could understand the eagerness of the Heyans to get rid of the jungle and its eternal humidity—his own clothing had been sopping ever since the city had landed here. "Well," the city manager said finally, "unless I've made a mistake somewhere, the whole kit and kaboodle will go shooting away from here at about half the speed of light. That's not too bad—less than cruising speed for us. We could always loop around and bring it back into its orbit."

"Ah, but could we? Remember, we don't control it! It appears automatically when we turn on the spindizzies. We don't even know in which direction we're going to move." "Yes we do," Hazleton objected. "Along the axis of spin, of course." "Cant? And torque?" "No problem—yet there is. I keep forgetting we're dealing with a planet instead of electrons." He applied the slipstick again. "No soap. Can't be answered without the Calculator and he's turned off. But if we can figure a way to control the flight, it won't matter in the end. There'll be perturbations of the other planets when this one goes massless, whether it moves or not, but nobody lives there anyhow." "All right, go figure a control system. I've got to get the Geology men to—"

The door slid back suddenly, and Amalfi looked over his shoulder. It was Anderson, the perimeter sergeant. The man was usually blasé in the face of all possible wonders, unless they threatened the city. "What's the matter?" Amalfi said, alarmed. "Sir, we've gotten an ultrawave from some outfit claiming to be refugees from another Okie—claim they hit a bindlestiff. They've crashlanded on this planet up north and they're being mobbed by one of the local bandit towns. They were holding 'em off and yelling for help, and then they stopped transmitting." Amalfi heaved himself to his feet. "Did you get a bearing?" he demanded. "Yes, sir." "Give me the figures. Come on, Mark. We need those boys." THEY grabbed a cab to the edge of the city, and went the rest of the way on foot, across the supersonics-cleared strip of bare turf which surrounded the Hevian town. The turf felt rubbery; Amalfi suspected that some rudimentary form of friction-field was keeping the mud in a state of stiff gel. He had visions of foot-soldiers sinking suddenly into liquid ooze as defenders turned off the fields, and quickened his pace. Inside the gates, the guards summoned a queer, malodorous vehicle which seemed to be powered by the combustion of hydrocarbons, and they were shot through the streets toward Miramon. Throughout the journey, Amalfi clung to a cloth strap

in an access of nervousness. He had never traveled right on the surface at any speed before, and the way things zipped past him made him jumpy. "Is this bird out to smash us up?" Hazleton demanded petulantly. "He must be doing all of four hundred kilos an hour." "I'm glad you feel the same way," Amalfi said, relaxing a little. "Actually I'll bet he's doing less than two hundred. It's just the way the—" The driver, who had been holding his car down to a conservative fifty out of deference to the strangers, wrenched the machine around a corner and halted neatly before Miramon's door. Amalfi got out, his knees wobbly. Hazleton's face was a delicate puce. "I'm going to figure a way to make our cabs operate outside the city," he muttered. "Every time we make a new planet-fall, we have to ride in ox carts, on the backs of bull kangaroos, in hot-air balloons, steam-driven airscrews, things that drag you feet first and face down through tunnels, or whatever else the natives think is classy transportation. My stomach won't stand much more." Amalfi grinned and raised his hand to Miramon, whose expression suggested laughter smothered with great difficulty. "What brings you here?" the Hevian said. "Come in. I have no chairs, but—" "No time," Amalfi said. He explained the situation quickly. "We've got to get those men out of there, if they're still alive. This bindlestiff is a bandit city, like the ones you have here, but it has all the stuff we have and more besides. It's vital to find out what these survivors know about it. Can you locate the town that's holding them? We have a fix on it." Miramon went back into his house—actually, like all the other living quarters in the town, it was a dormitory housing twenty-five men of the same trade or profession—and returned with a map. The map-making conventions of He were anything but self-explanatory, but after a while Hazieton figured out the symbolism involved. "That's your city, and here's ours," he said, pointing. "Right? And this peeled orange is a butterfly grid. I've always claimed that was a lot more faithful to spherical territory than our parabolic projection, boss." "Easier still to express what you want to remember as a topological relation," Amalfi grunted. "Show Miramon where the signals came from." "Up here, on this wing of the butterfly." Miramon frowned. "That can only be Fabr-Suithe. A very bad place to approach, even in the military sense. However, we shall have to try. Do you know what the end result will be?" "No; what?" "The bandit cities will come out in force to hinder the Great Work. They do not fear you now—they fear nothing, we think they take drugs—but they have seen no reason to risk probable huge losses by attacking you. When you attack one of them, they will have that reason; they learn hatred very quickly." Amalfi shrugged. "We'll chance it. We'll pick our own town up and go calling; if they don't want to deliver up these Okies—" "Boss—" "Eh?" "How are you going to get us off the ground?" Amalfi could feel his ears turning red, and swore. "I forgot that Twenty-third Street machine. And we can't get anything suitable into a Hevian rocket—a pile would fit easily enough, but a frictionator or a dismounted spindizzy wouldn't, and there'd be no point in taking popguns—Maybe we could gas them." "Excuse me," Miramon said, "but it is not certain that the priests will authorize the use of the rockets. We had best drive over to the temple directly and ask." "Belsen and bebop!" Amalfi said. It was the oldest oath in his repertoire. TALK, even with electrical aid, was impossible in the rocket. The whole machine roared like a gigantic tamtam to the vibration of the jets. Morosely Amalfi watched Hazleton connecting the mechanism in the nose with the powerleads from the pile—no mean balancing feat, considering the way the rocket pitched in its passage through the tortured Hevian air currents. The reactor itself had not been filled all the way, since its total capacity could not have been used, and the heavy water sloshed and foamed in the transparent cube. There had been no difficulty with the priests about the little rocket task force itself. To the end of his life Amalfi was sure that the straightfaced Miramon had invented the need for religious permission, just to get the two Okies back into the ground car again. Still, the discomforts of that ride were small compared to this one. The pilot shifted his feet on the treadles and the deck pitched. Metal rushed

back under Amalfi's nose, and he found himself looking through misty air at a crazily canted jungle. Something long, thin, and angry flashed over it and was gone. At the same instant there was a piercing inhuman shriek, sharp enough to dwarf for a long instant the song of the rocket. Then there were more of the same: ptsouiiirrr! ptsouiiirrr! ptsouiiirrr! The machine jerked to each one and now and then shook itself violently, twisting and careening across the jungle-top. Amalfi had never felt so helpless before in his life. He did not even know what the noise was; he could only be sure that it was ill-tempered. The coarse blaam of high explosive, when it began, was recognizable—the city had often had occasion to blast on jobs—but nothing in his experience went kerchowkerchowkerchowkerchowkerchow like a demented vibratory drill, and the invisible thing that screamed its own pep-yell as it flew—eeeeeeeeeyowKRCHKackackarackarackaracka—seemed wholly impossible. He was astonished to discover that the hull around him was stippled with small holes, real holes with the slipstream fluting over them. It took him what seemed to be three weeks to realize that the whooping and cheer-leading which meant nothing to him was riddling the ship and threatening to kill him any second. Someone was shaking him. He lurched to his knees, trying to unfreeze his eyeballs. "Amalfi! Ainalfi!" The voice, though it was breathing on his ear, was parsecs away. "Pick your spot, quick! They'll have us shot down in a—" Something burst outside and threw Amalfi to the deck. Doggedly he crawled to the port and peered down through the shattered plastic. The bandit Hevian city swooped past, upside down. He was sick suddenly, and the city was lost in a web of tears. The second time it came he managed to see which building had the heaviest guard, and pointed, choking. The rocket threw its tailfeathers over the nearest cloud and bored beak-first for the ground. Amalfi hung on to the edge of the suddenly-blank deck port, his own blood spraying back in a fine mist into his face from his cut fingers. "Now!"

Nobody heard, but Hazleton saw his nod. A blast of pure heat blew through the upended cabin as the pile blew off the shielded nose of the rocket. Even through the top of his head, the violet-white light of that soundless concussion nearly blinded Amalfi, and he could feel the irradiation of his shoulders and chest. He would have no colds for the next two or three years, anyhow—every molecule of histamine in his blood must have been detoxified at that instant. The rocket yawed wildly, and then came under control again. The ordnance noises had already quit, cut off at the moment of the flash. The bandit city was blind. The sound of the jets cut off, and Amalfi understood for the first time what an "aching void" might be. The machine fell into a steep glide, the air howling dismally outside it. Another rocket, under the guidance of one of Hazleton's assistants, dived down before it, scything a narrow runway in the jungle with a mesotron rifle—for the bandit towns kept no supersonic no-plant's-land between themselves and the rank vegetation. The moment the rocket stopped moving, Amalfi and a handpicked squad of Okies and Hevians were out of it and slogging through the muck. From inside the bandit city drifted a myr iad of screams—human screams now, screams of agony and terror, from men who thought themselves blinded for life. Amalfi had no doubt that many of them were. Certainly anyone who had had the misfortune to be looking at the sky when the pile had converted itself into photons would never see again. But the law of chance would have protected most of the renegades, so speed was vital. The mud built up heavy pads under his shoes, and the jungle did not thin out until they hit the town's wall itself. The gates had been rusted open years ago, and were choked with greenery. The Hevians hacked their way through it with practiced knives and cunning. Inside, the going was still almost as thick. The city proper presented a depressing face of proliferating despair. Most of the buildings were completely enshrouded in vines, and many were halfway toward ruins. Iron-hard tendrils had thrust their way between stones, into windows, under cornices, up drains and chimney funnels. Poison-green, succulent leaves plastered themselves greedily upon every surface, and in shadowed places there were huge blood-colored fungi which smelled like a man six days dead; the sweetish taint

hung heavily in the air. Even the paving blocks had sprouted— inevitably, since, whether by ignorance or laziness, most of them had been cut from green wood. The screaming began to die into whimpers. Amalfi did his best to keep from inspecting the inhabitants. A man who believes he has just been blinded permanently is not a pretty sight, even when he is wrong. Yet it was impossible not to notice the curious mixture of soiled finery and gleamingly clean nakedness; it was as if two different periods had mixed in the city, as if a gathering of Hruntan nobles had been sprinkled with Noble Savages. Possibly the men who had given in completely to the jungle had also slid back far enough to discover the pleasures of bathing—if so, they would shortly discover the pleasures of the mud-wallow, too, and would not look so noble after that. "Amalfi, here they are—" The mayor's suppressed pity for the blinded men evaporated when he got a look at the imprisoned Okies. They had been systematically mauled to begin with, and after that sundry little attentions had been paid to them which combined the best features of savagery and decadence. On~ of them, mercifully, had been strangled by his comrades early in the "trial." Another, a basket case, should have been rescued, for he could still talk rationally, but he pleaded so persistently for death that Amalfi had him shot in a sudden fit of sentimentality. Of the other three men, all could walk and talk, but two were mad. The catatonic was carried out on a stretcher, and the manic was gagged and led gingerly away. "How did you do it?" asked the rational man in Russian, the dead universal language of deep space. He was a human skeleton, but he radiated a terrific personal force. He had lost his tongue early in the "questioning," but had already taught himself to talk by the artifical method—the result was inhuman, but it was intelligible. "They were coming down to kill us as soon as they heard your jets. Then there was a sort of a flash, and they all started screaming—a pretty sound, let me tell you." "I'll bet," Amalfi said. "That 'sort of a flash' was a photon explosion. It was the only way we could figure on being sure of getting you out alive. We thought of trying gas, but if they had had gas masks they would have been able to kill you anyhow." "I haven't seen any masks, but I'm sure they have them. There are traveling volcanic gas clouds in this part of the planet, they say; they must have evolved some absorption device-charcoal is well known here. Lucky we were so far underground, or we'd be blind, too, then. You people must be engineers." "More or less," Amalfi agreed. "Strictly, we're miners and petroleum geologists, but we've developed a lot of sidelines since we've been aloft—like any Okie. Here's our rocket— crawl in. It's rough, but it's transportation. How about you?" "Agronomists. Our mayor thought there was a field for it out here along the periphery—teaching the abandoned colonies and the offshoots how to work poisoned soil and manage lowyield crops without heavy machinery. Our sideline was waxmans." "What are those?" Amalfi said, adjusting the harness around the wasted body. "Soil-source antibiotics. It was those the bindlestiff wanted —and got. The filthy swine. They can't bother to keep a reasonably sanitary city; they'd rather pirate some honest outfit for drugs when they have an epidemic. Oh, and they wanted germanium, too, of course. They blew us up when they found we didn't have any—we'd converted to a barter economy as soon as we got out of the last commerce lanes." "What about your passenger?" Amalfi said with studied nonchalance. "Dr. Beetle? Not that that was his name, I couldn't pronounce that even when I had my tongue. I don't imagine he survived; we had to keep him in a tank even in the city, and I can't quite see him living through a life-ship journey. He was a Myrdian, smart cookies all of them, too. That no-fuel drive of his—" Outside, a shot cracked, and Amalfi winced. "We'd best get off—they're getting their eyesight back~ Talk to you later. Hazleton, any incidents?" "Nothing to speak of, boss. Everybody stowed?" "Yep. Kick off." There was a volley of shots, and then the rocket coughed, roared, and stood on its tail. Amalfi pulled a deep sigh loose from the acceleration and turned his head toward the rational man. He was still securely strapped in, and looked quite relaxed. A brassnosed slug had come through the side of the ship next to him and had

neatly removed the top of his skull. IV. WORKING information out of the madmen was a painfully long, anxious process. The manic was a threehundred-fifty-hour case, and even after he had been returned to a semblance of rationality he could contribute very little. The life ship had not come to He because of the city's Dirac warning, he said. The life ship and the burned Okie had not had any Dirac equipment. The life ship had come to He, as Amalfi had predicted, because it was the only possible planetfall in the desert of the Rift. Even so, the refugees had had to use deep-sleep and strict starvation rationing to make it. "Did you see the 'stiff again?" "No, sir. If they heard your Dirac warning, they probably figured the police had spotted them and scrammed-or maybe they thought there was a military base or au advanced culture here on the planet." "You're guessing," Amalfi said gruffly. "What happened to Dr. Beetle?" The man looked startled. "The Myrdian in the tank? He got blown up with the city, I guess." "He wasn't put off in another life ship?" "Doesn't seem very likely. But I was only a pilot. Could be that they took him out in the mayor's gig for some reason." "You don't know anything about his no-fuel drive?" "First I heard of it."

Amalfi was far from satisfied; he suspected that there was still a short circuit somewhere in the man's memory. The city's auditors insisted that he had been cleared, however, and Amalfi had to accept the verdict. All that remained to be done was to get some assessment of the weapons available to the bindlestiff~ on this subject the manic was ignorant, but the city's analyst said cautiously that something might be extracted from the catatonic within a month or two. Amalfi accepted the figure, since it was the best he had. With Moving Day so close, he couldn't afford to worry overtime about another problem. He had already decided that the simplest answer to vulcanism, which otherwise would be inevitable when the planet's geophysical balance was changed, was to reinforce the crust. All over the surface of He, drilling teams were sinking long, thin, slanting shafts, reaching toward the stress-fluid of the world's core. The shafts interlocked intricately, and thus far only one volcano had been created by the drilling—in general the lava-pockets which had been tapped had already been anticipated and the flow had been bled off into half a hundred intersecting channels without ever reaching the surface. After the molten rock had hardened, the clogged channels were drilled again, with mesotron rifles set to the smallest possible dispersion. None of the shafts had yet tapped the stress fluid; the plan was to complete them all simultaneously. At that point, specific areas, riddled with channel-intersections, would give way, and immense plugs would be forced up toward the crust, plugs of iron, connected by ferrous cantilevers through the channels between. The planet of He would wear a cruel corset, permitting not the slightest flexure—it would be stitched with threads of steel, steel that had held even granite in solution for millennia. The heat problem was tougher, and Amalfi was not sure whether or not he had hit upon the solution. The very fact of structural resistance would create high temperatures, and any general formation of shearplanes would cut the imbedded girders at once. The method being prepared to cope with that was rather drastic, and its after-effects unknown. On the whole, however, the plans were simple, and putting them into effect had seemed heavy but relatively simple labor. Some opposition, of course, had been expected from the local bandit towns. But Amalfi had not expected to lose nearly twenty percent of his crews during the first month. It was Miramon who brought in the news of the latest camp found slaughtered. Amalfi was sitting under a tree fern on high ground overlooking the city, watching a flight of giant dragonflies and thinking about heat-transfer in rock. "You are sure they were adequately protected?" Miramon asked cautiously. "Some of our insects—" Amalfi thought the insects, and the jungle, almost disturbingly beautiful. The thought of destroying it all occasionally upset him. "Yes, they were," he said shortly. "We sprayed out the camp areas with dicoumarins and fluorine-substituted residuals. Besides—do any of your insects use explosives?" "Explosives! There was dynamite used? I saw no evidence—"

“No. That’s what bothers me. I don’t like all those felled trees you describe. We used to use TDX to get a cutting blast; it has a property of exploding in a flat plane.” Miramon goggled. “Impossible. An explosion has to expand evenly in the open.” “Not if it’s a piperazo-hexybitrate built from polarized carbon atoms. Such atoms can’t move in any direction but at right angles to the gravity radius. That’s what I mean. You people are up to dynamite, but not to TDX.” He paused, frowning. “Of course some of our losses have just been by bandit raids, with arrows and crude bombs—your friends from Fabr-Suithe and their allies. But these camps where there was an explosion and no crater to show for it—” He fell silent. There was no point in mentioning the gassed corpses. It was hard even to think about them. Somebody on this planet had a gas which was a regurgitant, a sternutatory and a vesicant all in one. The men had been forced out of their masks—which had been designed solely to protect them from volcanic gases—to vomit, had taken the stuff into their lungs by convulsive sneezing, and had blistered into great sacs of serum inside and out. That, obviously, had been the multiplebenzene ring Hawkesite; very popular in the days of the Hruntan Empire, when it had been called “polybathroomfloorine” for no discoverable reason. But what was it doing on He? There was only one possible answer, and for a reason which he did not try to understand, it made Amalfi breathe a little easier. All around him, the jungle sighed and swayed, and humming clouds of gnats made rainbows over the dew-laden pinnae of the fern. The jungle, almost always murmurously quiet, had never seemed like a real enemy; now Ainalfi knew that that intuition had been right. The real enemy had declared itself, stealthily, but with a stealth which was naïveté itself in comparison with the ancient guile of the jungle. “Miramon,” Amalfi said tranquilly, “we’re in a spot. That city I told you about—the bindlestiff—is already here. It must have landed before we arrived, long enough ago to hide itself thoroughly. Probably it came down at night in some taboo area. The men in it have leagued themselves with FabrSuithe, anyhow, that much is obvious.”

A moth with a two-meter wingspread blundered across the clearing, piloted by a gray-brown nematode which had sunk its sucker above the ganglion between the glittering creature’s pinions. Amalfi was in a mood to read parables into things, and the parasitism reminded him anew of how greatly he had underestimated the enemy. The bindlestiff evidently knew, and was skillful at, the secret of manipulating a new culture; a shrewd Okie never attempts to overwhelm a civilization, but instead pilots it, as indetectably as possible, doing no apparent harm, adding no apparent burden, but turning history deftly and tyrannically aside at the crucial instant— Amalfi snapped the belt switch of his ultraphone. “Hazleton?” “Here, boss.” Behind the city manager’s voice was the indistinct rumble of heavy mining. “What’s up?” “Nothing yet. Are you having any trouble out there?” “No. We’re not expecting any, either, with all this artillery.” “Famous last words,” Amalfi said. “The ‘stiff’s here, Mark.” There was a short silence. In the background, Amalfi could hear the shouts of Hazleton’s crew. When the city manager’s voice came in again, it was moving from word to word very carefully, as if it expected each one to break under its weight. “You imply that the ‘stiff was already on He when our Dirac broadcast went out. Right? I’m not sure these losses of ours can’t be explained some other way, boss; the theory . . . uh lacks elegance.”

Amalfi grinned tightly. “A heuristic criticism,” he said. “Go to the foot of the class, Mark, and think it over. Thus far they’ve out-thought us six ways for Sunday. We may be able to put your old plan into effect yet, but if it’s to work, we’ll have to provoke open conflict.” “How?” “Everybody here knows that there’s going to be a drastic change when we finish what we’re doing, but we’re the only ones who know exactly what we’re going to do. The ‘stiffs will have to stop us, whether they’ve got Dr. Beetle or not. So I’m forcing their hand. Moving Day is hereby advanced by one thousand hours.” “What! I’m sorry, boss, but that’s flatly impossible.” Amalfi felt a rare spasm of anger. “That’s as may be,” he growled. “Nevertheless, spread it around; let the Hevians hear it. And just to prove that I’m not kidding, Mark,

I'm turning the City Fathers back on at that time. If you're not ready to spin by then, you may well swing instead." The click of the belt-switch to the "Off" position was unsatisfying. Amalfi would much have preferred to conclude the interview with something really final—a clash of cymbals, for instance. He swung suddenly on Miramon. "What are you goggling at?" The Hevian shut his mouth, flushing. "Your pardon. I was hoping to understand your instructions to your assistant, in the hope of being of some use. But you spoke in such incomprehensible terms that it sounded like a theological dispute. As for me, I never argue about politics or religion." He turned on his heel and stamped off through the trees. Amalfi watched him go, cooling off gradually. This would never do. He must be getting to be an old man. All during the conversation he had felt his temper getting the better of his judgment, yet he had felt sodden and inert, unwilling to make the effort of opposing the momentum of his anger. At this rate, the City Fathers would soon depose him and appoint some stable character to the mayoralty—not Hazleton, certainly, but some unpoetic youngster who would play everything by empirics. Amalfi was in no position to be threatening anyone else with liquidation, even as a joke. He walked toward the grounded city, heavy with sunlight, sunk in reflection. He was now about a thousand years old, give or take fifty; strong as an ox, mentally alert and "clear," in good hormone balance, all twenty-eight senses sharp, his own special psi faculty-orientation—still as infallible as ever, and all in all as sane as a compulsively peripatetic star man could be. The anti-agapics would keep him in this shape indefinitely, as far as anyone knew—but the problem of patience had never been solved. The older a man became, the more quickly he saw answers to tough questions; and the less likely he was to tolerate slow thinking among his associates. If he were sane, his answers were generally right answers; if he were unsane, they were not; but what mattered was the speed of the thinking itself. In the end, both the sane and the unsane became equally dictatorial. It was funny; before death had been conquered, it had been thought that memory would turn immortality into a Greek gift, because not even the human brain could remember a practical infinity of accumulated facts. Nowadays, however, nobody bothered to remember many things. That was what the City Fathers and like machines were for; they stored facts. Living men memorized nothing but processes, throwing out obsolete ones for new ones as invention made it necessary. When they needed facts, they asked the machines. In some cases, even processes were thrown out, if there were simple, indestructible machines to replace them—the slide rule, for instance. Amalfi wondered suddenly if there were a single man in the city who could multiply, divide, take square root, or figure pH in his head or on paper. The thought was so novel as to be alarming—as alarming as if an ancient astrophysicist had seriously wondered how many of his colleagues could run an abacus. No, memory was no problem. But it was very hard to be patient after a thousand years. The bottom of a port drifted into his field of view, plastered with brown tendrils of mud. He looked up. The port was a small one, and in a part of the perimeter of the city a good distance away from the section where he had intended to go on board. Feeling like a stranger, he went in. Inside, the corridor rang with bloodcurdling shrieks. It was as if someone were flaying a live dinosaur, or, better, a pack of them. Underneath the awful noises there was a sound like water being expelled under high pressure, and someone was laughing madly. Alarmed, Amalfi hunched his bull shoulders and burst through the nearest door. SURELY there had never been such a place in the city. It was a huge, steamy chamber, walled with some ceramic substance placed in regular tiles. The tiles were slimy, and stained; hence, old—very old. Hordes of nude women ran aimlessly back and forth in it, screaming, battering at the wall, dodging wildly, or rolling on the mosaic floor. Every so often a thick stream of water caught one of them, bowling her howling away or driving her helplessly. Amalfi was soaking wet almost at once. The laughter got louder. Overhead, long banks of nozzles sprayed needles of mist into the air. The mayor bent quickly, threw off his muddy shoes, and stalked the laughter, his toes gripping the slippery

mosaic. The heavy column of water swerved toward him, then was jerked away again. "John! Do you need a bath so badly? Come join the party!" It was Dee Hazleton, the Utopian girl who had become the city manager's companion shortly before the crossing of the Rift had been undertaken. She was as nude as any of her victims, and was gleefully plying an enormous hose. "Isn't this fun? We just got a new batch of these creatures. I got Mark to connect the old fire hose and I've been giving them their first wash." It did not sound much like the old Dee, who had been full of solemn thoughts about politics—she had been a veritable cornmissar when Amalfi had first met her. He expressed his opinions of women who had lost their inhibitions so drastically. He went on at some length, and Dee made as if to turn the hose on him again. "No, you don't," he growled, wresting it from her. It proved extremely hard to manage. "Where is this place, anyhow? I don't recall any such torture chamber in the plans." "It was a public bath, Mark says. It's in the oldest part of the city, and Mark says it must have been just shut off when the city went aloft for the first time. I've been using it to sluice off these women before they're sent to Medical. The water is pumped in from the river to the west, so there's no waste involved." "Water for bathing!" Amalfi said. "The ancients certainly were wasteful. Still I'd thought the static jet was older than that." He surveyed the Hevian women, who were now huddling, temporarily reprieved, in the warmest part of the echoing chamber. None of them shared Dee's gently curved ripeness, but, as usual, some of them showed promise. Hazleton was prescient; it had to be granted. Of course it had been expectable that the Hevian would turn out to be human, for only eleven nonhuman civilizations had ever been discovered, and of these only the Lyrans and the Myrdians had any brains to speak of. But to have had the Hevians turn over complete custody of their women to the Okies, without so much as a conference, at first contact—after Hazleton had proposed using any possible women as bindlestiff-bait—a proposal advanced before it had been established that there even was such a place as He— Well, that was Hazelton's own psi-gift—not true clairvoy ance, but an ability to pluck workable plans out of logically insufficient data. Time after time only the seemingly miraculous working-out of Hazieton's plans had prevented his being shot by the blindly logical City Fathers. "Dee, come to Astronomy with me," Amalfi said with sudden energy. "I've got something to show you. And for my sake put on something, or the men will think I'm out to found a dynasty." "All right," Dee said reluctantly. She was not yet used to the odd Okie standards of exposure, and sometimes appeared nude when it wasn't customary—a compensation, Amalfi supposed, for her Utopian upbringing, where she had been taught that nudity had a deleterious effect upon the purity of one's politics. The Hevian women moaned and hid their heads while she put on her shorts—most of them had been stoned for inadvertently covering themselves at one time or another, for in Hevian society women were not people but reminders of damnation, doubly evil for the slightest secrecy. History, Amalfi thought, would be more instructive a teacher if it were not so stupefyingly repetitious. He led the way up the corridor, searching for a lift, Dee's wet soles padding cheerfully behind him. In Astronomy, Jake was as usual peering wistfully at a nebula somewhere out on the marches of no-when, trying to make ellipses out of spirals without recourse to the Calculator. He looked up as Ainalfi and the girl entered. "Hello," he said, dismally. "Amalfi, I really need some help here. How can a man work without facts? If only you'd turn the City Fathers back on—" "Shortly. How long has it been since you looked back the way we came, Jake?" "Not since we started across the Rift. Why, should I have? The Rift is just a scratch in a saucer; you need real distance to work on basic problems." "I know that. But let's take a look. I have an idea that we're not as alone in the Rift as we thought." Resignedly, Jake went to his control desk and thumbed buttons. "What do you expect to find?" he demanded, his voice petulant. "A haze of iron filings, or a stray meson? Or a fleet of police cruisers?" "Well," Amalfi said, pointing to the screen, "those aren't wine bottles." The police cruisers, so close that the

light~of He’s sun twinkled on their sides, shot across the screen in a brilliant stream, long tails of false photons striping the Rift behind them. “So they aren’t,” Jake said, not much interested. “Now may I have my scope back, Amalfi?” Amalfi only grinned. Cops or not cops, he felt young again. H AZLETON was mud up to the thighs. Long rib ands of it trailed behind him as he hurtled up the lift shaft to the control tower. Amalfi watched him coming, noting the set whiteness of the city manager’s face as he looked up at Amalfi’s bending head. “What’s this about cops?” Hazleton demanded while still in flight. “The message didn’t get to me straight. We were raided, all hell’s broken loose everywhere. I nearly didn’t get here straight myself.” He sprang into the chamber, his boots shedding gummy clods. “I saw the fighting. Looks like the Moving Day rumor reached the ‘stiffs, all right.” “Sure. What’s this about cops?” “The cops are here. They’re coming in from the northwest quadrant, already off overdrive, and should be here day after tomorrow.” “Surely they’re not after us,” Hazleton said. “And I can’t see why they should come all this distance after the ‘stiffs. They must have had to use deep-sleep to make it. And we didn’t say anything about the no-fuel drive in our alarm ‘cast—” “We didn’t have to,” Amalfi said. “Some day I must tell you the parable of the diseased bee—as soon as I figure out what a bee is. In the meantime things are breaking fast. We have to keep an eye on everything, and be able to jump in any direction no matter which item on the agenda comes up first. How bad is the fighting?” “Very bad. At least five of the local bandit towns are in on it, including Fabr-Suithe, of course. Two of them mount heavy stuff, about contemporary with the Hruntan Empire in its heyday . . . ah, I see you know that already. Well, it’s supposed to be a holy war on us. We’re meddling with the jungle and interfering with their chances for salvation-through-suffering, or something—I didn’t stop to dispute the point.” “That’s bad; it will convince some of the civilized towns, too —I doubt that Fabr-Suithe really believes the religious line, they’ve thrown all that overboard, but it makes wonderful propaganda.” “You’re right there. Only a few of the civilized towns, the ones that have been helping us from the beginning, are putting up a stiff fight. Almost everyone else, on both sides, is sitting it out waiting for us to cut each other’s throat. Our handicap is that we lack mobility. If we could persuade all the civilized towns to come in on our side we wouldn’t need it, but so many of them are scared.” “The enemy lacks mobility, too, until the bindlestiff is ready to take a direct hand,” Amalfi said thoughtfully. “Have you seen any signs that the tramps are in on the fighting?” “Not yet. But it can’t be long now. And we don’t even know where they are!” “They’ll be forced to locate themselves today or tomorrow, I’m certain. Right now I want you to muster all the rehabilitated women we have on hand and get ready to spring your scheme. As soon as I get a fix on the bindlestiff I’ll locate the nearest participating bandit town, and you can do the rest.” Hazieton’s eyes, very weary until now, began to glitter with amusement. “And how about Moving Day?” he said. “You know, of course—you know everything—that not one of your stress-fluid plugs is going to hold with the work this incomplete.” “I’m counting on it,” Amalfi said tranquilly. “We’ll spin when the time comes. If a few plugs spring high, wide, and tall, I won’t weep.” “How—” The Dinwiddie Watch blipped sharply, and both men turned to look at the screen. There was a fountain of green dots on it. Hazieton took three quick steps and turned on the coordinates, which he had had readjusted to the butterfly grid. “Well, where are they?” Amalfi demanded. “Right smack in the middle of the southwestern continent, in that vine-jungle where the little chigger-snakes nest—the ones that burrow under your fingernails. There’s supposed to be a lake of boiling mud on that spot.” “There probably is—they could be under it with a mediumlight screen.” “All right, we’ve got them placed—but what are they shooting up?” “Mines, I suspect,” Amalfi said. “That’s dandy,” Hazleton said bitterly. “They’ll leave an escape lane for themselves, of course, but we’ll never be able to find it. They’ve got us under a plutonium umbrella, Amalfi.”

“We’ll get out. Go plant your women, Mark. And—put some clothes on ‘em

first. They'll make more of a show that way." "You bet they will," the city manager said feelingly. He went out. A MALFI went out on the balcony. At moments of crisis, his old predilection for seeing and hearing and breathing the conflict, with his senses unfiltered and unheightened by any instruments, became too strong to resist. There was good reason for the drive, for that matter; for excitement of the everyday senses had long ago been shown to bring his orientation-sense to its best pitch. From the balcony of City Hall, most of the northwest quadrant of the perimeter was visible. There was plenty of battle noises rattling the garish tropical sunset there, and even an occasional tiny toppling figure. The city had adopted the local dodge of clearing and gelling the mud at its rim, and had returned the gel to the morass state at the first sign of attack; but the jungle men had broad skis, of some metal no Hevian could have fashioned so precisely. Disks of red fire marked bursting TDX shells, scything the air like death's own winflows. No gas was in evidence, but Amalfi knew that there would be gas before long. The city's retaliatory fire was largely invisible, since it emerged below the top of the perimeter. There was a Bethé fender out, which would keep the wall from being scaled— until one of the projectors was knocked out; and plenty of heavy rifles were being kept hot. But the city had never been designed for warfare, and many of its most efficient destroyers had their noses buried in the earth, since their intended func tion was only to clear a landing area. Using an out-and-out Bethé blaster was, of course, impossible where there was an adjacent planetary mass. He sniffed the scarlet edges of the struggle appraisingly. Under his fingers on the balcony railing were three buttons, which he had had placed there four hundred years ago. They had set in motion different things at different times. But each time, they had represented choices of action which he would have to make when the pinch came; he had never had reason to have a fourth button installed. Rockets screamed overhead. Bombs followed, crepitating bursts of noise and smoke and flying metal. He did not look up; the very mild spindizzy screen would fend off anything moving that rapidly. Only slow-moving objects, like men, could sidle through a polarized gravitic field. He looked out to the horizon, touching the buttons very delicately. Suddenly the sunset snuffed itself out. Amalfi, who had never seen a tropical sunset before coming to He, felt a vague alarm, but as far as he could see the abrupt darkness was natural, if startling. The fighting went on, the flying disks of TDX much more lurid now against the blackness. After a while there was a dog-fight far aloft, identifiable mostly by traceries of jet trails and missiles. The jungle jammered derision and fury without any letup. Amalfi stood, his senses reaching out slowly, feeling the positions of things. It was hard work, for he had never tried to grasp a situation at such close quarters before, and the trajectory of every shell tried to capture his attention. About an hour past midnight, at the height of the heaviest raid yet, he felt a touch at his elbow. "Boss—" Amalfi heard the word as if it had been uttered at the bottom of the Rift. The still-ascending fountain of space mines had just been touched, and he was trying to reach the top of it; somewhere up there the trumpet flattened into a shell encompassing the whole of He, and it was important to know how high up that network of orbits began. But the utter exhaustion of the voice touched something deeper. He said, "Yes, Mark." "It's done. We lost almost everybody. But we caused a very nice riot." A ghost of animation stirred in the voice for a moment. "You should have been there." "I'm—almost there now. Good . . . wo~rk, Mark. Get . some rest." "Sure. But—" Something very heavy described a searing hyperbola in Amalfi's mind, and then the whole city was a scramble of magnesium-white and ink. As the light faded, there was a formless spreading and crawling, utterly beyond any detection but Amalfi's. "Gas alarm, Mark," he heard himself saying. "Hawkesite barium suits for everybody." "Yes. Right. Boss, you'll kill yourself running things this way." Amalfi found that he could not answer. He had found the town where the women had been dropped. Nothing clear came through, but there was certainly a riot there, and it was not entirely within the town itself.

Tendrils of movement were being turned back from the Okie city, and were weaving out from places where there had been no sign of activity before. At the base of the mine fountain, something else new was happening. A mass rose slowly, and there was a thick flowing around it. Then it stopped, and there was a sense of doors opening, heavy potentials moving out into tangled desolation. The tramps were leaving their city. The unmistakable, slightly nauseating sensation of a spindizzy field under medium drive domed the boiling of the lake of mud. Dawn coming now. The riot in the town where the women were still would not come clear, but it was getting worse rather than better. Abruptly there was no town there at all, but a boiling, mushrooming pillar of radioactive gas—the place had been bombed. The struggle moved back toward the area of tension that marked the location of the bindlestiff. Amalfi's own city was shrouded in sick orange mist, lit with flashes of no-color. The gas could not pass the spindizzy screen in a body, but it diffused through, molecule by heavy molecule. He realized suddenly that he had not heeded his own gas warning, and that there was probably some harm coming to him; but he could not localize it. He moved slightly, and instantly felt himself incased. What— Barium paste. Hazleton had known that Amalfi could not leave the balcony, and evidently had plastered him with the stuff in default of trying to get a suit on him. Even his eyes were covered, and a feeling of distension in his nostrils bespoke a Kolman respirator. The emotional and gravitic tensions in the bindlestiff city continued to gather; it would soon be unbearable. Above, just outside the space mines, the first few police vessels were sidling in cautiously. The war in the jungle had already fallen into meaninglessness. The abduction of the women from the Hevian town by the tramps had collapsed all Hevian rivalry; bandits and civilized towns alike were bent now upon nothing but the destruction of Fabr-Suithe and its allies. Fabr-Suithe could hold them off for a long time, but it was clearly time for the bindlestiff to leave—time for it to make off with its women and its anti-agapics and its germanium, time for it to lose itself in the Rift before the Earth police could invest all of He. The tension knotted suddenly, painfully, and rose away from the boiling mud. The 'stiff was taking off. Amalfi pressed the button—the only one, this time, that had been connected to anything. Moving Day began. V. IT began with six pillars of glaring white, forty miles in diameter, that burst through the soft soil at every compass point of He. Fabr-Suithe had sat directly over the site of one of them. The bandit town was nothing but a flake of ash in a split second, a curled flake borne aloft on the top of a white-hot piston. The pillars lunged roaring into the heavens, fifty, a hundred, two hundred miles, and burst at their tops like popcorn. The sky burned thermite-blue with steel meteors. Outside, the space mines, cut off from the world of which they had been satellites by the greatest spin-dizzy screen of all time, fled into the Rift. And when the meteors had burned away, the sun was growing. The world of He was on over-drive, its magnetic moment transformed, expressed as momentum; it was the biggest city ever flown. There was no time to feel alarmed. The sun flashed by and was dwindling to a point before the fact could be grasped. It was gone. The far wall of the Rift began to swell, and separate into individual points of light. Appalled, Amalfi fought to grasp the scale of speed. He failed. The planet of He was moving, that was all he could comprehend; its speed gulped light-years like gnats. Even to think of controlling so stupendous a flight was ridiculous. Stars began to wink past He like fireflies. Then they were all behind. The surface of the saucer that was the galaxy receded. "Boss, we're going out of the—" "I know it. Get me a fix on the Hevian sun before it's too late." Hazleton worked feverishly. It took him only three minutes, but during those three minutes, the massed stars receded far enough so that the gray scar of the Rift became plain, as a definite mark on a spangled ground. The Hevian sun was less than an atom in it. "Got it. But we can't swing the planet back. It'll take us two thousand years to cross to the next galaxy. We'll have to abandon He, boss, or we're sunk." "All right. Get us aloft. Full drive." "Our

contract—" "Fulfilled—take my word for it. Spin!" The city screamed and sprang aloft. The planet of He did not dwindle—it simply vanished, snuffed out in the intergalactic gap. It was the first of the pioneers. Amalfi took the controls, the barium casing cracking and falling away from him as he moved. The air still stank of Hawkesite, but the concentration of the gas already had been taken down below the harmful level by the city's purifiers. The mayor began to edge the city away from the vector of He's movement and the city's own, back toward the home lens. Hazieton stirred restlessly. "Your conscience bothering you, Mark?" "Maybe," Hazieton said. "Is there some escape clause in our contract that lets us run off like this? If there is I missed it, and I read the fine print pretty closely." "No, no escape clause," Amalfi said, shifting the space stick delicately. "The Hevians won't be hurt. The spindizzy screen will protect them from loss of heat and atmosphere—their volcanoes will supply more heat than they'll need, and their technology is up to artificial UV generation. But they won't be able to put out enough UV to keep the jungle alive. By the time they reach the Andromedan star that suits them, they'll understand the spindizzy principle well enough to set up a proper orbit. Or maybe they'll like roaming better by then, and decide to be an Okie planet. Either way, we did what we promised to do, fair and square." "We didn't get paid," the city manager pointed out. "And it'll take our last reserves to get back to any part of our own galaxy. The bindlestiff got off, and got carried 'way out of range of the cops in the process—with plenty of dough, women, everything." "No, they didn't," Amalfi said. "They blew up the moment we moved He." "All right," Hazieton said resignedly. "You could detect that; I'll take your word for it. But you'd better be able to explain it." "It's not hard to explain. The 'stiffs had captured Dr. Beetle. I was pretty sure they would. They came to He for no other reason. They needed the fuelless drive, and they knew Dr. Beetle had it, because of the agronomists' SOS. So they snatched him when he landed—notice how they made a big fuss about the other agronomist life ship, to divert our attention?—and worked the secret out of him." "So?" "So," Amalfi said, "they forgot that any Okie city always has passengers like Dr. Beetle—people with big ideas only partially worked out, ideas that need the finishing touches that can only be provided by some other culture. After all, a man doesn't take passage on an Okie city unless he's a third-rate sort of person, hoping to make his everlasting fortune on some planet where the people know less than he does." Hazleton scratched his head ruefully. "That's right. We had the same experience with the Lyran invisibility machine. It didn't work, until we took that Hruntan physicist on board; he had the necessary extra knowledge—but he couldn't have discovered the principle himself, either." "Exactly. The 'stiffs were in too much of a hurry. They didn't carry their stolen fuelless drive with them until they found some culture which could perfect it. They tried to use it right away—they were lazy. And they tried to use it inside the biggest spindizzy field ever generated. It blew up. If we hadn't left them parsecs behind in a split second, it would have blown up He at the same time." Hazleton sighed and began to plot the probable point at which the city would return to its own galaxy. It turned out to be a long way away from the Rift, in an area that, after a mental wrench to visualize it backwards from the usual orientation, promised a fair population. "Look," he said, "we'll hit about where the last few waves of the Acolytes settled—remember the Night of Hadjjii?" Amalfi didn't, since he hadn't been born then, nor had Hazleton; but he remembered the history, which was what the city manager had meant. With a sidelong glance, he leaned forward, resumed the helmet he had cast aside a year ago, and turned on the City Fathers. The helmet phone shrilled with alarm. "All right, all right," he growled. "What is it?" "MAYOR AMALFI, HAVE YOU TIPPED THIS PLANET?" "No," Amalfi said. "We sent it on its way as it was." There was a short silence, humming with computation. "VERY WELL. WE MUST NOW SELECT THE POINT AT WHICH WE LEAVE THE RIFT. STAND BY FOR DETERMINATION." Amalfi and Hazleton grinned at each other. Amalfi said,

“We’re coming in on the last Acolyte stars. Give us a determination for the present setup there, please—” “YOU ARE MISTAKEN. THAT AREA IS NOWHERE NEAR THE RIFT. WE WILL GIVE YOU A DETERMINATION FOR THE FAR RIFT WALL: STAND BY.” Amalfi removed the headset gently. “That,” he said, moving the phone away from his mouth, “was long ago—and far away.”

BRIDGE by James Blish A SCREECHING tomado was rocking the Bridge when the alarm sounded; it was making the whole structure shudder and sway. This was normal and Robert Helmuth barely noticed it. There was always a tornado shaking the Bridge. The whole planet was enswathed in tornadoes, and worse. The scanner on the foreman's board had given 114 as the sector of the trouble. That was at the northwestern end of the Bridge, where it broke off, leaving nothing but the raging clouds of ammonia crystals and methane, and a sheer drop thirty miles to the invisible surface. There were no ultraphone "eyes" at that end which gave a general view of the area in so far as any general view was possiblebecause both ends of the Bridge were incomplete. With a sigh Helmuth put the beetle into motion. The little car, as flat-bottomed and thin through as a bed-bug, got slow- ly under way on its ball-bearing races, guided and held firm- ly to the surface of the Bridge by ten close-set flanged rails. Even so, the hydrogen gales made a terrific siren-like shrieking between the edge of the vehicle and the deck, and the impact of the falling drops of ammonia upon the curved roof was as heavy and deafening as a rain of cannon balls. As a matter of fact, they weighed almost as much as cannon balls here, though they were not much bigger than ordinary raindrops. Every so often, too, there was a blast, accompanied by a dull orange glare, which made the car, the deck, and the Bridge it- self buck savagely. These blasts were below, however, on the surface. While they shook the structure of the Bridge heavily, they almost never interfered with its functioning, and could not, in the very nature of things, do Helmuth any harm. Had any real damage ever been done, it would never have been repaired. There was no one on Jupiter to repair it. The Bridge, actually, was building itself. Massive, alone, and lifeless, it grew in the black deeps of Jupiter. The Bridge had been well-planned. From Helmuth's point of view almost nothing could be seen of it, for the beetle tracks ran down the center of the deck, and in the darkness and perpetual storm even ultrawave-assisted vision could not penetrate more than a few hundred yards at the most. The width of the Bridge was eleven miles; it's height, thirty miles; its length, deliberately unspecifled in the plans, fifty-four miles at the momenta squat, colossal structure, built with engi- neering principles, methods, materials and tools never touched before For the very good reason that they would have been im- possible anywhere else. Most of the Bridge, for instance, was made of ice: a marvellous structural material under a pres- sure of a million atmospheres, at a temperature of 94C. Under such conditions, the best structural steel is a fria- ble, talc-like powder, and aluminum becomes a peculiar, transparent substance that splits at a tap. Back home, Helmuth remembered, there had been talk of starting another Bridge on Saturn, and perhaps still later, on Uranus, too. But that had been politicians' talk. The Bridge was almost five thousand miles below the visible surface of Jupiter's atmosphere, and its mechanisms were just barely manageable. The bottom of Saturn's atmosphere had been sounded at sixteen thousand eight hundred and seventy-eight miles, and the temperature there was below 150C. There even pressure-ice would be immovable, and could not be worked with anything except itself. And as for Uranus . . . As far as Helmuth was concerned, Jupiter was quite bad enough. The beetle crept within sight of the end of the Bridge and stopped automatically. Helmuth set the vehicle's eyes for high- est penetration, and examined the nearby beams. The great bars were as close-set as screening. They had to be, in order to support even their own

weight, let alone the weight of the components of the Bridge. The whole web- work was flexing and fluctuating to the harpist-fingered gale, but it had been designed to do that. Helmuth could never help being alarmed by the movement, but habit assured him that he had nothing to fear from it. He took the automatics out of the circuit and inched the beetle forward manually. This was only Sector 113, and the Bridge's own Wheatstone-bridge scanning systemthere was no electronic device anywhere on the Bridge, since it was impossible to maintain a vacuum on Jupitersaid that the trouble was in Sector 114. The boundary of Sector 114 was still fully fifty feet away. It was a bad sign. Helmuth scratched nervously in his red beard. Evidently there was really cause for alarmreal alarm, not just the deep, grinding depression which he al- ways felt while working on the Bridge. Any damage serious enough to halt the beetle a full sector short of the trouble area was bound to be major. ~ It might even turn out to be the disaster which he had felt lurking ahead of him ever since he had been made fore- man of the Bridgethat disaster which the. Bridge itself could not repair, sending man reeling home from Jupiter in defeat. The secondaries cut in and the beetle stopped again. Grim- ly, Helmuth opened the switch and sent the beetle creeping across the invisible danger line. Almost at once, the car tilted just perceptibly to the left, and the screaming of the winds between its edges and the deck shot up the scale, sirening in and out of the soundless-dogwhistle range with an eeriness that set Helmuth's teeth on edge. The beetle itself fluttered and chattered like an alarm-clock hammer between the sur- face of the deck and 'the flanges of the tracks. Ahead there was still nothing to be seen but the horizontal driving of the clouds and the hail, roaring along the length of the Bridge, out of the blackness into the beetle's fanlights, and onward into blackness again towards the horizon no eye would ever see. Thirty miles below, the fusillade of hydrogen explosions continued. Evidently something really wild was going on on the surface. Helmuth could not remember having heard so much activity in years. There was a flat, especially heavy crash, and a long line of fuming orange fire came pouring down the seething at- mosphere into the depths, feathering horizontally like the mane of a Lipizzan horse, directly in front of Helmuth. In- stinctively, he winced and drew back from the board, al- though that stream of flame actually was only a little less cold than the rest of the streaming gases, far too cold to injure the Bridge. In the momentary glare, however, he saw something-an upward twisting of shadows, patterned but obviously un- finished, fluttering in silhouette against the hydrogen cata- ract's lurid light. The end of the Bridge. Wrecked. Helmuth grunted mvoluntarily and backed the beetle away. The flare dimmed; the light poured down the sky and fell away into the raging sea below. The scanner clucked with satisfaction as the beetle recrossed the line into Zone 113. He turned the body of the vehicle 180, presenting its back to the dying torrent. There was nothing further that he could do at the moment on the Bridge. He scanned his control boarda ghost image of which was cast across the scene on the Bridgefor the blue button marked Garage, punched it savagely, and tore off his helmet. Obediently, the Bridge vanished. Dillon was looking at him. "Well?" the civil engineer said. "What's the matter, Bob? Is it bad?" Helmuth did not reply for a moment. The abrupt transition from the storm-ravaged deck of the Bridge to the quiet, plac- id air of the control shack on Jupiter V was always a shock. He had never been able to anticipate it, let alone become accustomed to it; it was worse each time, not better. He put the helmet down carefully in front of him and got up, moving carefully upon shaky legs; feeling implicit in his own body the enormous pressures and weights his guiding intelligence had just quitted. The fact that the gravity on the foreman's deck was as weak as that of most of the habitable asteroids only made the contrast greater, and his need for caution in walking more extreme. He went to the big porthole and looked out. The unworn, tumbled, monotonous surface of airless Jupiter V looked al- most homey after the perpetual holocaust of Jupiter itself. But there was an overpowering reminder of that holocaust for through the thick quartz the face of the giant

planet stared at him, across only one hundred and twelve thousand and six hundred miles: a sphere-section occupying almost all of the sky except the near horizon. It was crawling with colour, striped and blotched with the eternal, frigid, poi- sonous storming of its atmosphere, spotted with the deep planet-sized shadows of farther moons. Somewhere down there, six thousand miles below the clouds that boiled in his face, was the Bridge. The Bridge was thirty miles high and eleven miles wide and fifty-four miles longbut it was only a sliver, an intricate and fragile ar- rangement of ice-crystals beneath the bulging, racing torna- does. On Earth, even in the West, the Bridge would have been the mightiest engineering achievement of all history, could the Earth have borne its weight at all. But on Jupiter, the Bridge was as precarious and perishable as a snowflake. "Bob?" Dillon's voice asked. "You seem more upset than usual. Is it serious?" Helmuth turned. His superior's worn young face, lantern-jawed and crowned by black hair already beginning to grey at the temples, was alight both with love for the Bridge and the consuming ardour of the responsibility he had to bear. As always, it touched Helmuth, and re- minded him that the implacable universe bed, after all, provided one warm corner in which human beings might hud- dle together. "Serious enough," he said, forming the words with dif- ficulty against the frozen inarticulateness Jupiter forced upon him. "But not fatal, as far as I could see. There's a lot of hydrogen vulcanism on the surface, especially at the north- west end, and it looks like there must have been a big blast under the cliffs. I saw what looked like the last of a series of fireballs." Dillon's face relaxed while Helmuth was talking, slowly, line by engraved line. "Oh. Just a flying chunk, then." "I'm almost sure that's what it was. The cross-draughts are heavy now. The Spot and the STD are due to pass each other some time next week, aren't they? I haven't checked, but I can feel the difference in the storms." "So the chunk got picked up and thrown through the end of the Bridge. A big piece?" Helmuth shrugged. "That end is all twisted away to the left, and the deck is burst to flinders. The scaffolding is all gone, too, of course. A pretty big piece, all right, Charitytwo miles through at a minimum." DiUon sighed. He, too, went to the window, and looked out. Helmuth did not need to be a mind reader to know what he was looking at. Out there, across the stony waste of Jupi- ter V plus one hundred and twelve thousand and six hundred miles of space, the South Tropical Disturbance was streaming towards the great Red Spot. and would soon overtake it. When the whirling funnel of the STDmore than big enough to suck three Earths into deep-freezepassed the planetary is- land of sodium-tainted ice which was the Red Spot, the Spot would follow it for a few thousand miles, at the same time rising closer to the surface of the atmosphere. Then the Spot would sink again, drifting back towards the incredible jet of stress-fluid which kept it in beinga jet fed by no one knew what forces at Jupiter's hot, rocky, twenty- two-thousand-mile core, under sixteen thousand miles of eter- nal ice. During the entire passage, the storms all over Jupiter became especially violent; and the Bridge had been forced to locate in anything but the calmest spot on the planet, thanks to the uneven distribution of the few permanent land- masses. Helmuth watched Dillon with a certain compassion, tem- pered with mild envy. Charity Dillon's unfortunate given name betrayed him as the son of a hangover, the only male child of a Witness family which dated back to the great Wit- ness Revival of 2003. He was one of the hundreds of govern- ment-drafted experts who had planned the Bridge, and he was as obsessed by the Bridge as Helmuth wasbut for dif- ferent reasons. Helmuth moved back to the port, dropping his hand gen- tly upon Dillon's shoulder. Together they looked at the scream- ing straw yellows, brick reds, pinks, oranges, browns, even blues and greens that Jupiter threw across the ruined stone of its innermost satellite. On Jupiter V, even the shadows had colour. Dillon did not move. He said at last: "Are you pleased, Bob?" "Pleased?" Helmuth said in astonishment. "No. It scares me white; you know that. I'm just glad that the whole Bridge didn't go." "You're quite sure?" Dillon said quietly. Helmuth took his hand from Dillon's shoulder

and returned to his seat at the central desk. "You've no right to needle me for something I can't help," he said, his voice even low- er than Dillon's. "I work on Jupiter four hours a daynot actually, because we can't keep a man alive for more than a split second down therebut my eyes and my ears and my mind are there, on the Bridge, four hours a day. Jupiter is not a nice place. I don't like it. I won't pretend I do. "Spending four hours a day in an environment like that over a period of yearswell, the human mind instinctively tries to adapt, even to the unthinkable. Sometimes I wonder how I'll behave when I'm put back in Chicago again. Some- times I can't remember anything about Chicago except vague generalities, sometimes I can't even believe there is such a place as Earthhow could there be, when the rest of the universe is like Jupiter, or worse?" "I know," Dillon said. "I've tried several times to show you that isn't a very reasonable frame of mind." "I know it isn't. But I can't help how I feel. No, I don't think the Bridge will last. It can't last; it's all wrong. But I don't want to see it go. I've just got sense enough to know that one of these days Jupiter is going to sweep it away." He wiped an open palm across the control boards, snapping all the toggles "Off" with a sound like the fall of a double- handful of marbles on a pane of glass. "Like that. Char- ity! And I work four hours a day, every day, on the Bridge. One of these days, Jupiter is going to destroy the Bridge. It'll go flying away in little flinders into the storms. My mind will be there, supervising some puny job, and my mind will go flying away along with my mechanical eyes and ears still trying to adapt to the unthinkable, tumbling away into the winds and the flames and the rains and the darkness and the pressure and the cold." "Bob, you're deliberately running away with yourself. Cut it out. Cut it out, I say!" Helmuth shrugged, putting a trembling hand on the edge of the board to steady himself. "All right. I'm all right, Charity. I'm here, aren't I? Right here on Jupiter V, in no danger, in no danger at all. The Bridge is one hundred and twelve thousand and six hundred miles away from here. But when the day comes that the Bridge is swept away "Charity, sometimes I imagine you ferrying my body back to the cosy nook it came from, while my soul goes tumbling and tumbling through millions of cubic miles of poison. All right. Charity, I'll be good. I won't think about it out loud; but you can't expect me to forget it. It's on my mind; I can't help it, and you should know that." "I do," Dillon said, with a kind of eagerness. "I do, Bob. I'm only trying to help, to make you see the problem as it is. The Bridge isn't really that awful, it isn't worth a single nightmare." "Oh, it isn't the Bridge that makes me yell out when I'm sleeping," Helmuth said, smiling bitterly. "I'm not that ridden by it yet. It's while I'm awake that I'm afraid the Bridge will be swept away. What I sleep with is a fear of myself." "That's a sane fear. You're as sane as any of us," Dillon insisted, fiercely solemn. "Look, Bob. The Bridge isn't a mon- ster. It's a way we've developed for studying the behaviour of materials under specific conditions of temperament, pres- sure, and gravity. Jupiter isn't Hell, either; it's a set of condi- tions. The Bridge is the laboratory we set up to work with those conditions." "It isn't going anywhere. It's a bridge to no place." "There aren't many places on Jupiter," Dillon said, missing Helmuth's meaning entirely. "We put the Bridge on an island in the local sea because we needed solid ice we could sink the caissons in. Otherwise, it wouldn't have mattered where we put it. We could have floated it on the sea itself, if we hadn't wanted to fix it in order to measure storm veloci- ties and such things." "I know that," Helmuth said. "But, Bob, you don't show any signs of understanding it. Why, for instance, should the Bridge go any place? It isn't even, properly speaking, a bridge at all. We only call it that because we used some bridge engineering principles in build- ing it. Actually, it's much more like a travelling cranean extremely heavy-duty overhead rail line. It isn't going any- where because it hasn't any place interesting to go, that's all. We're extending it to cover as much territory as possible, and to increase its stablility, not to span the distance between places. There's no point to reproaching it because it doesn't span a

real gapbetween, say, Dover and Calais. It's a bridge to knowledge, and that's far more important. Why can't you see that?" "I can see that; that's what I was talking about," Hel- muth said, trying to control his impatience. "I have as much common sense as the average child. What I was try- ing to point out is that meeting colossalness with colossal- nessout hereis a mug's game. It's a game Jupiter will always win, without the slightest effort. What if the engineers who built the Dover-Calais bridge had been limited to broom- straws for their structural members? They could have got the bridge up somehow, sure, and made it strong enough to carry light traffic on a fair day. But what would you have had left of it after the first winter storm came down the Channel from the North Sea? The whole approach is idiotic!" "All right," Dillon said reasonably. "You have a point. Now you're being reasonable. What better approach have you to suggest? Should we abandon Jupiter entirely because it's too big for us?" "No," Helmuth said. "Or maybe, yes. I don't know. I don't have any easy answer. I just know that this one is no answer at allit's just a cumbersome evasion." Dillon smiled. "You're depressed, and no wonder. Sleep it off, Bob, if you canyou might even come up with that an- swer. In the meantimewell, when you stop to think about it, the surface of Jupiter isn't any more hostile, inherently, than the surface of Jupiter V, except in degree. If you stepped out of this building naked, you'd die just as fast as you would on Jupiter. Try to look at it that way." Helmuth, looking forward into another night of dreams, said: "That's the way I look at it now." m There were three yellow "Critical" signals lit on the long gang board when Helmuth passed through the gang deck on the way back to duty. All of them, as usual, were concentrat- ed on Panel 9, where Eva Chavez worked. Eva, despite her Latin namesuch once-valid tickets no longer meant anything among Earth's uniformly mixed-race populationwas a big girl, vaguely blonde, who cherished a passion for the Bridge. Unfortunately, she was apt to be- come enthralled by the sheer Cosmicness of it all, precisely at the moments when cold analysis and split-second decisions were most crucial. Helmuth reached over her shoulder, cut her out of the circuit except as an observer, and donned the co-operator's helmet. The incomplete new shoals caisson sprang into being around him. Breakers of boiling hydrogen seethed seven hundred feet up along its slanted sidesbreakers that never subsided, but simply were torn away into flying spray. There was a spot of dull orange near the top of the north face of the caisson, crawling slowly towards the pediment of the nearest truss. Catalysis Or cancer, as Helmuth could not help but think of it. On this bitter, violent monster of a planet, even the tiny specks of calcium carbide were deadly. At these wind velocities, such specks imbedded themselves in everything; and at fifteen million pounds per square inch, pressure ice catalyzed by so- dium took up ammonia and carbon dioxide, building pro- tein-like compounds in a rapid, deadly chain of decay: H~NCHCO-HNCHCO-HNCHCO-HN.... Ca0 Ca Ca I I HNCHCO-HNCHCO-HNCHCO-HN... . I I I Ca0 Ca Ca I I HNCHCO-HNCHCO-HN... . For a second, Helmuth watched it grow. It was, after all, one of the incredible possibilities the Bridge had been built to study. On Earth, such a compound, had it occurred at all, might have grown porous, bony, and quite strong. Here, un- der nearly eight times the gravity, the molecules were forced to assemble in strict aliphatic order, but in cross section their arrangement was hexagonal, as if the stuff would become an aromatic compound if it only could. Even here it was mod- erately strong in cross sectionbut along the long axis it smeared like graphite, the calcium atoms readily surrender- ing their valence hold on one carbon atom to grab hope- fully for the next one in line No stuff to hold up the piers of humanity's greatest en- gineering project. Perhaps it was suitable for the ribs of some Jovian jellyfish, but in a Bridge-caisson, it was cancer. There was a scraper mechanism working on the edge of the lesion, flaking away the shearing aminos and laying down new ice. In the meantime, the decay of the caisson-face was working deeper. The scraper could not possibly get at

the core of the troublewhich was not the calcium carbide dust, with which the atmosphere was charged beyond redemption, but was instead one imbedded sodium speck which was taking no part in the reactionfast enough to extirpate it. It could barely keep pace with the surface spread of the di- sease. And laying new ice over the surface of the wound was worthless. At this rate, the whole caisson would slough away and melt like butter, within an hour, under the weight of the Bridge above it. Helmuth sent the futile scraper aloft. Drill for it? Notoo deep already, and location unknown. Quickly he called two borers up from the shoals below, where constant blasting was taking the foundation of the cais- son deeper and deeper into Jupiter's dubious "soil". He drove both blind, fire-snouted machines down into the lesion. The bottom of that sore turned out to be forty-five metres within the immense block. Helmuth pushed the red button all the same. The borers blew up, with a heavy, quite invisible blast, as they had been designed to do. A pit appeared on the face of the caisson. The nearest truss bent upward in the wind. It fluttered for a moment, trying to resist. It bent farther. Deprived of its major attachment, it tore free suddenly, and went whirling away into the blackness. A sudden flash of lightning picked it out for a moment, and Helmuth saw it dwindling like a bat with torn wings being borne away by a cyclone. The scraper scuttled down into the pit and began to fill it with ice from the bottom. Helmuth ordered down a new truss and a squad of scaffolders. Damage of this order took time to repair. He watched the tornado tearing ragged chunks from the edges of the pit until he was sure that the catalysis had stopped. Then, suddenly, prematurely, dismally tired, he took off the helmet. He was astounded by the white fury that masked Eva's big-boned, mildly pretty face. "You'll blow the Bridge up yet, won't you?" she said, evenly, without preamble. "Any pretext will do!" Baffled, Helmuth turned his head helplessly away; but that was no better. The suffused face of Jupiter peered swollenly through the picture-port, just as it did on the foreman's desk. He and Eva and Charity and the gang and the whole of satellite V were falling forward towards Jupiter; their unevent- ful cooped-up lives on Jupiter V were utterly unreal com- pared to the four hours of each changeless day spent on Jupiter's everchanging surface. Every new day brought their minds, like ships out of control, closer and closer to that gaudy inferno. There was no other way for a manor a womanon Jupiter V to look at the giant planet. It was simple experience, shared by all of them, that planets do not occupy four-fifths of the whole sky, unless the observer is himself up there m that planet's sky, falling, falling faster and faster "I have no intention," he said tiredly, "of blowing up the Bridge. I wish you could get it through your head that I want the Bridge to stay upeven though I'm not starry-eyed to the point of incompetence about the project. Did you think that rotten spot was going to go away by itself when you'd painted it over? Didn't you know that" Several helmeted, masked heads nearby turned blindly to- wards the sound of his voice. Helmuth shut up. Any distract- ing conversation or activity was taboo, down here in the gang room. He motioned Eva back to duty. The girl donned her helmet obediently enough, but it was plain from the way her normally full lips were thinned that she thought Helmuth had ended the argument only in order to have the last word. Helmuth strode to the thick pillar which ran down the central axis of the shack, and mounted the spiralling cleats towards his own foreman's cubicle. Already he felt in antici- pation the weight of the helmet upon his own head. Charity Dillon, however, was already wearing the helmet; he was sitting in Helmuth's chair. Charity was characteristically oblivious of Helmuth's en- trance. The Bridge operator must learn to ignore, to be utterly unconscious of anything happening around his body except the inhuman sounds of signals; must learn to heed only those senses which report something going on thousands of miles away. Helmuth knew better than to interrupt him. Instead, he watched Dillon's white, blade-like fingers roving with blind sureness over the controls. Dillon, evidently, was making a complete tour of the Bridge not only from end to end, but up and down, too. The tally board showed that he had

already activated nearly two-thirds of the ultraphone eyes. That meant that he had been up all night at the job; had begun it immediately after last talking to Helmuth. Why? With a thrill of unfocused apprehension, Helmuth looked at the foreman's jack, which allowed the operator here in the cubicle to communicate with the gang when necessary, and which kept him aware of anything said or done at gang boards. It was plugged in. Dillon sighed "suddenly, took the helmet off, and turned. "Hello, Bob," he said. "Funny about this job. You can't see, you can't hear, but when somebody's watching you, you feel a sort of pressure on the back of your neck. ESP, maybe. Ever felt it?" "Pretty often, lately. Why the grand tour, Charity?" "There's to be an inspection," Dillon said. His eyes met Helmuth's. They were frank and transparent. "A mob of Western officials, coming to see that their eight billion dollars isn't being wasted. Naturally, I'm a little anxious to see that they find everything in order." "I see," Helmuth said. "First time in five years, isn't it?" "Just about. What was that dust-up down below just now? Somebodyyou. I'm sure, from the drastic handiwork in- volvedbailed Eva out of a mess, and then I heard her talk about your wanting to blow up the Bridge. I checked the area when I heard the fracas start, and it did seem as if she had let things go rather far, but What was it all about?" Dillon ordinarily hadn't the guile for cat-and-mouse games, and he had never looked less guileful now. Helmuth said care- fully, "Eva was upset, I suppose. On the subject of Jupiter we're all of us cracked by now, in our different ways. The way she was dealing with the catalysis didn't look to me to be suitablea difference of opinion, resolved in my favour because I had the authority, Eva didn't. That's all." "Kind of an expensive difference, Bob. I'm not niggling by nature, you know that. But an incident like that while the commission is here" "The point is," Helmuth said, "are we to spend an extra ten thousand, or whatever it costs to replace a truss and reinforce a caisson, or are we to lose the whole caisson and as much as a third of the whole Bridge along with it?" "Yes, you're right there, of course. That could be ex- plained, even to a pack of senators. Butit would be diffi- cult to have to explain it very often. Well, the board's yours, Bob. You could continue my spot-check, if you've time." Dillon got up. Then he added suddenly, as if it were forced out of him: "Bob, I'm trying to understand your state of mind. From what Eva said, I gather that you've made it fairly public. I. . . I don't think it's a good idea to infect your fellow work- ers with your own pessimism. It leads to sloppy work. I know that regardless of your own feelings you won't countenance sloppy work, but one foreman can do only so much. And you're making extra work for yourselfnot for me, but for yourselfby being openly gloomy about the Bridge. "You're the best man on the Bridge, Bob, for all your grous- ing about the job, and your assorted misgivings. I'd hate to see you replaced." "A threat, Charity?" Helmuth said softly. 'Wo. I wouldn't replace you unless you actually went nuts, and I firmly believe that your fears in that respect are groundless. It's a commonplace that only sane men suspect their own sanity, isn't it?" "It's a common misconception. Most psychopathic ob- sessions begin with a mild worry." Dillon made as if to brush that subject away. "Anyhow, I'm not threatening; I'd fight to keep you here. But my say- so only covers Jupiter V; there are people higher up on Ganymede, and people higher yet back in Washingtonand in this inspecting commission. "Why don't you try to look on the bright side for a change? Obviously the Bridge isn't ever going to inspire you. But you might at least try thinking about all those dollars piling up in your account every hour you're on this job, and about the bridges and ships and who knows what-all that you'll be building, at any fee you ask, when you get back down to Earth. All under the magic words, 'One of the men who built the Bridge on Jupiter!' " Charity was bright red with embarrassment and enthusi- asm. Helmuth smiled. "I'll try to bear it in mind, Charity," he said. "When is this gaggle of senators due to arrive?" "They're on Ganymede now, taking a breather. They came directly from Washington without any routing. I suppose they'll make a stop at Callisto before they come here. They've something new

on their ship, I'm told, that lets them flit about more freely than the usual uphill transport can." An icy lizard suddenly was nesting in Helmuth's stomach, coiling and coiling but never settling itself. The room blurred. The persistent nightmare was suddenly almost upon him already. "Something. . . new?" he echoed, his voice as flat and non- committal as he could make it. "Do you know what it is?" "Well, yes. But I think I'd better keep quiet about it un- til" "Charity, nobody on this deserted rock-heap could possibly be a Soviet spy. The whole habit of 'security' is idiotic out here. Tell me now and save me the trouble of dealing with senators; or tell me at least that you know I know. They have antigravityl Isn't that it?" One word from DiUon, and the nightmare would be real. "Yes," Dillon said. "How did you know? Of course, it couldn't be a complete gravity screen by any means. But it seems to be a good long step towards it. We've waited a long time to see that dream come true But you're the last man in the world to take pride in the achievement, so there's no sense exulting about it to you. I'll let you know when I get a definite arrival date. In the meantime, will you think about what I said before?" "Yes, I will." Helmuth took the seat before the board. "Good. With you, I have to be grateful for small victories. Good trick, Bob." "Good trick, Charity." iv Instead of sleepingfor now he knew that he was really afraidhe sat up in the reading chair in his cabin. The illu- minated microfilm pages of a book flipped by across the sur- face of the wall opposite him, timed precisely to the reading rate most comfortable for him, and he had several weeks' worry-conserved alcohol and smoke rations for ready con- sumption. But Helmuth let his mix go flat, and did not notice the book, which had turned itself on, at the page where he had abandoned it last, when he had fitted himself into the chair. Instead, he listened to the radio. "There was always a great deal of ham radio activity in the Jovian system. The conditions were good for it, since there was plenty of power available, few impeding atmosphere lay- ers, and those thin, no Heaviside layers, and few official and no commercial channels with which the hams could in- terfere. And there were plenty of people scattered about the satel- lites who needed the sound of a voice. ". . . anybody know whether the senators are coming here? Doc Barth put in a report a while back on a fossil plant he found here, at least he thinks it was a plant. Maybe they'd like a look at it." "They're supposed to hit the Bridge team next." A strong voice, and the impression of a strong transmitter wavering in and out; that would be Sweeney, on Ganymede. "Sorry to throw the wet blanket, boys, but I don't think the senators are interested in our rock-balls for their own lumpy selves. We could only hold them here three days." Helmuth thought greyly: Then they've already left Callisto. "It that you, Sweeney? Where's the Bridge tonight?" "Dillon's on duty," a very distant transmitter said. "Try to raise Helmuth, Sweeney." "Helmuth, Helmuth, you gloomy beetle-gooser! Come in, Helmuth!" "Sure, Bob, come in and dampen us." Sluggishly, Helmuth reached out to take the mike, where it lay clipped to one arm of the chair. But the door to his room opened before he had completed the gesture. Eva came in. She said, "Bob, I want to tell you something." "His voice is changing!" the voice of the Callisto operator said. "Ask him what he's drinking, Sweeney!" Helmuth cut the radio out. The girl was freshly dressed in so far as anybody dressed in anything on Jupiter Vand Helmuth wondered why she was prowling the decks at this hour, half-way between her sleep period and her trick. Her hair was hazy against the light from the corridor, and she looked less mannish than usual. She reminded him a little of the way she had looked when they first met. "All right," he said. "I owe you a mix, I guess. Citric, su- gar and the other stuff is in the locker. . . you know where it is. Shot-cans are there, too." The girl shut the door and sat down on the bunk, with a free litheness that was almost grace, but with a determination which Helmuth knew meant that she had just decided to do something silly for all the right reasons. "I don't need a drink," she said. "As a matter of fact, late- ly I've been turning my lux-R's back to the common pool. I suppose you did that for meby showing me what a mind looked like that is hiding from itself." "Eva, stop sounding like

a tract. Obviously, you've ad- vanced to a higher, more Jovian plane of existence, but won't you still need your metabolism? Or have you decided that vitamins are all-in-the-mind?" "Now you're being superior. Anyhow, alcohol isn't a vita- min. And I didn't come to talk about that. I came to tell you something I think you ought to know." "Which is?" She said, "Bob, I mean to have a child here." A bark of laughter, part sheer hysteria and part exaspera- tion, jack-knifed Helmuth into a sitting position. A red arrow bloomed on the far wall, obediently marking the paragraph which, supposedly, he had reached in his reading, and the page vanished. "Women!" he said, when he could get his breath back. "Really, Evita, you make me feel much better. No environ- ment can change a human being much, after all." "Why should it?" she said suspiciously. "I don't see the joke. Shouldn't a woman want to have a child?" "Of course she should," he said, settling back. The flipping pages began again. "It's quite ordinary. All women want to have children. All women dream of the day they can turn a child out to play in an airless rock-garden, to pluck fossils and get quaintly star-burned. How cosy to tuck the little blue body back into its corner that night, promptly at the sound of the trick-change bell! Why, it's as natural as Jupiter-light as Earthian as vacuum-frozen apple pie." He turned his head casually away. "As for me, though, Eva, I'd much prefer that you take your ghostly little pretext out of here." Eva surged to her feet in one furious motion. Her fingers grasped him by the beard and jerked his head painfully around again. "You reedy male platitude!" she said, in a low grinding voice. "How you could see almost the whole point and make so little of itWomen, is it? So you think I came creeping in here, full of humbleness, to settle our technical differences." He closed his hand on her wrist and twisted it away. "What else?" he demanded, trying to imagine how it would feel to stay reasonable for five minutes at a time with these Bridge- robots. "None of us need bother with games and excuses. We're here, we're isolated, we were all chosen because, among other things, we were judged incapable of forming permanent emotional attachments, and capable of such alli- ances as we found attractive without going unbalanced when the attraction diminished and the alliance came unstuck. None of us have to pretend that our living arrangements would keep us out of jail in Boston, or that they have to in- volve any Earth-normal excuses." She said nothing. After a while he asked, gently, "Isn't that so?" "Of course it's so. Also it has nothing to do with the matter." "It doesn't? How stupid do you think I am? / don't care whether or not you've decided to have a child here, if you really mean what you say." She was trembling with rage. "You really don't, too. The decision means nothing to you." "Well, if I liked children, I'd be sorry for the child. But as it happens, I can't stand children. In short, Eva, as far as I'm concerned you can have as many as you want, and to me you'll stilt be the worst operator on the Bridge." "I'll bear that in mind," she said. At this moment she seemed to have been cut from pressure-ice. "I'll leave you something to charge your mind with, too, Robert Helmuth. I'll leave you sprawled here under your precious book... what is Madame Bovary to you, anyhow, you unadventurous turtle?... to think about a man who believes that children must always be born into warm cradlesa man who thinks that men have to huddle on warm worlds, or they won't survive. A man with no ears, no eyes, scarcely any head. A man in terror, a man crying Mamma! Mammal all the stellar days and nights long!" "Parlour diagnosis!" "Parlour labelling. Good trick, Bob. Draw your warm wooly blanket in tight about your brains, or some little sneeze of sense might creep in, and impair yourefficiency!" The door closed sharply after her. A million pounds of fatigue crashed down without warning on Helmuth's brain, and he fell back into the reading chair with a gasp. The roots of his beard ached, and Jupiters bloomed and wavered away before his closed eyes. He struggled once, and fell asleep. Instantly he was in the grip of the dream. It started, as always, with commonplaces, almost realistic enough to be a documentary film-stripexcept for the ap- palling sense of pressure, and the distorted emotional signifi- cance with which the

least word, the smallest movement was invested. It was the sinking of the first caisson of the Bridge. The actual event had been bad enough. The job demanded enough exactness of placement to require that manned ships enter Jupiter's atmosphere itself: a squadron of twenty of the most powerful ships ever built, with the five-million-ton asteroid, trimmed and shaped in space, slung beneath them in an immense cat's cradle. Four times that squadron had disappeared beneath the clouds; four times the tense voices of pilots and engineers had muttered in Helmuth's ears; four times there were shouts and futile orders and the snapping of cables and someone screaming endlessly against the eternal howl of the Jovian sky. It had cost, altogether, nine ships and two hundred and thirty-one men, to get one of five laboriously shaped asteroids planted in the shifting slush that was Jupiter's surface. Hel- muth had helped to supervise all five operations, counting the successful one, from his desk on Jupiter V; but in the dream he was not in the control shack, but instead on ship- board, in one of the ships that was never to come back Then, without transition, but without any sense of dis- continuity either, he was on the Bridge itself. Not in absentia, as the remote guiding intelligence of a beetle, but in person, in an ovular, tank-like suit the details of which would never come clear. The high brass had discovered antigravity, and had asked for volunteers to man the Bridge. Helmuth had volunteered. Looking back on it in the dream, he did not understand why he had volunteered. It had simply seemed expected of him, and he had not been able to help it, even though he had known what it would be like. He belonged on the Bridge, though he hated ithe had been doomed to go there, from the first. And there was. . . something wrong. . . with the antigrav- ity. The high brass had asked for its volunteers before the scientific work had been completed. The present antigravity fields were weak, and there was some basic flaw in the theory. Generators broke down after only short periods of use, burned out, unpredictably, sometimes only moments after testing up without a flawlike vacuum tubes in waking life. That was what Helmuth's set was about to do. He crouched inside his personal womb, above the boiling sea, the clouds raging about him, lit by a plume of hydrogen flame, and wait- ed to feel his weight suddenly become eight times greater than normal. He knew what would happen to him then. It happened. Helmuth greeted morning on Jupiter V with his customary scream. V The ship that landed as he was going on duty did nothing to lighten the load on his heart. In shape it was not dis- tinguishable from any of the long-range cruisers which ran the legs of the Moon-Mars-Belt-Ganymede trip. But it grounded its huge bulk with less visible expenditures of power than one of the little intersatellary boats. That landing told Helmuth that his dream was well on its way to coming true. If the high brass had had a real anti- gravity, there would have been no reason why the main jets should have been necessary at all. Obviously, what had been discovered was some sort of partial screen, which allowed a ship to operate with far less jet action than was normal, but which still left it subject to a sizeable fraction of the uni- versal stress of space. Nothing less than complete and completely controllable antigravity would do on Jupiter. He worked mechanically, noting that Charity was not in evidence. Probably he was conferring with the senators, re- ceiving what would be for him the glad news. Helmuth realized suddenly that there was nothing left for him to do now but to cut and run. There could certainly be no reason why he should have to re-enact the entire dream, helplessly, event for event, like an actor committed to a play. He was awake now, in full control of his own senses, and still at least partially sane. The man in the dream had volunteeredbut that man would not be Robert Helmuth. Not any longer. While the senators were here, he would turn in his resigna- tion. Direct, over Charity's head. "Wake up, Helmuth," a voice from the gang deck snapped suddenly. "If it hadn't been for me, you'd have run yourself off the end of the Bridge. You had all the automatic stops on that beetle cut out." Helmuth reached guiltily and more than a little too late for the controls. Eva had already run his beetle back beyond the danger line. "Sorry," he mumbled. "Thanks, Eva." "Don't thank

me. If you'd actually been in it, I'd have let it go. Less reading and more sleep is what I recommend for you, Helmuth." "Keep your recommendations to yourself," he snapped. The incident started a new and even more disturbing chain of thought. If he were to resign now, it would be nearly a year before he could get back to Chicago. Antigravity or no antigravity, the senators' ship would have no room for unex- pected passengers. Shipping a man back home had to be ar- ranged far in advance. Space had to be provided, and a cargo equivalent of the weight and space requirements he would take up on the return trip had to be deadheaded out to Jupiter. A year of living in the station on Jupiter V without any functionas a man whose drain on the station's supplies no longer could be justified in terms of what he did. A year of living under the eyes of Eva Chavez and Charity Dillon and the other men and women who still remained Bridge opera- tors, men and women who would not hesitate to let him know what they thought of his quitting. A year of living as a bystander in the feverish excitement of direct, personal exploration of Jupiter. A year of watching and hearing the inevitable deathswhile he alone stood aloof, priv- ileged and useless. A year during which Robert Helmuth would become the most hated living entity in the Jovian system. And, when he got back to Chicago and went looking for a jobfor his resignation from the Bridge gang would auto- matically take him out of government servicehe would be asked why he left the Bridge at the moment when work on the Bridge was just reaching its culmination. He began to understand why the man in the dream had volunteered. When the trick-change bell rang, he was still determined to resign, but he had already concluded bitterly that there were, after all, other kinds of hells besides the one on Jupiter. He was returning the board to neutral as Charity came up the cleats. Charity's eyes were snapping like a skyful of com- ets. Helmuth had known that they would be. "Senator Wagoner wants to speak to you, if you're not too tired, Bob," he said. "Go ahead; I'll finish up there." "He does?" Helmuth frowned. The dream surged back upon him. NO. "They would not rush him any faster than he wanted to go. "What about, Charity? Am I suspected of un- Westem activities? I suppose you've told them how I feel." "I have," Dillon said, unruffled. "But we're agreed that you may not feel the same after you've talked to Wagoner. He's in the ship, of course. I've put out a suit for you at the lock." Charity put the helmet over his head, effectively cutting himself off from further conversation, or from any further consciousness of Helmuth at all. Helmuth stood looking at him a moment. Then, with a convulsive shrug, he went down the cleats. Three minutes later, he was plodding in a spacesuit across the surface of Jupiter V, with the vivid bulk of Jupiter splashing his shoulders with colour. A courteous Marine let him through the ship's air lock and deftly peeled him out of the suit. Despite a grim determina- tion to be uninterested in the new antigravity and any possi- ble consequence of it, he looked curiously about as he was conducted up towards the bow. But the ship was like the ones that had brought him from Chicago to Jupiter Vit was like any spaceship: there was nothing in it to see but corridor walls and stairwells, until you arrived at the cabin where you were needed. Senator Wagoner was a surprise. He was a young man, no more than sixty-five at most, not at all portly, and he had the keenest pair of blue eyes that Helmuth had ever seen. He received Helmuth alone, in his own cabina comfort- able cabin as spaceship accommodations go, but neither roomy nor luxurious. He was hard to match up with the stories Helmuth had been hearing about the current Senate, which had been involved in scandal after scandal of more than Roman proportions. Helmuth looked around. "I thought there were several of you," he said. "There are, but I didn't want to give you the idea that you were facing a panel," Wagoner said, smiling. "I've been forced to sit in on most of these endless loyalty investiga- tions back home, but I can't see any point in exporting such religious ceremonies to deep space. Do sit down, Mr. Hel- muth. There are drinks coming. We have a lot to talk about." Stiffly, Helmuth sat down. "Dillon tells me," Wagoner said, leaning back comfortably in his own chair, "that your usefulness to the Bridge is about at an end. In a way. I'm sorry to hear that, for you've been one of

the best men we've had on any of our planetary projects. But, in another way, I'm glad. It makes you available for something much bigger, where we need you much more." "What do you mean by that?" "I'll explain in a moment. First, I'd like to talk a little about the Bridge. Please don't feel that I'm quizzing you, by the way. You're at perfect liberty to say that any given question is none of my business, and I'll take no offence and hold no grudge. Also, 1 hereby disavow the authenticity of any tape or other tapping of which this statement may be a part.' In short, our conversation is unofficial, highly so." "Thank you." "It's to my interest; I'm hoping that youTI talk freely to me. Of course my disavowal means nothing, since such for- mal statements can always be excised from a tape; but later on I'm going to tell you some things you're not supposed to know, and you'll be able to judge by what I say then that anything you say to me is privileged. Okay?" A steward came in silently with the drinks, and left again. Helmuth tasted his. As far as he could tell, it was exactly like many he had mixed for himself back in the con- trol shack, from standard space rations. The only difference was that it was cold, which Helmuth found startling, but not unpleasant after the first sip. He tried to relax. "I'll do my best," he said. "Good enough. Now: Dillon says that you regard the Bridge as a monster. I've examined your dossier pretty closely, and I think perhaps Dillon hasn't quite the gist of your meaning. I'd like to hear it straight from you." "I don't think the Bridge is a monster," Helmuth said slow- ly. "You see, Charity is on the defensive. He takes the Bridge to be conclusive evidence that no possible set of adverse conditions ever will stop man for long, and there I'm in agree- ment with him. But he also thinks of it as Progress, personi- fied. He can't admityou asked me to speak my mind, senatorthat the West is a decadent and dying culture. All the other evidence that's available shows that it is. Charity likes to think of the Bridge as giving the lie to that evidence." "The West hasn't many more years," Wagoner agreed, astonishingly. "Still and all, the West has been responsible for some really towering achievements in its time. Perhaps the Bridge could be considered as the last and the mightiest of them all." "Not by me," Helmuth said. "The building of gigantic proj- ects for ritual purposesdoing a thing for the sake of doing itis the last act of an already dead culture. Look at the pyramids in Egypt for an example. Or an even more idiotic and more enormous example, bigger than anything human beings have accomplished yet, the laying out of the 'Diagram of Power' over the whole face of Mars. If the Martians had put all that energy into survival instead, they'd probably be alive yet." "Agreed," Wagoner said. "All right. Then maybe you'll also agree that the essence of a vital culture is its ability to defend itself. The West has beaten off the Soviets for a century nowbut as far as I can see, the Bridge is the West's 'Diagram of Power', its pyra- mids, or what have you. All the money and the resources that went into the Bridge are going to be badly needed, and won't be there, when the next Soviet attack comes." "Which will be very shortly, I'm told," Wagoner said, with complete calm. "Furthermore, it will be successful, and in part it will be successful for the very reasons you've outlined. For a man who's been cut off from the Earth for years, Helmuth, you seem to know more about what's going on down there than most of the general populace does." "Nothing promotes an interest in Earth like being off it," Helmuth said. "And there's plenty of time to read out here." Either the drink was stronger than he had expected, or the senator's calm concurrence in the collapse of Helmuth's entire world had given him another shove towards nothingness; his head was spinning. Wagoner saw it. He leaned forward suddenly, catching Hel- muth flat-footed. "However," he said, "it's difficult for me to agree that the Bridge serves, or ever did serve,.a ritual purpose. The Bridge served a huge practical purpose which is now ful- filleddie Bridge, as such, is now a defunct project." "Defunct?" Helmuth repeated faintly. "Quite. Of course we'll continue to operate it for a while, simply because you can't stop a process of that size on a dime, and that's just as well for people like Dillon who are emotionally tied up in it.

You're the one person with any au- thority in the whole station who has already lost enough interest in the Bridge to make it safe for me to tell you that it's being abandoned." "But why?" "Because," Wagoner went on quietly, "the Bridge has now given us confirmation of a theory of stupendous importance so important, in my opinion, that the imminent fall of the West seems like a puny event in comparison. A confirma- tion, incidentally, which contains in it the seeds of ultimate destruction for the Soviets, whatever they may win for themselves in the next fifty years or so." "I suppose," Helmuth said, puzzled, "that you mean anti- gravity?" For the first time, it was Wagoner's turn to be taken aback. "Man," he said at last, "do you know everything I want to tell you? I hope not, or my conclusions will be mighty suspicious. Surely Charity didn't tell you we had antigravity; I strictly enjoined him not to mention it." "No, the subject's been on my mind," Helmuth said. "But I certainly don't see why it should be so world-shaking, any more than I see how the Bridge helped to bring it about. I thought it had been developed independently, for the further exploitation of the Bridge, and would step up Bridge opera- tion, not discontinue it." "Not at all. Of course, the Bridge has given us information in thousands of different categories, much of it very valuable indeed. But the one job that only the Bridge could do was that of confirming, or throwing out, the Blackett-Dirac equa- tions." "Which are?" "A relationship between magnetism and the spinning of a massive bodythat much is the Dirac part of it. The Blackett Equation seemed to show that the same formula also applied to gravity. If the figures we collected on the magnetic field strength of Jupiter forced us to retire the Dirac equations, then none of the rest of the information we've gotten from the Bridge would have been worth the money we spent to get it. On the other hand, Jupiter was the only body in the solar system available to us which was big enough in all relevant respects to make it possible for us to test those equations at all. They involve quantities of enormous orders of magnitudes. "And the figures show that Dirac was right. They also show that Blackett was right. Both magnetism and gravity are phenomena of rotation. "I won't bother to trace the succeeding steps, because I think you can work them out for yourself. It's enough to say that there's a drive-generator on board this ship which is the complete and final justification of all the hell you people on the Bridge gang have been put through. The gadget has a long technical name, but the technics who tend it have already nicknamed it the spindizzy, because of what it does to the magnetic moment of any atomany atomwithin its field. "While it's in operation, it absolutely refuses to notice any atom outside its own influence. Furthermore, it will notice no other strain or influence which holds good beyond the borders of that field. It's so snooty that it has to be stopped down to almost nothing when it's brought close to a planet, or it won't let you land. But in deep space... well, it's impervious to meteors and such trash, of course; it's impervious to gravity; andit hasn't the faintest interest in any legislation about top speed limits." "You're kidding," Helmuth said. "Am I, now? This ship came to Ganymede directly from Earth. It did it in a little under two hours, counting ma- nceuvering time." Helmuth took a defiant pull at his drink. "This thing really has no top speed at all?" he said. "How can you be sure of that?" "Well, we can't," Wagoner admitted. "After all, one of the unfortunate things about general mathematical formulas is that they don't contain cut-off points to warn you of areas where they don't apply. Even quantum mechanics is somewhat subject to that criticism. However, we expect to know pretty soon just how fast the spindizzy can drive an object, if there is any limit. We expect you to tell us." "I?" "Yes, Helmuth, you. The coming debUcle on Earth makes it absolutely imperative for usthe Westto get interstellar ex- peditions started at once. Richardson Observatory, on the Moon, has two likely-looking systems picked out alreadyone at Wolf 359, another at 61 Cygniand there are sure to be hundreds of others where Earth-like planets are highly prob- able. We want to scatter adventurous people, people with a thoroughly indoctrinated love of being free, all over

this part of the galaxy, if it can be done. "Once they're out there, they'll be free to flourish, with no interference from Earth. The Soviets haven't the spindizzy yet, and even after they steal it from us, they won't dare allow it to be used. It's too good and too final an escape route. "What we want you to do. . . now I'm getting to the point, you see... is to direct this exodus. You've the intelligence and the cast of mind for it. Your analysis of the situation on Earth confirms that, if any more confirmation were need- ed. Andthere's no future for you on Earth now." "You'll have to excuse me," Helmuth said, firmly. "I'm in no condition to be reasonable now; it's been more than I could digest in a few moments. And the decision doesn't en- tirely rest with me, either. If I could give you an answer in .. . let me see. . . about three hours. Will that be soon enough?" "That'll be fine," the senator said. "And so, that's the story," Helmuth said. Eva remained silent in her chair for a long time. "One thing I don't understand," she said at last. "Why did you come to me? I'd have thought that you'd find the whole thing terrifying." "Oh, it's terrifying, all right," Helmuth said, with quiet exultation. "But terror and fright are two different things, as I've just discovered. We were both wrong, Evita. I was wrong in thinking that the Bridge was a dead end. You were wrong in thinking of it as an end in itself." "I don't understand you." "All right, let's put it this way: The work the Bridge was doing was worth-while, as I know nowso I was wrong in being frightened of it, in calling it a bridge to nowhere. "But you no more saw where it was going than I, and you made the Bridge the be-all and end-all of your existence. "Now, there's a place to go to; in fact there are places hundreds of places. They'll be Earth-like places. Since the Soviets are about to win Earth, those places will be more Earth-like than Earth itself, for the next century or so at least!" She said, "Why are you telling me this? Just to make peace between us?" "I'm going to take on this job, Evita, if you'll go along?" She turned swiftly, rising out of the chair with a marvellous fluidity of motion. At the same instant, all the alarm bells in the station went off at once, filling every metal cranny with a jangle of pure horror. "Posts!" the speaker above Eva's bed roared, in a distort- ed, gigantic version of Charity Dillon's voice. "Peak storm overload! The STD is now passing the Spot. Wind velocity has already topped all previous records, and part of the land mass has begun to settle. This is an A-l overload emergency." Behind Charity's bellow, the winds of Jupiter made a spectrum of continuous, insane shrieking. The Bridge was re- sponding with monstrous groans of agony. There was another sound, too, an almost musical cacophony of sharp, percussive tones, such as a dinosaur might make pushing its way through a forest of huge steel tuning-forks. Helmuth had never heard that sound before, but he knew what it was. The deck of the Bridge was splitting up the middle. After a moment more, the uproar dimmed, and the speaker said, in Charity's normal voice, "Eva, you too, please. Ac- knowledge, please. This is itunless everybody comes on duty at once, the Bridge may go down within the next hour." "Let it," Eva responded quietly. There was a brief, startled silence, and then a ghost of a human sound. The voice was Senator Wagoner's, and the sound just might have been a chuckle. Charity's circuit clicked out. The mighty death of the Bridge continued to resound in the little room. After a while, the man and the woman went to the win- dow, and looked past the discarded bulk of Jupiter at the near horizon, where there had always been visible a few stars,

Common Time ". . . the days went slowly round and round, endless and uneventful as cycles in space. Time, and time-pieces! How many centuries did my hammock tell, as pendulum- like it swung to the ship's dull roll, and ticked the hours and ages." Herman Melville, in Mardi Don't move. It was the first thought that came into Garrard's mind when he awoke, and perhaps it

saved his life. He lay where he was, strapped against the padding, listening to the round hum of the engines. That in itself was wrong; he should be unable to hear the overdrive at all. He thought to himself: Has it begun already? Otherwise everything seemed normal. The DPC-3 had crossed over into interstellar velocity, and he was still alive, and the ship was still functioning. The ship should at this moment be traveling at 22.4 times the speed of lighta neat 4,157,000 miles per second. Somehow Garrard did not doubt that it was. On both previous tries, the ships had whiffed away toward Alpha Cen- tauri at the proper moment when the overdrive should have cut in; and the split second of residual image after they had vanished, subjected to spectroscopy, showed a Doppler shift which tallied with the acceleration predicted for that moment by Haertel. The trouble was not that Brown and Cellini hadn't gotten away in good order. It was simply that neither of them had ever been heard from again. Very slowly, he opened his eyes. His eyelids felt terrifically heavy. As far as he could judge from the pressure of the couch against his skin, the gravity was normal; nevertheless, moving his eyelids seemed almost an impossible job. After long concentration, he got them fully open. The instrument chassis was directly before him, extended over his diaphragm on its elbow joint. Still without moving anything but his eyesand those only with the utmost patiencehe checked each of the meters. Velocity: 22.4 c. Operating tem- perature: normal. Ship temperature: 37 C. Air pressure: 778 mm. Fuel: No. I tank full. No. 2 tank full. No. 3 tank full. No. 4 tank nine tenths full. Gravity: I g. Calendar: stopped. He looked at it closely, though his eyes seemed to focus very slowly, too. It was, of course, something more than a calendarit was an all-purpose clock, designed to show him the passage of seconds, as well as of the ten months his trip was supposed to take to the double star. But there was no doubt about it: the second hand was motionless. That was the second abnormality. Garrard felt an impulse to get up and see if he could start the clock again. Perhaps the trouble had been temporary and safely in the past. Im- mediately there sounded in his head the injunction he had drilled into himself for a full month before the trip had begun Don't move! Don't move until you know the situation as far as it can be known without moving. Whatever it was that had snatched Brown and Cellini irretrievably beyond human ken was potent, and totally beyond anticipation. They had both been excellent men, intelligent, resourceful, trained to the point of diminishing returns and not a micron beyond that point the best men in the Project. Preparations for every knowable kind of trouble had been built into their ships, as they had been built into the DFC-3. Therefore, if there was something wrong nevertheless, it would be something that might strike from some commonplace quarterand strike only once. He listened to the humming. It was even and placid, and not very loud, but it disturbed him deeply. The overdrive was supposed to be inaudible, and the tapes from the first unmanned test vehicles had recorded no such hum. The noise did not appear to interfere with the overdrive's opera- tion, or to indicate any failure in it. It was just an irrelevancy for which he could find no reason. But the reason existed. Garrard did not intend to do so much as draw another breath until he found out what it was. Incredibly, he realized for the first time that he had not in fact drawn one single breath since he had first come to. Though he felt not the slightest discomfort, the discovery called up so overwhelming a flash of panic that he very nearly sat bolt upright on the couch. Luckilyor so it seemed, after the panic had begun to ebbthe curious leth- argy which had affected his eyelids appeared to involve his whole body, for the impulse was gone before he could sum- mon the energy to answer it. And the panic, poignant though it had been for an instant, turned out to be wholly intel- lectual. In a moment, he was observing that his failure to breathe in no way discommoded him as far as he could tell it was just there, waiting to be explained . . . Or to kill him. But it hadn't, yet. Engines humming; eyelids heavy; breathing absent; calen- dar stopped. The four facts added up to nothing. The temp- tation to move somethingeven if it were only a big toe was strong, but Garrard fought it

back. He had been awake only a short whilehalf an hour at mostand already had noticed four abnormalities. There were bound to be more, anomalies more subtle than these four; but available to close examination before he had to move. Nor was there anything in particular that he had to do, aside from caring for his own wants; the Project, on the chance that Brown's and Cellini's failure to return had resulted from some tampering with the overdrive, had made everything in the DFC-3 subject only to the computer. In a very real sense, Garrard was just along for the ride. Only when the overdrive was off could he adjust Pock. It was a soft, low-pitched noise, rather like a cork coming out of a wine bottle. It seemed to have come just from the right of the control chassis. He halted a sudden jerk of his head on the cushions toward it with a flat fiat of will. Slowly, he moved his eyes in that direction. He could see nothing that might have caused the sound. The ship's temperature dial showed no change, which ruled out a heat noise from differential contraction or expansion the only possible explanation he could bring to mind. He closed his eyesa process which turned out to be just as difficult as opening them had beenand tried to visualize what the calendar had looked like when he had first come out of anesthesia. After he got a clear andhe was almost sure accurate picture, Garrard opened his eyes again. The sound had been the calendar, advancing one second. It was now motionless again, apparently stopped. He did not know how long it took the second hand to make that jump, normally; the question had never come up. Certainly the jump, when it came at the end of each second, had been too fast for the eye to follow. Belatedly, he realized what all this cogitation was costing him in terms of essential information. The calendar had moved. Above all and before anything else, he must know exactly how long it took it to move again . . . He began to count, allowing an arbitrary five seconds lost. One-and-a-six, one-and-a-seven, one-and-an-eight Garrard had gotten only that far when he found himself plunged into hell. First, and utterly without reason, a sickening fear flooded swiftly through his veins, becoming more and more intense. His bowels began to knot, with infinite slowness. His whole body became a field of small, slow pulsesnot so much shak- ing him as putting his limbs into contrary joggling motions, and making his skin ripple gently under his clothing. Against the hum another sound became audible, a nearly subsonic thunder which seemed to be inside his head. Still the fear mounted, and with it came the pain, and the tenesmusa boardlike stiffening of his muscles, particularly across his abdomen and his shoulders, but affecting his forearms almost as grievously. He felt himself beginning, very gradually, to double at the middle, a motion about which he could do precisely nothinga terrifying kind of dynamic paralysis. . . . It lasted for hours. At the height of it, Garrard's mind, even his very personality, was washed out utterly; he was only a vessel of horror. When some few trickles of reason began to return over that burning desert of reasonless emotion, he found that he was sitting up on the cushions, and that with one arm he had thrust the control chassis back on its elbow so that it no longer jutted over his body. His clothing was wet with perspiration, which stubbornly refused to evaporate or to cool him. And his lungs ached a little, although he could still detect no breathing. What under God had happened? Was it this that had killed Brown and Cellini? For it would kill Garrard, tooof that he was sure, if it happened often. It would kill him even if it happened only twice more, if the next two such things fol- lowed the first one closely. At the very best it would make a slobbering idiot of him; and though the computer might bring Garrard and the ship back to Earth, it would not be able to tell the Project about this tornado of senseless fear. The calendar said that the eternity in hell had taken three seconds. As he looked at it in academic indignation, it said pock and condescended to make the total seizure four sec- onds long. With grim determination, Garrard began to count again. He took care to establish the counting as an absolutely even, automatic process which would not stop at the back of his mind no matter what other problem he tackled along with it, or what emotional typhoons should interrupt him. Really compulsive counting

cannot be stopped by anything not the transports of love nor the agonies of empires. Garrard knew the dangers in deliberately setting up such a mechanism in his mind, but he also knew how desperately he needed to time that clock tick. He was beginning to understand what had happened to himbut he needed exact measurement before he could put that understanding to use. Of course there had been plenty of speculation on the possible effect of the overdrive on the subjective time of the pilot, but none of it had come to much. At any speed below the velocity of light, subjective and objective time were exactly the same as far as the pilot was concerned. For an observer on Earth, time aboard the ship would appear to be vastly slowed at near-light speeds; but for the pilot himself there would be no apparent change. Since flight beyond the speed of light was impossible although for slightly differing reasonsby both the current theories of relativity, neither theory had offered any clue as to what would happen on board a translight ship. They would not allow that any such ship could even exist. The Haertel transformation, on which, in effect, the DFC-3 flew, was nonrelativistic: it showed that the apparent elapsed time of a translight journey should be identical in ship-time, and in the time of observers at both ends of the trip. But since ship and pilot were part of the same system, both covered by the same expression in Haertel's equation, it had never occurred to anyone that the pilot and the ship might keep different times. The notion was ridiculous. One-and-a-sevenhundredone, one-and-a-sevenhundredtwo, one - and - a - sevenhundredthree, one - and - a - sevenhundred four . . . The ship was keeping ship-time, which was identical with observer-time. It would arrive at the Alpha Centauri system in ten months. But the pilot was keeping Garrard-time, and it was beginning to look as though he wasn't going to arrive at all. It was impossible, but there it was. Somethingalmost certainly an unsuspected physiological side effect of the over- drive field on human metabolism, an effect which naturally could not have been detected in the preliminary, robot- piloted tests of the overdrivehad speeded up Garrard's subjective apprehension of time, and had done a thorough job of it. The second hand began a slow, preliminary quivering as the calendar's innards began to apply power to it. Seventy- hundred-forty-one, seventy-hundred-forty-two, seventy-hun- dred-forty-three ... At the count of 7,058 the second hand began the jump to the next graduation. It took it several apparent minutes to get across the tiny distance, and several more to come com- pletely to rest. Later still, the sound came to him: pock. In a fever of thought, but without any real physical agita- tion, his mind began to manipulate the figures. Since it took him longer to count an individual number as the number be- came larger, the interval between the two calendar ticks probably was closer to 7,200 seconds than to 7,058. Figur- ing backward brought him quickly to the equivalence he wanted: One second in ship-time was two hours in Garrard-time. Had he really been counting for what was, for him, two whole hours? There seemed to be no doubt about it. It looked like a long trip ahead. Just how long it was gong to be struck him with stunning force. Time had been slowed for him by a factor of 7200. He would get to Alpha Centauri in just 72,000 months. Which was Six thousand years! Garrard sat motionless for a long time after that, the Nessus-shirt of warm sweat swathing him persistently, re- fusing even to cool. There was, after all, no hurry. Six thousand years. There would be food and water and air for all that time, or for sixty or six hundred thousand years; the ship would synthesize his needs, as a matter of course, for as long as the fuel lasted, and the fuel bred itself. Even if Garrard ate a meal every three seconds of objective, or ship, time (which, he realized suddenly, he wouldn't be able to do, for it took the ship several seconds of objective time to prepare and serve up a meal once it was ordered; he'd be lucky if he ate once a day, Garrard-time), there would be no reason to fear any shortage of supplies. That had been one of the earliest of the possibilities for disaster that the Project engineers had ruled out in the design of the DFC-3. But nobody had thought to provide a

mechanism which would indefinitely refurbish Garrard. After six thousand years, there would be nothing left of him but a faint film of dust on the DFC-3's dully gloaming horizontal surfaces. His corpse might outlast him a while, since the ship itself was sterilebut eventually he would be consumed by the bacteria which he carried in his own digestive tract. He needed those bacteria to synthesize part of his B-vitamin needs while he lived, but they would consume him without compunc- tion once he had ceased to be as complicated and delicately balanced a thing as a pilotor as any other kind of life. Garrard was, in short, to die before the DFC-3 had gotten fairly away from Sol; and when, after 12,000 apparent years, the DFC-3 returned to Earth, not even his mummy would be still aboard. The chill that went through him at that seemed almost unrelated to the way he thought he felt about the discovery; it lasted an enormously long time, and insofar as he could characterize it at all, it seemed to be a chill of urgency and excitementnot at all the kind of chill he should be feeling at a virtual death sentence. Luckily it was not as intolerably violent as the last such emotional convulsion; and when it was over, two clock ticks later, it left behind a residuum of doubt. Suppose that this effect of time-stretching was only men- tal? The rest of his bodily processes might still be keeping ship-time; Garrard had no immediate reason to believe other- wise. If so, he would be able to move about only on ship-time, too; it would take many apparent months to complete the simplest task. But he would live, if that were the case. His mind would arrive at Alpha Centauri six thousand years older, and perhaps madder, than his body, but he would live. If, on the other hand, his bodily movements were going to be as fast as his mental processes, he would have to be enormously careful. He would have to move slowly and exert as little force as possible. The normal human hand movement, in such a task as lifting a pencil, took the pencil from a state of rest to another state of rest by imparting to it an acceleration of about two feet per second per second and, of course, decelerated it by the same amount. If Garrard were to attempt to impart to a two-pound weight, which was keeping ship-time, an acceleration of 14,440 ft/sec' in his time, he'd have to exert a force of 900 pounds on it. The point was not that it couldn't be donebut that it would take as much effort as pushing a stalled jeep. He'd never be able to lift that pencil with his forearm muscles alone; he'd have to put his back into the task. And the human body wasn't engineered to maintain stresses of that magnitude indefinitely. Not even the most powerful professional weight-lifter is forced to show his prowess throughout every minute of every day. Pock. That was the calendar again; another second had gone by. Or another two hours. It had certainly seemed longer than a second, but less than two hours, too. Evidently subjective time was an intensively recomplicated measure. Even in this world of micro-timein which Garrard's mind, at least, seemed to be operatinghe could make the lapses between calendar ticks seem a little shorter by becoming actively in- terested in some problem or other. That would help, during the waking hours, but it would help only if the rest of hia body were not keeping the same time as his mind. If it were not, then he would lead an incredibly active, but perhaps not intolerable, mental life during the many centuries of his awake-time, and would be mercifully asleep for nearly as long. Both problemsthat of how much force he could exert with his body, and how long he could hope to be asleep in his mindemerged simultaneously into the forefront of his consciousness while he still sat inertly on the hammock, their terms still much muddled together. After the single tick of the calendar, the shipor the part of it that Garrard could see from heresettled back into complete rigidity. The sound of the engines, too, did not seem to vary in frequency or am- plitude, at least as far as his ears could tell. He was still not breathing. Nothing moved, nothing changed. It was the fact that he could still detect no motion of his diaphragm or his rib cage that decided him at last. His body had to be keeping ship-time, otherwise he would have blacked out from oxygen starvation long before now. That assump- tion explained, too, those two incredibly prolonged,

seemingly sourceless saturnalias of emotion through which he had suf- fered: they had been nothing more nor less than the response of his endocrine glands to the purely intellectual reactions he had experienced earlier. He had discovered that he was not breathing, had felt a flash of panic and had tried to sit up. Long after his mind had forgotten those two impulses, they had inched their way from his brain down his nerves to the glands and muscles involved, and actual, physical panic had supervened. When that was over, he actually was sitting up, though the flood of adrenalin had prevented his noticing the motion as he had made it. The later chillless violent, and apparently associated with the discovery that he might die long before the trip was completedactually had been his body's response to a much earlier mental commandthe ab- stract fever of interest he had felt while computing the time differential had been responsible for it. Obviously, he was going to have to be very careful with apparently cold and intellectual impulses of any kindor he would pay for them Intel with a prolonged and agonizing glandular reaction. Nevertheless, the discovery gave him considerable satisfaction, and Garrard allowed it free play; it certainly could not hurt him to feel pleased for a few hours, and the glandular pleasure might even prove helpful if it caught him at a moment of mental depression. Six thousand years, after all, provided a considerable number of oppor- tunities for feeling down in the mouth; so it would be best to encourage all pleasure moments, and let the after-reaction last as long as it might. It would be the instants of panic, of fear, of gloom, which he would have to regulate sternly the moment they came into his mind; it would be those which would otherwise plunge him into four, five, six, perhaps even ten, Oarrard-hours of emotional inferno. Pock. There now, that was very good: there had been two Gar- rard-hours which he had passed with virtually no difficulty of any kind, and without being especially conscious of their pas- sage. If he could really settle down and become used to this kind of scheduling, the trip might not be as bad as he had at first feared. Sleep would take immense bites out of it; and during the waking periods he could put in one hell of a lot of creative thinking. During a single day of ship time, Garrard could get in more thinking than any philosopher of Earth could have managed during an entire lifetime. Garrard could, if he disciplined himself sufficiently, devote his mind for a century to running down the consequences of a single thought, down to the last detail, and still have millennia left to go on to the next thought. What panoplies of pure reason could he not have assembled by the time 6,000 years had gone by? With sufficient concentration, he might come up with the solution to the Problem of Evil between breakfast and dinner of a single ship's day, and in a ship's month might put his finger on the First Causel Pock. Not that Carrard was sanguine enough to expect that he would remain logical or even sane throughout the trip. The vista was still grim, in much of its detail. But the oppor- tunities, too, were there. He felt a momentary regret that it hadn't been Haertel, rather than himself, who had been given such an opportunity Pock. for the old man could certainly have made better use of it than Garrard could. The situation demanded someone trained in the- highest rigors of mathematics to be put to the best conceivable use. Still and all Garrard began to feel Pock. that he would give a good account of himself, and it tickled him to realize that (as long as be held onto his essential sanity) he would return Pock. to Earth after ten Earth months with knowledge cen- turies advanced beyond anything Pock. that Haertel knew, or that anyone could know Pock. who had to work within a normal lifetime. Pck. The whole prospect tickled him. Pck. Even the clock tick seemed more cheerful. Pck. He felt fairly safe now Pck in disregard- ing his drilled-in command Pck against moving Pck, since in any Pck event he Pck had already Pck moved Pck without Pck being Pck harmed Pck Pck Pck Pck Pck pckpckpckpck- pckpckpck.. . . He yawned, stretched, and got up. It wouldn't do to be too pleased, after all. There were certainly many problems that still needed coping with, such as how to keep the impulse toward getting a ship-time task performed going, while his higher centers were following the ramifications of some purely

philosophical point. And besides . . . And besides, he had just moved. More than that; he had just performed a complicated maneuver with his body in normal time! Before Garrard looked at the calendar itself, the message it had been ticking away at him had penetrated. While he had been enjoying the protracted, glandular backwash of his earlier feeling of satisfaction, he had failed to notice, at least consciously, that the calendar was accelerating. Good-bye, vast ethical systems which would dwarf the Greeks. Good-bye, calculuses aeons advanced beyond the spinor calculus of Dirac. Good-bye, cosmologies by Garrard which would allot the Almighty a job as third-assistant- waterboy in an n-dimensional backfield. Good-bye, also, to a project he had once tried to undertake in collegeto describe and count the positions of love, of which, according to under-the-counter myth, there were sup- posed to be at least forty eight. Garrard had never been able to carry his tally beyond twenty, and he had just lost what was probably his last opportunity to try again. The micro-time in which he had been living had worn off, only a few objective minutes after the ship had gone into overdrive and he had come out of the anesthetic. The long intellectual agony, with its glandular counterpoint, had come to nothing. Garrard was now keeping ship-time. Garrard sat back down on the hammock, uncertain whether to be bitter or relieved. Neither emotion satisfied him in the end; he simply felt unsatisfied. Micro-time had been bad enough while it lasted; but now it was gone, and everything seemed normal. How could so transient a thing have killed Brown and Cellini? They were stable men, more stable, by his own private estimation, than Garrard himself. Yet he had come through it. Was there more to it than this? And if there waswhat, conceivably, could it be? There was no answer. At his elbow, on the control chassis which he had thrust aside during that first moment of infinitely protracted panic, the calendar continued to tick. The engine noise was gone. His breath came and went in natural rhythm. He felt light and strong. The ship was quiet, calm, unchanging. The calendar ticked, faster and faster. It reached and passed the first hour, ship-time, of flight in overdrive. Pock. Garrard looked up in surprise. The familiar noise, this time, had been the hour-hand jumping one unit. The minute- hand was already sweeping past the past half-hour. The second-hand was whirling like a propellerand while he watched it, it speeded up to complete invisibility Pock. Another hour. The half-hour already passed. Pock. An- other hour. Pock. Another. Pock. Pock. Pock, Pock, Pock, Pock, pck-pck-pck-pck-pckpckpckpck. . . . The hands of the calendar swirled toward invisibility as time ran away with Garrard. Yet the ship did not change. It stayed there, rigid, inviolate, invulnerable. When the date tumblers reached a speed at which Garrard could no longer read them, he discovered that once more he could not move and that, although his whole body seemed to be aflutter like that of a hummingbird, nothing coherent was coming to him through his senses. The room was dimming, becoming redder; or no, it was . . . But he never saw the end of the process, never was allowed to ' look from the pinnacle of macro-time toward which the Haertel overdrive was taking him. Pseudo-death took him first. 3 That Garrard did not die completely, and within a com- paratively short time after the DFC-3 had gone into overdrive, was due to the purest of accidents; but Garrard did not know that. In fact, he knew nothing at all for an indefinite period, sitting rigid and staring, his metabolism slowed down to next to nothing, his mind almost utterly inactive. From time to time, a single wave of low-level metabolic activity passed through himwhat an electrician might have termed a "maintenance turnover"in response to the urgings of some occult survival urge; but these were of so basic a nature as to reach his consciousness not at all. This was the pseudo- death. When the observer actually arrived, however, Garrard woke. He could make very little sense out of what he saw or felt even now; but one fact was clear: the overdrive was offand with it the crazy alterations in time ratesand there was strong light coming through one of the ports. The first leg of the trip was over. It had been these two changes in his environment which had restored him to life. The thing (or things) which

had restored him to con- sciousness, however, wasit was what? It made no sense. It was a construction, a rather fragile one, which completely surrounded his hammock. No, it wasn't a construction, but evidently something alivea living being, organized hori- zontally, that had arranged itself in a circle about him. No, it was a number of beings. Or a combination of all of these things. How it had gotten into the ship was a mystery, but there it was. Or there they were. "How do you hear?" the creature said abruptly. Its voice, or their voices, came at equal volume from every point in the circle, but not fiqm any particular point in it. Garrard could think of no reason why that should be unusual. "I" he said. "Or wewe hear with our ears. Here." His answer, with its unintentionally long chain of open vowel sounds, rang ridiculously. He wondered why he was speaking such an odd language. "We-they wooed to pitch you-yours thiswise," the creature said. With a thump, a book from the DFC-3's ample library fell to the deck beside the hammock. "We wooed there and there and there for a many. You are the being-Garrard. We- they are the clinesterton beademung, with all of love." "With all of love," Garrard echoed. The beademung's use of the language they both were speaking was odd; but again Garrard could find no logical reason why the beade- mung's usage should be considered wrong. "Areare you-they from Alpha Centauri?" he said hesi- tantly. "Yes, we hear the twin radioceles, that show there beyond the gift-orifices. We-they pitched that the being-Garrard with most adoration these twins and had mind to them, soft and loud alike. How do you hear?" This time the being-Garrard understood the question. "I hear Earth," he said. "But that is very soft, and does not show." "Yes," said the beademung. "It is a harmony, not a first, as ours. The All-Devouring listens to lovers there, not on the radioceles. Let me-mine pitch you-yours so to have mind of the rodalent beademung and other brothers and lovers, along the channel which is fragrant to the being-Garrard." Garrard found that he understood the speech without difficulty. The thought occurred to him that to understand a language on its own termswithout having to put it back into English in one's own mindis an ability that is won only with difficulty and long practice. Yet, instantly his mind said, "But it is English," which of course it was. The offer the clinesterton beademung had just made was enormously hearted, and he in turn was much minded and of love, to his own delighting as well as to the beademungen; that almost went without saying. There were many matings of ships after that, and the being-Garrard pitched the harmonies of the beademungen, leaving his ship with the many gift orifices in harmonic for the All-Devouring to love, while the beademungen made show of they-theirs. He tried, also, to tell how he was out of love with the overdrive, which wooed only spaces and times, and made featurelings. The rodalent beademung wooed the overdrive, but it did not pitch he-them. Then the being-Garrard knew that all the time was de- voured, and he must hear Earth again. "I pitch you-them to fullest love," he told the beade- mungen, "I shall adore the radioceles of Alpha and Proxima Centauri, 'on Earth as it is in Heaven.' Now the overdrive my-other must woo and win me, and make me adore a featureling much like silence." "But you will be pitched again," the clinesterton beade- mung said. "After you have adored Earth. You are much loved by Time, the All-Devouring. We-they shall wait for this othering." Privately Garrard did not faith as much, but he said, "Yes, we-they will make a new wooing of the beadernun- gen at some other radiant. With all of love." On this the beademungen made and pitched adorations, and in the midst the overdrive cut in. The ship with the many gift orifices and the being-Garrard him-other saw the twin radioceles sundered away. Then, once more, came the pseudo-death. 4 When the small candle lit in the endless cavern of Garrard's pseudo-dead mind, the DFC-3 was well inside the orbit of Uranus. Since the sun was still very small and distant, it made no spectacular display through the nearby port, and nothing called him from the post-death sleep for nearly two days. The computers waited patiently for him. They were no longer immune to his control; he could now tool the ship back to Earth himself if he so desired. But the computers were also designed to take into

account the fact that he might be truly dead by the time the DFC-3 got back. After giving him a solid week, during which time he did nothing but sleep, they took over again. Radio signals began to go out, tuned to a special channel. An hour later, a very weak signal came back. It was only a directional signal, and it made no sound inside the DFC-3 but it was sufficient to put the big ship in motion again. It was that which woke Garrard. His conscious mind was still glazed over with the icy spume of the pseudo-death; and as far as he could see the interior of the cabin had not changed one whit, except for the book on the deck The book. The clinesterton beademung had dropped it there. But what under God was a clinesterton beademung? And what was he, Garrard, crying about? It didn't make sense. He remembered dimly some kind of experience out there by the Centauri twins the twin radioceles There was another one of those words. It seemed to have Greek roots, but he knew no Greekand besides, why would Centaurians speak Greek? He leaned forward and actuated the switch which would roll the shutter off the front port, actually a telescope with a translucent viewing screen. It showed a few stars, and a faint nimbus off on one edge which might be the Sun. At about one o'clock on the screen, was a planet about the size of a pea which bad tiny projections, like teacup handles, on each side. The DFC-3 hadn't passed Saturn on its way out; at that time it had been on the other side of the Sun from the route the starship had had to follow. But the planet was certainly difficult to mistake. Garrard was on his way homeand he was still alive. and sane. Or was he still sane? These fantasies about Cen- taurianswhich still seemed to have such a profound emo- tional effect upon himdid not argue very well for the stabil- ity of his mind. But they were fading rapidly. When he discovered, clutch- ing at the handiest fragments of the "memories," that the plural of beademung was beademungen, he stopped taking the problem seriously. Obviously a race of Centaurians who spoke Greek wouldn't also be forming weak German plurals. The whole business had obviously been thrown up by his unconscious. But what had he found by the Centaurus stars? There was no answer to that question but that in- comprehensible garble about love, the All-Devouring, and beademungen. Possibly, he had never seen the Centaurus stars at all, but had been lying here, cold as a mackerel, for the entire twenty months. Or had it been 12,000 years? After the tricks the over- drive had played with time, there was no way to tell what the objective date actually was. Frantically Garrard put the telescope into action. Where was the Earth? After 12,000 years The Earth was there. Which, he realized swiftly, proved nothing. The Earth had lasted for many millions of years; 12,000 years was nothing to a planet. The Moon was there, too; both were plainly visible, on the far side of the Sun but not too far to pick them out clearly, with the telescope at highest power. Garrard could even see a clear sun-highlight on the Atlantic Ocean, not far east of Greenland; evidently the computers were bringing the DFC-3 in on the Earth from about 23 north of the plane of the ecliptic. The Moon, too, had not changed. He could even see on its face the huge splash of white, mimicking the sun-high- light on Earth's ocean, which was the magnesium hydroxide landing beacon, which had been dusted over the Mare Va- porum in the earliest days of space flight, with a dark spot on its southern edge which could only be the crater Monilius. But that again proved nothing. The Moon never changed. A film of dust laid down by modern man on its face would last for millenniawhat, after all, existed on the Moon to blow it away? The Mare Vaporum beacon covered more than 4,000 square miles; age would not dim it, nor could man himself undo iteither accidentally, or on purposein anything under a century. When you dust an area that large on a world without atmosphere, it stays dusted. He checked the stars against his charts. They hadn't moved; why should they have, in only 12,000 years? The pointer stars in the Dipper still pointed to Polaris. Draco, like a fantastic bit of tape, wound between the two Bears, and Cepheus and Cassiopeia, as it always had done. These constellations told him only that it was spring in the northern hemisphere of Earth. But spring of what year? Then, suddenly, it occurred to Garrard that he had

a method of finding the answer. The Moon causes tides in the Earth, and action and reaction are always equal and op- posite. The Moon cannot move things on Earth without itself being affectedand that effect shows up in the moon's angular momentum. The Moon's distance from the Earth increases steadily by 0.6 inches every year. At the end of 12,000 years, it should be 600 feet farther away from the Earth, and action and reaction are always equal and op- Was it possible to measure? Garrard doubted it, but he got out his ephemeris and his dividers anyhow, and took pictures. While he worked, the Earth grew nearer. By the time he had finished his first calculationwhich was indeci- sive, because it allowed a margin for error greater than the distances he was trying to checkEarth and Moon were close enough in the telescope to permit much more accurate measurements. Which were, he realized wryly, quite unnecessary. The computer had brought the DFC-3 back, not to an observed sun or planet, but simply to a calculated point. That Earth and Moon would not be near that point when the DFC-3 re- turned was not an assumption that the computer could make. That the Earth was visible from here was already good and sufficient proof that no more time had elapsed than had been calculated for from the beginning. This was hardly new to Garrard; it had simply been retired to the back of his mind. Actually he had been doing all this figuring for one reason, and one reason only: because deep in his brain, set to work by himself, there was a mechanism that demanded counting. Long ago, while he was still trying to time the ship's calendar, he had initiated compulsive countingand it appeared that he had been counting ever since. That had been one of the known dangers of deliberately starting such a mental mechanism; and now it was bearing fruit in these perfectly useless as- tronomical exercises. The insight was healing. He finished the figures roughly, and that unheard moron deep inside his brain stopped count- ing at last. It had been pawing its abacus for twenty months now, and Garrard imagined that it was as glad to be retired as he was to feel it go. His radio squawked, and said anxiously, "DFC-3, DFC-3. Garrard, do you hear me? Are you still alive? Everybody's going wild down here. Garrard, if you hear me, call us!" It was Haertel's voice. Garrard closed the dividers so convulsively that one of the points nipped into the heel of his hand. "Haertel, I'm here. DF,C-3 to the Project. This is Garrard." And then, without knowing quite why, he added: "With all of love." Haertel, after all the hoopla was over, was more than interested in the time effects. "It certainly enlarges the mani- fold in which I was working," he said. "But I think we can account for it in the transformation. Perhaps even factor it out, which would eliminate it as far as the pilot is con- cerned. We'll see, anyhow." Garrard swirled his highball reflectively. In Haertel's cramped old office, in the Project's administration shack, he felt both strange and as old, as compressed, constricted. He said, "I don't think I'd do that, Adolph. I think it saved my life." "How?" "I told you that I seemed to die after a while. Since I got home, I've been reading; and I've discovered that the psychol- ogists take far less stock in the individuality of the human psyche than you and I do. You and I are physical scientists, so we think about the world as being all outside our skins something which is to be observed, but which doesn't alter the essential /. But evidently, that old solipsistic position isn't quite true. Our very personalities, really, depend in large part upon alt the things in our environment, large and small, that exist outside our skins. If by some means you could cut a human being off from every sense impression that comes to him from outside, he would cease to exist as a personality within two or three minutes. Probably he would die." "Unquote: Harry Stack Sullivan," Haertel said, dryly. "So?" "So," Garrard said, "think of what a monotonous environ- ment the inside of a spaceship is. It's perfectly rigid, still, unchanging, lifeless. In ordinary interplanetary flight, in such an environment, even the most hardened spaceman may go off his rocker now and then. You know the typical spaceman's psychosis as well as I do, I suppose. The man's personality goes rigid, just like his surroundings. Usually he recovers as soon as he makes port, and makes contact with a

more- or-less normal world again. "But in the DPC-3, I was cut off from the world around me much more severely. I couldn't look outside the ports I was in overdrive, and there was nothing to see. I couldn't communicate with home, because I was going faster than light. And then I found I couldn't move either, for an enormous long while; and that even the instruments that are in constant change for the usual spaceman wouldn't be in motion for me. Even those were fixed. "After the time rate began to pick up, I found myself in an even more impossible box. The instruments moved, all right, but then they moved too fast for me to read them. The whole situation was now utterly rigidand, in effect, I died. I froze as solid as the ship around me, and stayed that way as long as the overdrive was on." "By that showing," Haertel said dryly, "the time effects were hardly your friends." "But they were, Adolph. Look. Your engines act on sub- jective time; they keep it varying along continuous curves from far-too-slow to far-too-fastand, I suppose, back down again. Now, this is a situation of continuous change. It wasn't marked enough, in the long run, to keep me out of pseudo- death; but it was sufficient to protect me from being obliter- ated altogether, which I think is what happened to Brown and Cellini. Those men knew that they could shut down the overdrive if they could just get to it, and they killed them- selves trying. But I knew that I just had to sit and take it and, by my great good luck, your sine-curve time variation made it possible for me to survive." "Ah, ah," Haertel said. "A point worth considering though I doubt that it will make interstellar travel very popular!" He dropped back into silence, his thin mouth pursed. Garrard took a grateful pull at his drink. At last Haertel said: "Why are you in trouble over these Centaurians? It seems to me that you have done a good job. It was nothing that you were a heroany fool can be bravebut I see also that you thought, where Brown and Cellini evidently only reacted. Is there some secret about what you found when you reached those two stars?" Garrard said, "Yes, there is. But I've already told you what it is. When I came out of the pseudo-death, I was just a sort of plastic palimpsest upon which anybody could have made a mark. My own environment, my ordinary Earth environment, was a hell of a long way off. My present surroundings were nearly as rigid as they had ever been. When I met the Centauriansif I did, and I'm not at all sure of thatthey became the most important thing in my world, and my personality changed to accommodate and understand them. That was a change about which I couldn't do a thing. "Possibly I did understand them. But the man who under- stood them wasn't the same man you're talking to now, Adolph. Now that I'm back on Earth, I don't understand that man. He even spoke English in a way that's gibberish to me. If I can't understand myself during that periodand I can't; I don't even believe that that man was the Garrard I knowwhat hope have I of telling you or the Project about the Centurians? They found me in a controlled environ- ment, and they altered me by entering it. Now that they're gone, nothing comes through; I don't even understand why I think they spoke English!" "Did they have a name for themselves?" "Sure," Garrard said. "They were the beademungen." "What did they look like?" "I never saw them." Haertel leaned forward. "Then . . ." "I heard them. I think." Garrard shrugged, and tasted his Scotch again. He was home, and on the whole he was pleased. But in his malleable mind he heard someone say, On Earth, as it is in Heaven; and then, in another voice, which might also have been his own (why had he thought "him- other"?), It is later than you think. "Adolph," he said, "is this all there is to it? Or are we going to go on with it from here? How long will it take to make a better starship, a DFC-4?" "Many years," Haertel said, smiling kindly. "Don't be anxious, Garrard. You've come back, which is more than the others managed to do, and nobody will ask you to go out again. I really think that it's hardly likely that we'll get another ship built during your lifetime; and even if we do, we'll be slow to launch it. We really have very little infor- mation about what kind of playground you found out there." "I'll go," Garrard said. "I'm not afraid to go backI'd like to go. Now that I know how the DFC-3 behaves, I could take it out again, bring you back proper maps,

tapes, photos." "Do you really think," Haertel said, his face suddenly serious, "that we could let the DFC-3 go out again? Garrard, we're going to take that ship apart practically molecule by molecule; that's preliminary to the building of any DFC-4. And no more can we let you go. I don't mean to be cruel, but has it occurred to you that this desire to go back may be the result of some kind of post-hypnotic suggestion? If so, the more badly you want to go back, the more dangerous to us all you may be. We are going to have to examine you just as thoroughly as we do the ship. If these beademungen wanted you to come back, they must have had a reason and we have to know that reason." Garrard nodded, but he knew that Haertel could see the slight movement of his eyebrows and the wrinkles forming in his forehead, the contractions of the small muscles which stop the flow of tears only to make grief patent on the rest of the face. "In short," he said, "don't move." Haertel looked politely puzzled. Garrard, however, could say nothing more. He had returned to humanity's common time, and would never leave it again. Not even, for all his dimly remembered promise, with all there was left in him of love.

This Earth of Hours THE ADVANCE squadron was coming into line as Master Sergeant Oberholzer came onto the bridge of the Novae Washingtongrad, saluted, and stood stiffly to the left of Lieu- tenant Campion, the exec, to wait for orders. The bridge was crowded and crackling with tension, but after twenty years in the Marines it was all old stuff to Oberholzer. The Hobo (as most of the enlisted men called her, out of earshot of the brass) was at the point of the formation, as befitted a virtually indestructible battleship already surfeited with these petty conquests. The rest of the cone was sweeping on ahead, in the swift enveloping maneuver which had reduced so many previous planets before they had been able to understand what was happening to them. This time, the planet at the focus of all those shifting conic sections of raw naval power was a place called Calle. It was showing now on a screen that Oberholzer could see, turning as placidly as any planet turned when you were too far away from it to see what guns it might be pointing at you. Lieutenant Campion was watching it too, though he had to look out of the very corners of his eyes to see it at all. If the exec were caught watching the screen instead of the meter board assigned to him, Captain Hammer would probably reduce him to an ensign. Nevertheless, Campion never took his eyes off the image of Calle. This one was going to be rough. Captain Hammer was watching, too. After a moment he said, "Sound!" in a voice like sandpaper. "By the pulse six, sir," Lieutenant Spring's voice murmured from the direction of the 'scope. His junior, a very raw youngster named Rover, passed him a chit from the plotting table. "For that read: By the birefs five eight nine, sir," the invisible navigator corrected. Oberholzer listened without moving while Captain Ham- mer muttered under his breath to Flo-Mar 12-Upjohn, the only civilian allowed on the bridgeand small wonder, since he was the Consort of State of the Matriarchy itself. Hammer had long ago become accustomed enough to his own bridge to be able to control who overheard him, but 12-Upjohn's answering whisper must have been audible to every man there. 'The briefing said nothing about a second inhabited planet," the Consort said, a little peevishly. "But then there's very little we do know about this systemthat's part of our trouble. What makes you think it's a colony?" "A colony from Calle, not one of ours," Hammer said, in more or less normal tones; evidently he had decided against trying to keep only half of the discussion private. "The electromagnetic 'noise' from both planets has the same spectrumthe energy level, the output, is higher on Calle, that's all. That means similar machines being used in similar ways. And let me point out, Your Excellency, that the outer planet is in opposition to Calle now, which will put it precisely in our rear if we complete this maneuver." "When

we complete this maneuver," 12-Upjohn said firmly. "Is there any evidence of communication between the two planets?" Hammer frowned. "No," he admitted. "Then we'll regard the colonization hypothesis as unproved and stand ready to strike back hard if events prove us wrong. I think we have a sufficient force here to reduce three planets like Calle if we're driven to that pitch." Hammer grunted and resigned the argument. Of course it was quite possible that 12-Upjohn was right; he did not lack for experiencein fact, he wore the Silver Barring, as the most-traveled Consort of State ever to ride the Standing Wave. Nevertheless Oberholzer repressed a sniff with difficulty. Like all the military, he was a colonial; he had never seen the Earth, and never expected to; and, both as a colonial and as a Marine who had been fighting the Matriarchy's battles all his adult life, he was more than a little contemp- tuous of Earthmen, with their tandem names and all that they implied. Of course it was not the Consort of State's fault that he had been born on Earth, and so had been named only Marvin 12 out of the misfortune of being a male; nor that he had married into Florence Upjohn's cabinet, that being the only way one could become a cabinet member, and Marvin 12 having been taught from birth to believe such a post the highest honor a man might covet. All the same, neither 12-Upjohn nor his entourage of drones filled Oberholzer with confidence. Nobody, however, had asked M. Sgt. Richard Oberholzer what he thought, and nobody was likely to. As the chief of all the non-Navy enlisted personnel on board the Hobo, he was expected to be on the bridge when matters were ripening toward criticality; but his duty there was to listen, not to proffer advice. He could not in fact remember any occasion when an officer had asked his opinion, though he had receivedand executedhis fair share of near-suicidal orders from bridges long demolished. "By the pulse five point five," Lieutenant Spring's voice sang. "Sergeant Oberholzer," Hammer said. "Aye, sir." "We are proceeding as per orders. You may now brief your men and put them into full battle gear." Oberholzer saluted and went below. There was little enough he could tell the squadas 12-Upjohn had said, Calle's system was nearly unknownbut even that little would improve the total ignorance in which they had been kept till now. Luckily, they were not much given to asking ques- tions of a strategic sort; like impressed spacehands every- where, the huge mass of the Matriarchy's interstellar holdings meant nothing to them but endlessly riding the Standing Wave, with battle and death lurking at the end of every jump. Luckily also, they were inclined to trust Oberholzer, if only for the low cunning he had shown in keeping most of them alive, especially in the face of unusually Crimean orders from the bridge. This time Oberholzer would need every ounce of trust and erg of obedience they would give him. Though he never ex- pected anything but the worst, he had a queer cold feeling that this time he was going to get it. There were hardly any data to go on yet, but there had been something about Calle that looked persuasively like the end of the line. Very few of the forty men in the wardroom even looked up as Oberholzer entered. They were checking their gear in the dismal light of the fluorescents, with the single-mind- edness of men to whom a properly wound gun-tube coil, a properly set face-shield gasket, a properly fueled and focused vaulting jet, have come to mean more than parents, children, retirement pensions, the rule of law, or the logic of empire. The only man to show any flicker of interest was Sergeant Cassiriras was normal, since he was Oberholzer's under- studyand he did no more than look up from over the straps of his antigas suit and say, "Well?" "Well," Oberholzer said, "now hear this." There was a sort of composite jingle and clank as the men lowered their gear to the deck or put it aside on their bunks. "We're investing a planet called Calle in the Canes Venatici cluster," Oberholzer said, sitting down on an olive- drab canvas pack stuffed with lysurgic acid grenades. "A cruiser called the Assam Dragonyou were with her on her shakedown, weren't you, Himber?touched down here ten years ago with a flock of tenders and got swallowed up. They got two or three quick yells for help out and that was thatnothing anybody could make much sense of, no wea- pons named or description of the enemy. So here we

are, loaded for the kill." "Wasn't any Galley in command of the Assam Dragon when I was aboard," Himber said doubtfully. "Nah. Place was named for the astronomer who spotted her, from the rim of the cluster, a hundred years ago," Oberholzer said. "Nobody names planets for ship captains. Anybody got any sensible questions?" "Just what kind of trouble are we looking for?" Cassirir said. "That's just it we don't know. This is closer to the center of the Galaxy than we've ever gotten before. It may be a population center too; could be that Calle is just one piece of a federation, at least inside its own cluster. That's why we've got the boys from Momma on board; this one could be damn important." Somebody sniffed. "If this cluster is full of people, how come we never picked up signals from it?" "How do you know we never did?" Oberholzer retorted. "For all I know, maybe that's why the Assam Dragon came here in the first place. Anyhow that's not our problem. All we're" The lights went out. Simultaneously, the whole mass of the Novoe Washingtongrad shuddered savagely, as though a boulder almost as big as she was had been dropped on her. Seconds later, the gravity went out too. 2 Flo-Mar 12-Upjohn knew no more of the real nature of the disaster than did the wardroom squad, nor did anybody on the bridge, for that matter. The blow had been inde- tectable until it struck, and then most of the fleet was simply annihilated; only the Hobo was big enough to survive the blow, and she survived only partiallyin fact, in five pieces. Nor did the Consort of State ever know by what miracle the section he was in hit Calle still partially under power; he was not privy to the self-salvaging engineering principles of battleships. All he knewonce he struggled back to consciousnesswas that he was still alive, and that there was a broad shaft of sunlight coming through a top- to-bottom split in one wall of what had been his office aboard ship. He held his ringing head for a while, then got up in search of water. Nothing came out of the dispenser, so he unstrapped his dispatch case from the underside of his desk and produced a pint palladium flask of vodka. He had screwed up his face to sample thisat the moment he would have preferred waterwhen a groan reminded him that there might be more than one room in his suddenly shrunken universe, as well as other survivors. He was right on both counts. "Though the ship section he was in consisted mostly of engines of whose function he had no notion, there were also three other staterooms. Two of these were deserted, but the third turned out to contain a battered member of his own staff, by name Robin One. The young man was not yet conscious and 12-Up]'ohn regarded him with a faint touch of despair. Robin One was perhaps the last man in space that the Consort of State would have chosen to be shipwrecked with. That he was utterly expendable almost went without say- ing; he was, after all, a drone. When the perfection of sperm electrophoresis had enabled parents for the first time to predetermine the sex of their children, the predictable result had been an enormous glut of maleswhich was directly accountable for the present regime 6n Earth. By the time the people and the lawmakers, thoroughly frightened by the crazy years of fashion upheavals, "beefcake," poly- andry, male prostitution, and all the rest, had come to their senses, the Matriarchy was in to stay; a weak electric current had overturned civilized society as drastically as the steel knife had demoralized the Eskimos. Though the tide of excess males had since receded some- what, it had left behind a wrack, of which Robin One was a bubble. He was a drone, and hence superfluous by defini- tionfit only to be sent colonizing, on diplomatic missions or otherwise thrown away. Superfluity alone, of course, could hardly account for his presence on 12-Upjohn's staff. Officially, Robin One was an interpreter; actuallysince nobody could know the language the Consort of State might be called upon to understand on this missionhe was a poet, a class of unattached males with special privileges in the Matriarchy, particularly if what they wrote was of the middling-difficult or Hillyer So- ciety sort. Robin One was an eminently typical member of this class, distractible, sulky, jealous, easily wounded, homo- sexual, lazy except when writing, and probably (to give him the benefit of the doubt, for 12-Upjohn had no ear whatever for poetry) the second-worst poet of his

generation. It had to be admitted that assigning 12-UpJ'ohn a poet as an interpreter on this mission had not been a wholly bad idea, and that if Hildegard MuUer of the Interstellar Un- derstanding Commission had not thought of it, no mere male would have been likely toleast of all Bar-Rob 4-Agberg, Director of Assimilation. The nightmare of finding the whole of the center of the Galaxy organized into one vast federation, much older than Earth's, had been troubling the State De- partment for a long time, at first from purely theoretical considerationsall those heart-stars were much older than those in the spiral arms, and besides, where star density in space is so much higher, interstellar travel does not look like quite so insuperable an obstacle as it long had to Earthmen and later from certain practical signs, of which the obliter- ation of the Assam Dragon and her tenders had been only the most provocative. Getting along with these people on the first contact would be vital, and yet the language barrier might well provoke a tragedy wanted by neither side, as the obliteration of Nagasaki in World War II had been provoked by the mistranslation of a single word. Under such circum- stances, a man with a feeling for strange words in odd rela- tionships might well prove to be useful, or even vital. Nevertheless, it was with a certain grim enjoyment that 12-Upjohn poured into Robin One a good two-ounce jolt of vodka. Robin coughed convulsively and sat up, blinking. "Your Excellencyhowwhat's happened? I thought we were dead. But we've got lights again, and gravity." He was observant, that had to be granted. "The lights are ours but the gravity is Calle's," 12-Upjohn explained tersely. "We're in a part of the ship that cracked up." "Well, it's good that we've got power." "We can't afford to be philosophical about it. Whatever shape it's in, this derelict is a thoroughly conspicuous object and we'd better get out of it in a hurry." "Why?" Robin said. "We were supposed to make contact with these people. Why not just sit here until they notice and come to see us?" "Suppose they just blast us to smaller bits instead? They didn't stop to parley with the fleet, you'll notice." "This is a different situation," Robin said stubbornly. "I wouldn't have stopped to parley with that fleet myself, if I'd had the means of knocking it out first. It didn't look a bit like a diplomatic mission. But why should they be afraid of a piece of a wreck?" The Consort of State stroked the back of his neck re- flectively. The boy had a point. It was risky; on the other hand, how long would they survive foraging in completely unknown territory? And yet obviously they couldn't stay cooped up in here foreverespecially if it was true that there was already no water. He was spared having to make up his mind by a halloo from the direction of the office. After a startled stare at each other, the two hit the deck running. Sergeant Oberholzer's face was peering grimly through the split in the bulkhead. "Oho," he said. "So you did make it." He said something unintelligible to some invisible person outside, and then squirmed through the breach into the room, with consider- able difficulty, since he was in full battle gear. "None of the officers did, so I guess that puts you in command." "In command of what?" 12-Upjohn said dryly. "Not very much," the Marine admitted. "I've got five men surviving, one of them with a broken hip, and a section of the ship with two drive units in it. It would lift, more or less, if we could jury-rig some controls, but I don't know where we'd go in it without supplies or a navigatoror an overdrive, for that matter." He looked about speculatively. "There was a Standing Wave transceiver in this section, I think, but ifd be a miracle if it still functioned." "Would you know how to test it?" Robin asked. "No. Anyhow we've got more immediate business than that. We've picked up a native. What's more, he speaks Englishmust have picked it up from the Assam Dragon. We started to ask him questions, but it turns out he's some sort of top official, so we brought him over here on the off chance that one of you was alive." "What a break!" Robin One said explosively. "A whole series of them," 12-Upjohn agreed, none too happily. He had long ago learned to be at his most suspicious when the breaks seemed to be coming his way. "Well, better bring him in." "Can't," Oberholzer said. "Apologies, Your Excellency, but he

wouldn't fit. You'll have to come to him." 3 It was impossible to imagine what sort of stock the Callean had evolved from. He seemed to be a thoroughgoing mixture of several different phyla. Most of him was a brown, segmented tube about the diameter of a barrel and perhaps twenty-five feet long, rather like a cross between a python and a worm. The front segments were carried upright, raising the head a good ten feet off the ground. Properly speaking, 12-Upjohn thought, the Callean really had no head, but only a front end, marked by two enormous faceted eyes and three upsetting simple eyes which were usually closed. Beneath these there was a collar of six short, squidlike tentacles, carried wrapped around the creature in a ropy ring. He was as impossible-looking as he was fear- some, and 12-Upjohn felt at a multiple disadvantage from the beginning. "How did you learn our language?" he said, purely as a starter. "I learned it from you," the Callean said promptly. The voice was unexpectedly high, a quality which was accentuated by the creature's singsong intonation; 12-Upjohn could not see where it was coming from. "From your ship which I took apart, the dragon-of-war." "Why did you do that?" "It was evident that you meant me ill," the Callean sang. "At that time I did not know that you were sick, but that became evident at the dissections." "Dissections! You dissected the crew of the Dragon?" "All but one." There was a growl from Oberholzer. The Consort of State shot him a warning glance. "You may have made a mistake," 12-Upjohn said. "A natural mistake, perhaps. But it was our purpose to offer you trade and peaceful relationships. Our weapons were only precautionary." "I do not think so," the Callean said, "and I never make mistakes. That you make mistakes is natural, but it is not natural to me." 12-Upjohn felt his jaw dropping. That the creature meant what he said could not be doubted; his command of the language was too complete to permit any more sensible interpretation. 12-Upjohn found himself at a loss; not only was the statement the most staggering he had ever heard from any sentient being, but while it was being made he had discovered how the Callean spoke: the sounds issued at low volume from a multitude of spiracles or breath-holes all along the body, each hole producing only one pure tone, the words and intonations being formed in mid-air by inter- modulationa miracle of co-ordination among a multitude of organs obviously unsuitable for sound-forming at all. This thing was formidablethat would have been evident even without the lesson of the chunk of the Novae Washington- grad canted crazily in the sands behind them. Sands? He looked about with a start. Until that moment the Callean had so hypnotized his attention that he had for- gotten to look at the landscape, but his unconscious had registered it. Sand, and nothing but sand. If there were better parts of Calle than this desert, they were not visible from here, all the way to the horizon. "What do you propose to do with us?" he said at last There was really nothing else to say; cut off in every possible sense from his home world, he no longer had any base from which to negotiate. "Nothing," the Callean said. "You are free to come and go as you please." "You're no longer afraid of us?" "No. When you came to kill me I prevented you, but you can no longer do that." "There you've made a mistake, all right," Oberholzer said, lifting his rifle toward the multicolored, glittering jewels of the Callean's eyes. "You know what this isthey must have had them on the Dragon." "Don't be an idiot, Sergeant," 12-Upjohn said sharply. "We're in no position to make any threats." Nor, he added silently, should the Marine have called attention to his gun before the Callean had taken any overt notice of it. "I know what it is," the creature said. "You cannot kill me with that. You tried it often before and found you could not. You would remember this if you were not sick." "I never saw anything that I couldn't kill with a Sussmann flamer," Oberholzer said between his teeth. "Let me try it on the bastard, Your Excellency." "Wait a minute," Robin One said, to 12-Upjohn's astonish- ment. "I want to ask some questionsif you don't mind, Your Excellency?" "I don't mind," 12-Upjohn said after an instant. Anything to get the Marine's crazy impulse toward slaughter side- tracked. "Go ahead." "Did you dissect the crew of the Assam Dragon person- ally?" Robin

asked the Callean. "Of course." "Are you the ruler of this planet?" "Yes." "Are you the only person in this system?" "No." Robin paused and frowned. Then he said: "Are you the only person of your species in your system?" "No. There is another on Xixobraxthe fourth planet." Robin paused once more, but not, it seemed to 12-Upjohn, as though he were in any doubt; it was only as though he were gathering his courage for the key question of all. 12- Upjohn tried to imagine what it might be, and failed. "How many of you are there?" Robin One said. "I cannot answer that. As of the instant you asked me that question, there were eighty-three hundred thousand billion, one hundred and eighty nine million, four hundred and sixty five thousand, one hundred and eighty; but now the number has changed, and it goes on changing." "Impossible," 12-Upjohn said, stunned. "Not even two planets could support such a numberand you'd never allow a desert like this to go on existing if you had even a fraction of that population to support. I begin to think, sir, that you are a type normal to my business: the ordinary, unimaginative liar." "He's not lying," Robin said, his voice quivering. "It all fits together. Just let me finish, sir, please. I'll explain, but I've got to go through to the end first." "Well," 12-Upjohn said, helplessly, "all right, go ahead." But he was instantly sorry, for what Robin One said was: "Thank you. I have no more questions." The Callean turned in a great liquid wheel and poured away across the sand dunes at an incredible speed. 12-Upjohn shouted after him, without any clear idea of what it was that he was shoutingbut no matter, for the Callean took no notice. Within seconds, it seemed, he was only a thread- worm in the middle distance, and then he was gone. They were all alone in the chill desert air. Oberholzer lowered his rifle bewilderedly. "He's fast," he said to nobody in particular. "Gripes, but he's fast. I couldn't even keep him in the sights." "That proves it," Robin said tightly. He was trembling, but whether with fright or elation, 12-Upjohn could not tell; possibly both. "It had better prove something," the Consort of State said, trying hard not to sound portentous. There was some- thing about this bright remote desert that made empty any possible pretense to dignity. "As far as I can see, you've just lost us what may have been our only chance to treat with these creatures . . . just as surely as the sergeant would have done it with his gun. Explain, please." "I didn't really catch on until I realized that he was using the second person singular when he spoke to us," Robin said. If he had heard any threat implied in 12-Upjohn's charge, it was not visible; he seemed totally preoccupied. "There's no way to tell them apart in modem English. We thought he was referring to us as "you' plural, but he wasn't, any more than his 1' was a plural. He thinks we're all a part of the same personalityincluding the men from the Dragon, toojust as he is himself. That's why he left when I said I had no more questions. He can't comprehend that each of us has an independent ego. For him such a thing doesn't exist." "Like ants?" 12-Upjohn said slowly. "I don't see how an advanced technology . . . but no, I do see. And if it's so, it means that any Callean we run across could be their chief of state, but that no one of them actually is. The only other real individual is next door, on the fourth planetanother hive ego." "Maybe not," Robin said. "Don't forget that he thinks we're part of one, too." 12-Upjohn dismissed that possibility at once. "He's sure to know his own system, after all. . . . What alarms me is the population figure he cited. It's got to be at least clusterwide and from the exactness with which he was willing to cite it, for a given instant, he had to have immediate access to it. An instant, effortless census." "Yes," Robin said. "Meaning mind-to-mind contact, from one to all, throughout the whole complex. That's what started me thinking about the funny way he used pronouns." "If that's the case. Robin, we are spurlos versenkt. And my pronoun includes the Earth." "They may have some limitations," Robin said, but it was clear that he was only whistling in the dark. "But at least it explains why they butchered the Dragon's crew so readily and why they're willing to let us wander around their planet as if we didn't even exist. We don't, for them. They can't have any respect for a single life. No wonder they didn't give a

damn for the sergeant's gun!" His initial flush had given way to a marble paleness; there were beads of sweat on his brow in the dry hot air, and he was trembling harder than ever. He looked as though he might faint in the next instant, though only the slightest of stutters disturbed his rush of words. But for once the Consort of State could not accuse him of agitation over trifles. Oberholzer looked from one to the other, his expression betraying perhaps only disgust, or perhaps blank incom- prehensionit was impossible to tell. Then, with a sudden sharp snick which made them both start, he shot closed the safety catch on the Sussmann. "Well," he said in a smooth cold empty voice, "now we know what we'll eat." 4 Their basic and dangerous division of plans and purposes began with that. Sergeant Oberholzer was not a fool, as the hash marks on his sleeve and the battle stars on his ribbons attested plainly; he understood the implications of what the Callean had saidat least after the Momma's boy had interpreted them; and he was shrewd enough not to undervalue the con- tribution the poor terrified fairy had made to their possible survival on this world. For the moment, however, it suited the Marine to play the role of the dumb sergeant to the hilt. If a full understanding of what the Calleans were like might reduce him to a like state of trembling impotence, he could do without it. Not that he really believed that any such thing could happen to him; but it was not hard to see that Momma's boys were halfway there alreadyand if the party as a whole hoped to get anything done, they had to be jolted out of it as fast as possible. At first he thought he had made it. "Certainly noti" the Consort of State said indignantly. "You're a man, sergeant, not a Callean. Nothing the Calleans do is any excuse for your behaving otherwise than as a man." "I'd rather eat an enemy than a friend," Oberholzer said cryptically. "Have you got any supplies inside there?" "I1 don't know. But that has nothing to do with it." "Depends on what you mean by 'it.' But maybe we can argue about that later. What are your orders. Your Excellency?" "I haven't an order in my head," 12-Upjohn said with sudden, disarming frankness. "We'd better try to make some sensible plans first, and stop bickering. Robin, stop snuffling, too. The question is, what can we do besides trying to survive, and cherishing an idiot hope for a rescue mission?" "For one thing, we can try to spring the man from the Dragon's crew that these worms have still got alive," Ober- holzer said. "If that's what he meant when he said they dissected all but one." "That doesn't seem very feasible to me," 12-Upjohn said. "We have no idea where they're holding him" "Ask them. This one answered every question you asked him." "and even supposing that he's near by, we couldn't free him from a horde of Calleans, no matter how many dead bodies they let you pile up. At best, sooner or later you'd run out of ammunition." "It's worth trying," Oberholzer said. "We could use the manpower." "What for?" Robin One demanded. "He'd be- just one more mouth to feed. At the moment, at least, they're feeding him." "For raising ship," Oberholzer retorted, "if there's any damn chance of welding our two heaps of junk together and getting off this mudball. We ought to look into it, anyhow." Robin One was looking more alarmed by the minute. If the prospect of getting into a fight with the Calleans had scared him, Oberholzer thought, the notion of hard physical labor evidently was producing something close to panic. "Where could we go?" he said. "Supposing that we could fly such a shambles at all?" "I don't know," Oberholzer said. "We don't know what's possible yet. But anything's better than sitting around here and starving. First off, I want that man from the Dragon." "I'm opposed to it," 12-Upjohn said firmly. "The Calleans are leaving us to our own devices now. If we cause any real trouble they may well decide that we'd be safer locked up, or dead. I don't mind planning to lift ship if we canbut no military expeditions." "Sir," Oberholzer said, "military action on this planet is what I was sent here for. I reserve the right to use my own judgment. You can complain, if we ever get backbut I'm not going to let a man rot in a worm-burrow while I've got a gun on my back. You can come along or not, but we're going." He signaled to Cassirir, who seemed to be grinning

slightly. 12-Upjohn stared at him for a moment, and then shook his head. "We'll stay," he said. "Since we have no water. Sergeant, I hope you'll do us the kindness of telling us where your part of the ship lies." "That way, about two kilometers," Oberholzer said. "Help yourself. If you want to settle in there, you'll save us the trouble of toting Private Hannes with us on a stretcher." "Of course," the Consort of State said. "We'll take care of him. But, Sergeant . . ." "Yes, Your Excellency?" "If this stunt of yours still leaves us all alive afterwards, and we do get back to any base of ours, I will certainly see to it that a complaint is lodged. I'm not disowning you now because it's obvious that we'll all have to work together to survive, and a certain amount of amity will be essential. But don't be deceived by that." "I understand, sir," Oberholzer said levelly. "Cassirir, let's go. We'll backtrack to where we nabbed the worm, and then follow his trail to wherever he came from. Fall in." The men shouldered their Sussmanns. 12-Upjohn and Robin One watched them go. At the last dune before the two would go out of sight altogether, Oberholzer turned and waved, but neither waved back. Shrugging, Oberholzer resumed plodding. "Sarge?" "Yeah?" "How do you figure to spring this joker with only four guns?" "Five guns if we spring himI've got a side arm," Ober- holzer reminded him. "We'll play it by ear, that's all. I want to see just how serious these worms are about leaving us alone, and letting us shoot them if we feel like it. I've got a hunch that they aren't very bright, one at a time, and don't react fast to strictly local situations. If this whole planet is like one huge body, and the worms are its brain cells, then we're germsand maybe ifd take more than four germs to make the body do anything against us that counted, at least fast enough to do any good." Cassirir was frowning absurdly; he did not seem to be taking the theory in without pain. Well, Cassirir had never been much of a man for tactics. "Here's where we found the guy," one of the men said, pointing at the sand. "That's not much of a trail," Cassirir said. "If there's any wind it'll be wiped out like a shot." "Take a sight on it, that's all we need. You saw him run offstraight as a ruled line, no twists or turns around the dunes or anything. Like an army ant. If the trail sands over, we'll follow the sight. It's a cinch it leads someplace." "All right," Cassirir said, getting out his compass. After a while the four of them resumed trudging. There were only a few drops of hot, flat-tasting water left in the canteens, and their eyes were gritty and red from dry- ness and sand, when they topped the ridge that overlooked the nest. The word sprang instantly into Oberholzer's mind, though perhaps he had been expecting some such thing ever since Robin One had compared the Calleans to ants. It was a collection of rough white spires, each perhaps fifty feet high, rising from a common doughlike mass which almost filled a small valley. There was no greenery around it and no visible source of water, but there were three roads, two of them leading into oval black entrances which Ober- holzer could see from here. Occasionallynot oftena Cal- lean would scuttle out and vanish, or come speeding over the horizon and dart into the darkness. Some of the spires bore masts carrying what seemed to be antennae or more recondite electronic devices, but there were no windows to be seen; and the only sound in the valley, except for the dry dusty wind, was a subdued composite hum. "Man!" Cassirir said, whispering without being aware of it. "It must be as black as the ace of spades in there. Anybody got a torch?" Nobody had. "We won't need one anyhow," Oberholzer said confidently. "They've got eyes, and they can see in desert sunlight. That means they can't move around in total darkness. Let's goI'm thirsty." They stumbled down into the valley and approached the nearest black hole cautiously. Sure enough, it was not as black as it had appeared from the hill; there was a glow inside, which had been hidden from them against the con- trast of the glaringly lit sands. Nevertheless, Oberholzer found himself hanging back. While he hesitated, a Callean came rocketing out of the entrance and pulled to a smooth, sudden stop. "You are not to get in the way," he said, in exactly the same piping singsong voice the other had used. 'Tell me where to go and I'll stay out of your way," Oberholzer said. "Where is the man from the

warship that you didn't dissect?" "In Gnitonis, halfway around the world from here." Oberholzer felt his shoulders sag, but the Callean was not through. "You should have told me that you wanted him," he said. "I will have him brought to you. Is there else that you need?" "Water," Oberholzer said hopefully. 'That will be brought. There is no water you can use here. Stay out of the cities; you will be in the way." "How else can we eat?" "Food will be brought. You should make your needs known; you are of low intelligence and helpless. I forbid nothing, I know you are harmless, and your life is short in any case; but I do not want you to get in the way." The repetition was beginning to tell on Oberholzer, and the frustration created by hig having tried to use a battering ram against a freely swinging door was compounded by his mental picture of what the two Momma's boys would say when the squad got back. "Thank you," he said, and bringing the Sussmann into line, he trained it on the Callean's squidlike head and squeezed the trigger. It was at once established that the CallSans were as mortal to Sussmann flamers as is all other flesh and blood; this one made a very satisfactory corpse. Unsatisfied, the flamer bolt went on to burn a long slash in the wall of the nest, not far above the entrance. Oberholzer grounded the rifle and waited to see what would happen next; his men hefted their weapons tensely. For a few minutes there was no motion but the random twitching of the headless Callean's legs. Evidently he was still not entirely dead, though he was a good four feet shorter than he had been before, and plainly was feeling the lack. Then, there was a stir inside the dark entrance. A ten-legged animal about the size of a large rabbit emerged tentatively into the sunlight, followed by two more, and then by a whole series of them, perhaps as many as twenty. Though Oberholzer had been unabashed by the Calleans themselves, there was something about these things that made him feel sick. They were coal black and shiny, and they did not seem to have any eyes; their heavily armored heads bore nothing but a set of rudimentary palps and a pair of enormous pincers, like those of a June beetle. Sightless or no, they were excellent surgeons. They cut the remains of the Callean swiftly into sections, precisely one metamere to a section, and bore the carrion back inside the nest. Filled with loathing, Oberholzer stepped quickly forward and kicked one of the last in the procession. It toppled over like an unstable kitchen stool, but regained its footing as though nothing had happened. The kick had not hurt it visibly, though Oberholzer's toes felt as though he had kicked a Victorian iron dog. The creature, still holding its steak delicately in its living tongs, mushed implacably after the others back into the dubiety of the nest. Then all that was left in the broiling sunlight was a few pools of black- ening blood seeping swiftly into the sand. "Let's get out of here," Cassirir said raggedly. "Stand fast," Oberholzer growled. "If they're mad at us, I want to know about it right now." But the next Callean to pass them, some twenty eternal minutes later, hardly even slowed down. "Keep out of the way," he said, and streaked away over the dunes. Snarling, Oberholzer caromed a bolt after him, but missed him clean. "All right," he said. "Let's go back. No hitting the canteens till we're five kilometers past the mid-point cairn. Marchi" The men were all on the verge of prostration by the time that point was passed, but Oberholzer never once had to enforce the order. Nobody, it appeared, was eager to come to an end on Calle as a series of butcher's cuts in the tongs of a squad of huge black beetles. "I know what they think," the man from the Assam Dragon said. "I've heard them say it often enough." He was a personable youngster, perhaps thirty, with blond wavy hair which had been turned almost white by the strong Callean sunlight: his captors had walked him. for three hours every day on the desert. He had once been the Assam Dragon's radioman, a post which in interstellar flight is a branch of astronomy, not of communications; never- theless, Oberholzer and the marines called him Sparks, in deference to a tradition which, 12-Upjohn suspected, the marines did not even know existed. "Then why wouldn't there be a chance of our establishing better relations with the 'person' on the fourth planet?" 12- Upjohn said. "After all, there's never been an Earth

landing there." "Because the 'person' on Xixobrax is a colony of Callg, and knows everything that goes on here. It took the two planets in co-operation to destroy the fleet. There's almost full telepathic communion between the twoin fact, all through the Central Empire. The only rapport that seems to weaken over short distancesinterplanetary distancesb the sense of identity. That's why each planet has an 1' of its own, its own ego. But it's not the kind of ego we know anything about. Xixobrax wouldn't give us any better deal than Calle has, any more than I'd give Calle a better deal than you would, Your Excellency. They have common pur- poses and allegiances. All the Central Empire seems to be like that." 12-Upjohn thought about it; but he did not like what he thought. It was a knotty problem, even in theory. Telepathy among men had never amounted to anything. After the pioneer exploration of the microcosm with the Arpe Effectthe second of two unsuccessful attempts at an interstellar drive, long before the discovery of the Standing Waveit had become easy to see why this would be so. Psi forces in general were characteristic only of the subspace in which the primary particles of the atom had their being; their occasional manifestations in the macrocosm were statistical accidents, as weak and indirigible as spontaneous radioactive decay. Up to now this had suited 12-Upjohn. It had always seemed to him that the whole notion of telepathy was a dodgean attempt to by-pass the plain duty of each man to learn to know his brother, and, if possible, to learn to love him; the telepathy fanatics were out to short-circuit the task, to make easy the most difficult assignment a human being might undertake. He was well aware, too, of the bias against telepathy which was inherent in his profession of mplomat; yet he had always been certain of his case, hazy though it was around the edges. One of his proofs was that telepathy's main defenders invariably were incorrigibly lazy writers, from Upton Sinclair and Theodore Dreiser all the way down to . . . All the same, it seemed inarguable that the whole center of the Galaxy, an enormously diverse collection of peoples and cultures, was being held together in a common and strife-free union by telepathy alone, or perhaps by telepathy and its even more dubious adjuncts: a whole galaxy held together by a force so unreliable that two human beings sitting across from each other at a card table had never been able to put it to an even vaguely practicable use. Somewhere, there was a huge hole in the argument. While he had sat helplessly thinking in these circles, even Robin One was busy, toting power packs to the welding crew which was working outside to braze together on the desert the implausible, misshapen lump of metal which the Marine sergeant was fanatically determined would become a ship again. Now the job was done, though no shipwright would admire it, and the question of where to go with it was being debated in full council. Sparks, for his part, was prepared to bet that the Calleans would not hinder their departure. "Why would they have given us all this oxygen and stuff if they were going to prevent us from using it?" he said reasonably. "They know what it's foreven if they have no brains, collectively they're plenty smart enough." 'Wo brains?" 12-Upjohn said. "Or are you just exag- gerating?" "No brains," the man from the Assam Dragon insisted. "Just lots of ganglia. I gather that's the way all of the races of the Central Empire are organized, regardless of other physical differences. That's what they mean when they say we're all sickhadn't you realized that?" "No," 12-Upjohn said in slowly dawning horror. "You had better spell it out." "Why, they say that's why we get cancer. They say that the brain is the ultimate source of all tumors, and is itself a tumor. They call it 'hostile symbiosis.' " "Malignant?" "In the long run. Races that develop them kill themselves off. Something to do with solar radiation; animals on planets of Population II stars develop them, Population I planets don't." Robin One hummed an archaic twelve-tone series under his breath. There were no words to go with it, but the Con- sort of State recognized it; it was part of a chorale from a twentieth-century American opera, and the words went: Weep, weep beyond time for this Earth of hours. "If fits," he said heavily. "So to receive and use a weak field like telepathy, you need a weak brain. Human beings will never make

it." "Earthworms of the galaxy, unite," Robin One said. "They already have," Sergeant Oberholzer pointed out. "So where does all this leave us?" "It means," 12-Upjohn said slowly, "that this Central Empire, where the stars are almost all Population I, is spreading out toward the spiral arms where the Earth lies. Any cluster civilizations they meet are natural alliesclusters are purely Population Iand probably have already been mentally assimilated. Any possible natural allies we meet, going around Population II stars, we may well pick a fight with instead." "That's not what I meant," Sergeant Oberholzer said. "I know what you meant; but this changes things. As I understand it, we have a chance of making a straight hop to the nearest Earth base, if we go on starvation rations" "and if I don't make more than a point zero five per cent error in plotting the course," Sparks put in. "Yes. On the other hand, we can make sure of getting there by going in short leaps via planets known to be in- habited, but never colonized and possibly hostile. The only other possibility is Xixobrax, which I think we've ruled out. Correct?" "Right as rain," Sergeant Oberholzer said. "Now I see what you're driving at. Your Excellency. The only thing is you didn't mention that the stepping stone method will take us the rest of our lives." "So I didn't," 12-Upjohn said bleakly. "But I hadn't for- gotten it. The other side of that coin is that it will be even longer than that before the Matriarchy and the Central Empire collide." "After which," Sergeant Oberholzer said with a certain relish, "I doubt that it'll be a Matriarchy, whichever wins. Are you calling for a vote, sir?" "Wellyes, I seem to be." "Then let's grasshopper," Sergeant Oberholzer said unhesi- tatingly. 'The boys and I can't fight a point zero five per cent error in navigationbut for hostile planets, we've got the flamers." Robin One shuddered. "I don't mind the fighting part," he said unexpectedly. "But I do simply loathe the thought of being an old, old man when I get home. All the same, we do have to get the word back." "You're agreeing with the sergeant?" "Yes, that's what I said." "I agree," Sparks said. "Either way we may not make it, but the odds are in favor of doing it the hard way." "Very good," 12-Upjohn said. He was uncertain of his exact emotion at this moment; perhaps gloomy satisfaction was as close a description as any. "I make it unanimous. Let's get ready." The sergeant saluted and prepared to leave the cabin; but suddenly he turned back. "I didn't think very much of either of you, a while back," he said brutally. "But I'll tell you this: there must be some- thing about brains that involves guts, too. I'll back 'em any time against any critter that lets itself be shot like a fish in a barrelwhatever the odds." The Consort of State was still mulling that speech over as the madman's caricature of an interstellar ship groaned and lifted its lumps and angles from Calle. Who knows, he kept telling himself, who knows, it might even be true. But he noticed that Robin One was still humming the chorale from Psyche and Eros', and ahead the galactic night was as black as death. The End

How Beautiful With Banners

by James Blish

Feeling as naked as a peppermint soldier in her transparent film wrap, Dr. Ulla Hillstrøm watched a flying cloak swirl away toward the black horizon with a certain consequent irony. Although nearly transparent itself in the distant dim arc-light flame that was Titan's sun, the fluttering creature looked warmer than what she was wearing, for all that reason said it was at the same minus 316° F. as the thin

methane it flew in. Despite the virus space-bubble's warranted and eerie efficiency, she found its vigilance—itself probably as nearly alive as the flying cloak was—rather difficult to believe in, let alone to trust.

The machine—as Ulla much preferred to think of it—was inarguably an improvement on the old-fashioned pressure suit. Made (or more accurately, cultured) of a single colossal protein molecule, the vanishingly thin sheet of life-stuff processed gases, maintained pressure, monitored radiation through almost the whole of the electromagnetic spectrum, and above all did not get in the way. Also, it could not be cut, punctured or indeed sustain any damage short of total destruction; macroscopically it was a single, primary unit, with all the physical integrity of a crystal of salt or steel.

If it did not actually think, Ulla was grateful; often it almost seemed to, which was sufficient. Its primary drawback for her was that much of the time it did not really seem to be there.

Still, it seemed to be functioning; otherwise Ulla would in fact have been as solid as a stick of candy, toppled forever across the confectionery whiteness that frosted the knife-edged stones of this cruel moon, layer upon layer. Outside—only a perilous few inches from the lightly clothed warmth of her skin—the brief gust the cloak had been soaring on died, leaving behind a silence so cataleptic that she could hear the snow creaking in a mockery of motion. Impossible though it was to comprehend, it was getting still colder out there. Titan was swinging out across Saturn's orbit toward eclipse, and the apparently fixed sun was secretly going down, its descent sensed by the snows no matter what her Earthly sight, accustomed to the nervousness of living skies, tried to tell her. In another two Earth days it would be gone, for an eternal week.

At the thought, Ulla turned to look back the way she had come that morning. The virus bubble flowed smoothly with the motion and the stars became brighter as it compensated for the fact that the sun was now at her back. She still could not see the base camp, of course. She had strayed too far for that, and in any event, except for a few wiry palps, it was wholly underground.

Now there was no sound but the creaking of the methane snow, and nothing to see but a blunt, faint spearhead of hazy light, deceptively like an Earthly aurora or the corona of the sun, pushing its way from below the edge of the cold into the indifferent company of the stars. Saturn's rings were rising, very slightly awaver in the dark blue air, like the banners of a spectral army. The idiot face of the gas giant planet itself, faintly striped with meaningless storms, would be glaring down at her before she could get home if she did not get herself in motion soon. Obscurely disturbed, Dr. Hillstrøm faced front and began to unload her sled.

The touch and clink of the sampling gear cheered her, a little, even in this ultimate loneliness. She was efficient—many years, and a good many suppressed impulses, had seen to that; it was too late for temblors, especially so far out from the sun that had warmed her Stockholm streets and her silly friendships. All those null adventures were gone now like a sickness. The phantom embrace of the virus suit was perhaps less satisfying—only perhaps—but it was much more reliable. Much more reliable; she could depend on that.

Then, as she bent to thrust the spike of a thermocouple into the wedding-cake soil, the second flying cloak (or was it the same one?) hit her in the small of the back and tumbled her into nightmare.

. . . . .

With the sudden darkness there came a profound, ambiguous emotional blow—ambiguous, yet with something shockingly familiar about it. Instantly exhausted, she felt herself go flaccid and unstrung, and her mind, adrift in nowhere, blurred and spun downward too into trance.

The long fall slowed just short of unconsciousness, lodged precariously upon a shelf of dream, a mental buttress founded four years in the past—a long distance, when one recalls that in a four-dimensional plenum every second of time is 186,000 miles of space. The memory was curiously inconsequential to have arrested her, let alone supported her: not of her home, of her few triumphs or even of her aborted marriage, but of a sordid little encounter with a reporter that she had talked herself into at the Madrid genetics conference, when she herself was already an associate professor, a Swedish government delegate, a 25-year-old divorcée, and altogether a woman who should have known better.

But better than what? The life of science even in those days had been almost by definition the life of the eternal campus exile. There was so much to learn—or, at least, to show competence in—that people who wanted to be involved in the ordinary, vivid concerns of human beings could not stay with it long, indeed often could not even be recruited. They turned aside from the prospect with a shudder or even a snort of scorn. To prepare for the sciences had become a career in indefinitely protracted adolescence, from which one awakened fitfully to find one's adult self in the body of a stranger. It had given her no pride, no self-love, no defenses of any sort; only a queer kind of virgin numbness, highly dependent upon familiar surroundings and unvalued habits, and easily breached by any normally confident siege in print, in person, anywhere—and remaining just as numb as before when the spasm of fashion, politics or romanticism had swept by and left her stranded, too easy a recruit to have been allowed into the center of things or even considered for it.

Curious, most curious that in her present remote terror she should find even a moment's rest upon so wobbly a pivot. The Madrid incident had not been important; she had been through with it almost at once. Of course, as she had often told herself, she had never been promiscuous, and had often described the affair, defiantly, as that single (or at worst, second) test of the joys of impulse which any woman is entitled to have in her history. Nor had it really been that joyous. She could not now recall the boy's face, and remembered how he had felt primarily because he had been in so casual and contemptuous a hurry.

But now that she came to dream of it, she saw with a bloodless, lightless eye that all her life, in this way and in that, she had been repeatedly seduced by the inconsequential. She had nothing else to remember even in this hour of her presumptive death. Acts have consequences, a thought told her, but not ours; we have done, but never felt. We are no more alone on Titan, you and I, than we have ever been. *Basta, per carita!* —so much for Ulla.

Awakening in the same darkness as before, Ulla felt the virus bubble snuggling closer to her blind skin, and recognized the shock that had so regressed her—a shock of recognition, but recognition of something she had never felt herself. Alone in a Titanic snowfield, she had eavesdropped on an …

No. Not possible. Sniffling, and still blind, she pushed the cozy bubble away from her breasts and tried to stand up. Light flushed briefly around her, as though the bubble had cleared just above her forehead and then clouded again. She was still alive, but everything else was utterly problematical. What had happened to her? She simply did not know.

Therefore, she thought, begin with ignorance. No one begins anywhere else … but I did not know even that, once upon a time.

Hence:

. . . . .

Though the virus bubble ordinarily regulated itself, there was a control box on her hip—actually an ultra-short-range microwave transmitter—by which it could be modulated against more special environments than the bubble itself could cope with alone. She had never had to use it before, but she tried it now.

The fogged bubble cleared patchily, but it would not stay cleared. Crazy moirés and herringbone patterns swept over it, changing direction repeatedly, and, outside, the snowy landscape kept changing color like a delirium. She found, however, that by continuously working the frequency knob on her box—at random, for the responses seemed to bear no relation to the Braille calibrations on the dial—she could maintain outside vision of a sort in pulses of two or three seconds each.

This was enough to show her, finally, what had happened. There was a flying cloak around her. This in itself was unprecedented; the cloaks had never attacked a man before, or indeed paid any of them the least attention during their brief previous forays. On the other hand, this was the first time anyone had ventured more than five or ten minutes outdoors in a virus suit.

It occurred to her suddenly that insofar as anything was known about the nature of the cloaks, they were in some respect much like the bubbles. It was almost as though the one were a wild species of the other.

It was an alarming notion and possibly only a metaphor, containing as little truth as most poetry. Annoyingly, she found herself wondering if, once she got out of this mess, the men at the base camp would take to referring to it as "the cloak and suit business."

The snowfield began to turn brighter; Saturn was rising. For a moment the drifts were a pale straw color, the normal hue of Saturn light through an atmosphere; then it turned a raving Kelly green. Muttering, Ulla twisted the potentiometer dial, and was rewarded with a brief flash of normal illumination which was promptly overridden by a torrent of crimson lake, as though she were seeing everything through a series of photographic color separations.

Since she could not help this, she clenched her teeth and ignored it. It was much more important to find out what the flying cloak had done to her bubble, if she were to have any hope of shucking the thing.

There was no clear separation between the bubble and the Titanian creature. They seemed to have blended into a melange which was neither one nor the other, but a sort of coarse burlesque of both. Yet the total surface area of the integument about her did not seem to be any greater—only more ill-fitting, less responsive to her own needs. Not much less; after all, she was still alive, and any really gross insensitivity to the demands and cues of her body would have been instantly fatal. But there was no way to guess how long the bubble would stay even that obedient. At the moment the wild thing that had enslaved it was perhaps dangerous to the wearer only if she panicked, but the change might well be progressive, pointed ultimately toward some saturnine equivalent of the shirt of Nessus.

And that might be happening very rapidly. She might not be allowed the time to think her way out of this fix by herself. Little though she wanted any help from the men at the base camp, and useless though she

was sure they would prove, she had damn well better ask for it now, just in case.

But the bubble was not allowing any radio transmission through its roiling unicell wall today. The earphone was dead; not even the hiss of the stars came through it—only an occasional pop of noise that was born of entropy loss in the circuits themselves.

She was cut off. *Nun denn, allein!*

With the thought, the bubble cloak shifted again around her. A sudden pressure at her lower abdomen made her stumble forward over the crisp snow, four or five steps. Then it was motionless once more, except within itself.

That it should be able to do this was not surprising, for the cloaks had to be able to flex voluntarily at least a little to catch the thermals they rode, and the bubble had to be able to vary its dimensions and surface tension over a wide range to withstand pressure changes, outside and in, and do it automatically. No, of course the combination would be able to move by itself. What was disquieting was that it should want to.

Another stir of movement in the middle distance caught her eye: a free cloak, seemingly riding an updraft over a fixed point. For a moment she wondered what on that ground could be warm enough to produce so localized a thermal. Then, abruptly, she realized that she was shaking with hatred, and fought furiously to drive the spasm down, her fingernails slicing into her naked palms.

A raster of jagged black lines, like a television interference pattern, broke across her view and brought her attention fully back to the minutely solipsistic confines of her dilemma. The wave of emotion, nevertheless, would not quite go away, and she had a vague but persistent impression that it was being imposed from outside, at least in part—a cold passion she was interpreting as fury because its real nature, whatever it was, had no necessary relevance to her own imprisoned soul. For all that it was her own life and no other that was in peril, she felt guilty, as though she were eavesdropping, and as angry with herself as with what she was overhearing, yet burning as helplessly as the forbidden lamp in the bedchamber of Psyche and Eros.

Another metaphor—but was it after all so far-fetched? She was a mortal present at the mating of inhuman essences; mountainously far from home; borne here like invisible lovers upon the arms of the wind; empalaced by a whole virgin-white world, over which flew the banners of a high god and a father of gods and, equally appropriately, Venus was very far away from whatever love was being celebrated here.

What ancient and coincidental nonsense! Next she would be thinking herself degraded at the foot of some cross.

Yet the impression, of an eerie tempest going on just slightly outside any possibility of understanding what it was, would not pass away. Still worse, it seemed to mean something, to be important, to mock her with subtle clues to matters of great moment, of which her own present trap was only the first and not necessarily the most significant.

And suppose that all these impressions were in fact not extraneous or irrelevant, but did have some import—not just as an abstract puzzle, but to that morsel of displaced life that was Ulla Hillstrøm? No matter how frozen her present world, she could not escape the fact that from the moment the cloak had captured her she had been simultaneously gripped by a Sabbat of specifically erotic memories, images, notions, analogies, myths, symbols and frank physical sensations, all the more obtrusive because they

were both inappropriate and disconnected. It might well have to be faced that a season of love can fall due in the heaviest weather—and never mind what terrors flow in with it or what deep damnations. At the very least, it was possible that somewhere in all this was the clue that would help her to divorce herself at last even from this violent embrace.

But the concept was preposterous enough to defer consideration of it if there were any other avenues open, and at least one seemed to be: the source of the thermal. The virus bubble, like many of the Terrestrial micro-organisms to which it was analogous, could survive temperatures well above boiling, but it seemed reasonable to assume that the flying cloaks, evolved on a world where even words congealed, might be sensitive to a relatively slight amount of heat.

Now, could she move of her own volition inside this shroud? She tried a step. The sensation was tacky, as though she were plowing in thin honey, but it did not impede her except for a slight imposed clumsiness which experience ought to obviate. She was able to mount the sled with no trouble.

The cogs bit into the snow with a dry, almost inaudible squeaking and the sled inched forward. Ulla held it to as slow a crawl as possible, because of her interrupted vision.

The free cloak was still in sight, approximately where it had been before, insofar as she could judge against this featureless snowscape; which was fortunate, since it might well be her only flag for the source of the thermal, whatever it was.

A peculiar fluttering in her surroundings—a whisper of sound, of motion, of flickering in the light—distracted her. It was as though her compound sheath were trembling slightly. The impression grew slowly more pronounced as the sled continued to lurch forward. As usual there seemed to be nothing she could do about it, except, possibly, to retreat; but she could not do that either, now; she was committed. Outside, she began to hear the soft soughing of a steady wind.

The cause of the thermal, when she finally reached it, was almost bathetic—a pool of liquid. Placid and deep blue, it lay inside a fissure in a low, heart-shaped hummock, rimmed with feathery snow. It looked like nothing more or less than a spring, though she did not for a moment suppose that the liquid could be water. She could not see the bottom of it; evidently it was welling up from a fair depth. The spring analogy was probably completely false; the existence of anything in a liquid state on this world had to be thought of as a form of vulcanism. Certainly the column of heat rising from it was considerable; despite the thinness of the air, the wind here nearly howled. The free cloak floated up and down, about a hundred feet above her, like the last leaf of a long, cruel autumn. Nearer home, the bubble cloak shook with something comically like subdued fury.

Now, what to do? Should she push boldly into that cleft, hoping that the alien part of the bubble cloak would be unable to bear the heat? Close up, that course now seemed foolish, as long as she was ignorant of the real nature of the magma down there. And besides, any effective immersion would probably have to surround at least half of the total surface area of the bubble, which was not practicable—the well was not big enough to accommodate it, even supposing that the compromised virus suit did not fight back, as in the pure state it had been obligated to do. On the whole she was reluctantly glad that the experiment was impossible, for the mere notion of risking a new immolation in that problematical well horrified her.

Yet the time left for decision was obviously now very short, even supposing—as she had no right to do—that the environment-maintaining functions of the suit were still in perfect order. The quivering of the bubble was close to being explosive, and even were it to remain intact, it might shut her off from the outside world at any second.

The free cloak dipped lower, as if in curiosity. That only made the trembling worse. She wondered why.

Was it possible—was it possible that the thing embracing her companion was jealous?

. . . . .

There was no time left to examine the notion, no time even to sneer at it. Act—act! Forcing her way off the sled, she stumbled to the well and looked frantically for some way of stopping it up. If she could shut off the thermal, bring the free cloak still closer—but how?

Throw rocks. But were there any? Yes, there, there were two, not very big, but at least she could move them. She bent stiffly and tumbled them into the crater.

The liquid froze around them with soundless speed. In seconds, the snow rimming the pool had drawn completely over it, like lips closing, leaving behind only a faint dimpled streak of shadow on a white ground.

The wind moaned and died, and the free cloak, its hems outspread to the uttermost, sank down as if to wrap her in still another deadly swath. Shadow spread around her; the falling cloak, its color deepening, blotted Saturn from the sky, and then was sprawling over the beautiful banners of the rings—

The virus bubble convulsed and turned black, throwing her to the frozen ground beside the hummock like a bead doll. A blast of wind squalled over her.

Terrified, she tried to curl into a ball. The suit puffed up around her.

Then at last, with a searing invisible wrench at its contained kernel of space-time which burned out the control box instantly, the single creature that was the bubble cloak tore itself free of Ulla and rose to join its incomplete fellow.

In the single second before she froze forever into the livid backdrop of Titan, she failed even to find time to regret what she had never felt, for she had never known it, and only died as she had lived, an artifact of successful calculation. She never saw the cloaks go flapping away downwind—nor could it ever have occurred to her that she had brought anything new to Titan, thus beginning that long evolution the end of which, sixty millions of years away, no human being would see.

No, her last thought was for the virus bubble, and it was only two words long:

You philanderer—

Almost on the horizon, the two cloaks, the two Titanians, flailed and tore at each other, becoming smaller and smaller with distance. Bits and pieces of them flaked off and fell down the sky like ragged tears. Ungainly though the cloaks normally were, they courted even more clumsily.

Beside Ulla, the well was gone; it might never have existed. Overhead, the banners of the rings flew changelessly, as though they too had seen nothing—or perhaps, as though in the last six billion years they had seen everything, siftings upon siftings in oblivion, until nothing remained but the banners of their own

mirrored beauty.

The End

King of the Hill IT DID Col. Hal Gascoigne no good whatsoever to know that he was the only man aboard Satellite Vehicle 1. No good at all. He had stopped reminding himself of the fact some time back. And now, as he sat sweating in the perfectly balanced air in front of the bombardier board, one of the men spoke to him again: "Colonel, sir" Gascoigne swung around in the seat, and the sergeant Gascoigne could almost remember the man's nameUirew him a snappy Air Force salute. "Well?" "Bomb one is primed, sir. Your orders?" "My orders?" Gascoigne said wonderingly. But the man was already gone. Gascoigne couldn't actually see the ser- geant leave the control cabin, but he was no longer in it. While he tried to remember, another voice rang in the cabin, as flat and razzy as all voices sound on an intercom. "Radar room. On target." A regular, meaningless peeping. The timing circuit had cut in. Or had it? There was nobody in the radar room. There was nobody in the bomb hold, either. There had never been anybody on board SV-I but Gascoigne, not since he had relieved Grinnelland Grinnell had flown the station up here in the first place. Then who had that sergeant been? His name was . . . It was . . . The hammering of the teletype blanked it out. The noise was as loud as a pom-pom in the echoing metal cave. He got up and coasted across the deck to the machine, gliding in the gravity-free cabin with the ease of a man to whom free fall is almost second nature. The teletype was silent by the time he reached it, and at first the tape looked blank. He wiped the sweat out of his eyes. There was the message. MNBVCXZ LKJ HGFDS PYTR AOIU EUIO QPALZM He got out his copy of The Well-Tempered Pogo and checked the speeches of Grundoon the Beaver-Chile for the key letter-sequence on which the code was based. There weren't very many choices. He had the clear in ten minutes. BOMB ONE WASHINGTON 1700 HRS TAMMANANY There it was. That was what he had been priming the bomb for. But there should have been earlier orders, giving him the go-ahead to prime. He began to rewind the paper. It was all blank. AndWashington? Why would the Joint Chiefs of Staff order him "Colonel Gascoigne, sir." Gascoigne jerked around and returned the salute. "What's your name?" he snapped. "Sweeney, sir," the corporal said. Actually it didn't sound very much like Sweeney, or like anything else; it was just a noise. Yet the man's face looked familiar. "Ready with bomb two, sir." The corporal saluted, turned, took two steps, and faded. He did not vanish, but he did not go out the door, either. He simply receded, became darker and harder to distinguish, and was no longer there. It was as though he and Gascoigne had disagreed about the effects of perspective in the glowing Earthlight, and Gascoigne had turned out to be wrong. Numbly, he finished rewinding the paper. There was no doubt about it. There the 'order stood, black on yellow, as plain as plain. Bomb the capital of your own country at 1700 hours. Just incidentally, bomb your own home in the process, but don't give that a second thought. Be thorough, drop two bombs; don't worry about missing by a few seconds of arc and hitting Baltimore instead, or Silver Spring, or Milford, Del. CIG will give you the coordinates, but plaster the area anyhow. That's S.O.P. With rubbery fingers, Gascoigne began to work the keys of the teletype. Sending on the frequency of Civilian Intel- ligence Group, he typed: HELP SHOUT SERIOUS REPEAT SERIOUS PERSONNEL TROUBLE HERE STOP DON'T KNOW HOW LONG I CAN KEEP IT DOWN STOP URGENT GASCOIGNE SV ONE STOP Behind him, the oscillator peeped rhythmically, timing the drive on the launching rack trunnion. "Radar room. On target." Gascoigne did not turn. He sat before the bombardier board and sweated in the perfectly balanced air.

Inside his skull, his own voice was shouting: STOP STOP STOP That, as we reconstructed it afterwards, is how the SV-1 affair began. It was pure luck, I suppose, that Gascoigne sent his message direct to us. Civilian Intelligence Group is rarely called into an emergency when the emergency is just being born. Usually Washington tries to do the bailing job first. Then, when Washington discovers that the boat is still sinking, it passes the bailing can to ususually with a demand that we transform it into a centrifugal pump, .on the double. We don't mind. Washington's failure to develop a gov- ernment department similar in function to CIG is the reason why we're in business. The profits, of course, go to Affiliated Enterprises, Inc., the loose corporation of universities and industries which put up the money to build ULTIMAC and ULTIMAC is, in turn, the reason why Washington comes running to CIG so often. This time, however, it did not look like the big computer was going to be of much use to us. I said as much to Joan Hadamard, our social sciences division chief, when I handed her the message. "Urn," she said. "Personnel trouble? What does he mean? He hasn't got any personnel on that station." This was no news to me. CIG provided the figures that got the SV-I into its orbit in the first place, and it was on our advice that it carried only one man. The crew of a space vessel either has to be large or it has to be a lone man; there is no intermediate choice. And SV-I wasn't big enough to carry a large crewnot to carry them and keep the men from flying at each other's throats sooner or later, that is. "He means himself," I said. "That's why I don't think this is a job for the computer. It's going to have to be played person-to-person. It's my bet that the man's responsibility- happy; that danger was always implicit in the one-man recommendation." "The only decent solution is a full complement," Joan agreed. "Once the Pentagon can get enough money from Congress to build a big station." "What puzzles me is, why did he call us instead of his superiors?" "That's easy. We process his figures. He trusts us. The Pentagon thinks we're infallible, and he's caught the disease from them." "That's bad," I said. "I've never denied it." "No, what I mean is that it's bad that he called us instead of going through channels. It means that the emergency is at least as bad as he says it is." I thought about it another precious moment longer while Joan did some quick dialing. As everybody on Earthwith the possible exception of a few Tibetansalready knew, the man who rode SV-I rode with three hydrogen bombs im- mediately under his feetbombs which he could drop with great precision on any spot on the Earth. Gascoigne was, in effect, the sum total of American foreign policy; he might as well have had "Spatial Supremacy" stamped on his forehead. "What does the Air Force say?" I asked Joan as she hung up. "They say they're a little worried about Gascoigne. He's a very stable man, but they had to let him run a month over his normal replacement timewhy, they don't explain. He's been turning in badly garbled reports over the last week. They're thinking about giving him a dressing down." "Thinking! They'd better be careful with that stuff, or they'll hurt themselves. Joan, somebody's going to have to go up there. I'll arrange fast transportation, and tell Gascoigne that help is coming. Who should go?" "I don't have a recommendation," Joan said. "Better ask the computer." I did soon the double. ULTIMAC said: Hams. "Good luck, Peter," Joan said calmly. Too calmly. "Yeah," I said. "Or good night." Exactly what I expected to happen as the ferry rocket approached SV-I, I don't now recall. I had decided that I couldn't carry a squad with me. If Gascoigne was really far gone, he wouldn't allow a group of men to disembark; one man, on the other hand, he might pass. But I suppose I did expect him to put up an argument first. Nothing happened. He did not challenge the ferry, and he didn't answer hails. Contact with the station was made through the radar automatics, and I was put off on board as routinely as though I was being let into a moviebut a lot more rapidly. The control room was dark and confusing, and at first I didn't see Gascoigne anywhere. The Earthlight coming through the observation port was brilliant, but beyond the edges of its path the darkness was almost absolute, broken only by the little stars of indicator lenses. A

faint snicking sound turned my eyes in the right direc- tion. There was Gascoigne. He was hunched over the bom- bardier board, his back to me. In one hand he held a small tool resembling a ticket punch. Its jaws were nibbling steadily at a taut line of tape running between two spools; that had . been the sound I'd heard. I recognized the device without any trouble; it was a programmer. But why hadn't Gascoigne heard me come in? I hadn't tried to sneak up on him, there is no quiet way to come through an air lock anyway. But the punch went on snicking steadily. "Colonel Gascoigne," I said. There was no answer. I took a step forward. "Colonel Gascoigne, I'm Harris of CIG. What are you doing?" The additional step did the trick. "Stay away from me," Gascoigne growled, from somewhere way down in his chest. "I'm programming the bomb. Punching in the orders my- self. Can't depend on my crew. Stay away." "Give over for a minute. I want to talk to you." "That's a new one," said Gascoigne, not moving. "Most of you guys were rushing to set up lauchings before you even reported to me. Who the hell are you, anyhow? There's nobody on board, I know that well enough." "I'm Peter Harris," I said. "From CIGyou called us, remember? You asked us to send help." "Doesn't prove a thing. Tell me something I don't know. Then maybe I'll believe you exist. Otherwisebeat it." "Nothing doing. Put down that punch." Gascoigne straightened slowly and turned to look at me. "Well, you don't vanish, I'll give you that," he said. "What did you say. your name was?" "Harris. Here's my ID card." Gascoigne took the plastic-coated card tentatively, and then removed his glasses and polished them. The gesture itself was perfectly ordinary, and wouldn't have surprised meexcept that Gascoigne was not wearing glasses. "It's hard to see in here," he complained. "Everything gets so steamed up. Hm. All right, you're real. What do you want?" His finger touched a journal. Silently, the tape began to roll from one spool to another. "Gascoigne, stop that thing. If you drop any bombs there'll be hell to pay. It's tense enough down below as it is. And there's no reason to bomb anybody." "Plenty of reason," Gascoigne muttered. He turned toward the teletype, exposing to me for the first time a hip holster cradling a large, black automatic. I didn't doubt that he could draw it with fabulous rapidity, and put the bullets just where he wanted them to go. "I've got orders. There they are. See for yourself." Cautiously, I sidled over to the teletype and looked. Except for Gascoigne's own message to CIG, and one from Joan Hadamard announcing that I was on my way, the paper was totally blank. There had been no other messages that day unless Gascoigne had changed the roll, and there was no reason why he should have. Those rolls last close to forever. "When did this order come in?" "This morning some time. I don't know. Sweeney!" he bawled suddenly, so loud that the paper tore in my hands. "When did that drop order come through?" Nobody answered. But Gascoigne said almost at once, "There, you heard him." "I didn't hear anything but you," I said, "and I'm going to stop that tape. Stand aside." "Not a chance. Mister," Gascoigne said grimly. "The tape rides." "Who's getting hit?" "Washington," Gascoigne said, and passed his hand over his face. He appeared to have forgotten the imaginary spectacles. "That's where your home is, isn't it?" "It sure is," Gascoigne said. "It sure as hell is, Mister. Cute, isn't it?" It was cute, all right. The Air Force boys at the Pentagon were going to be given about ten milliseconds to be sorry they'd refused to send a replacement for Gascoigne along with me. Replace him with who? We can't send his second. alternate in anything short of a week. The man has to have retraining, and the first alternate's in the hospital with a ruptured spleen. Besides, Gascoigne's the best man for the job; he's got to be bailed out somehow. Sure. With a psychological centrifugal pump, no doubt. In the meantime the tape kept right on running. "You might as well stop wiping your face, and turn down the humidity instead," I said. "You've already smudged your glasses again." "Glasses?" Gascoigne muttered. He moved slowly across the cabin, sailing upright like a sea horse, to the blank glass of a closed port. I seriously doubted that he could see his reflection in it, but maybe he didn't really want to see it. "I messed them up, all right. Thanks." He went through the polishing routine again. A man who thinks he is wearing

glasses also thinks he can't see without them. I slid to the programmer and turned off the tape. I was between the spools and Gascoigne now but I couldn't stay there forever. "Let's talk a minute. Colonel," I said. "Surely it can't do , any harm." Gascoigne smiled, with a sort of childish craft. "I'll talk," he said. "Just as soon as you start that tape again. I was watching you in the mirror, before I took my glasses off." The liar. I hadn't made a move while he'd been looking into that porthole. His poor pitiful weak old rheumy eyes had seen every move I made while he was polishing his "glasses." I shrugged and stepped away from the programmer. "You start it," I said. "I won't take the responsibiltiy." "It's orders," Gascoigne said woodenly. He started the tape running again. "It's their responsibility. What did you want to talk to me about, anyhow?" "Colonel Gascoigne, have you ever killed anybody?" He looked startled. "Yes, once I did," he said, almost eagerly. "I crashed a plane into a house. Killed the whole family. Walked away with nothing worse than a burned leg good as new after a couple of muscle stabilizations. That's what made me shift from piloting to weapons; that leg's not quite good enough to fly with any more." "Tough." He snickered suddenly, explosively. "And now look at me," he said. "I'm going to kill my own faftiily in a little while. And millions of other people. Maybe the whole world." How long was "a little while"? "What have you got against it?" I said. "Against whatthe world? Nothing. Not a damn thing. Look at me; I'm king of the hill up here. I can't complain." He paused and licked his lips. "It was different when I was a kid," he said. "Not so dull, then. In those days you could get a real newspaper, that you could unfold for the first time yourself, and pick out what you wanted to read. Not like now, when the news comes to you predigested on a piece of paper out of your radio. That's what's the matter with it, if you ask me." "What's the matter with what?" "With the newsthat's why it's always bad these days. Everything's had something done to it. The milk is ho- mogenized, the bread is sliced, the cars steer themselves, the phonographs will produce sounds no musical instrument could make. Too much meddling, too many people who can't keep their hands off things. Ever fire a kiln?" "Me?" I said, startled. "No, I didn't think so. Nobody makes pottery these days. Not by hand. And if they did, who'd buy it? They don't want something that's been made. They want something that's been Done To." The tape kept on traveling. Down below, there was a heavy rumble, difficult to identify specifically: something heavy being shifted on tracks, or maybe a freight lock opening. "So now you're going to Do Something to the Earth," I said slowly. "Not me. It's orders." ' "Orders from inside, Colonel Gascoigne. There's nothing on the spools." What else could I do? I didn't have time to take him through two years of psychoanalysis and bring him to his own insight. Besides, I'm not licensed to practice medi- cinenot on Earth. "I didn't want to say so, but I have to now." "Say what?" Gascoigne said suspiciously. "That I'm crazy or something?" "No. I didn't say that. You did," I pointed out. "But I will tell you that that stuff about not liking the world these days is baloney. Or rationalization, if you want a nicer word. You're carrying a screaming load of guilt, Colonel, whether you're aware of it or not." "I don't know what you're talking about. Why don't you just beat it?" "No. And you know well enough. You fell all over your- self to tell me about the family you killed in your flying accident." I gave him ten seconds of silence, and then shot the question at him as hard as I could. "What was their name?" "How do I know? Sweeney or something. Anything. I don't remember." "Sure you do. Do you think that killing your own family is going to bring the Sweeneys back to life?" Gascoigne's mouth twisted, but he seemed to be entirely unaware of the grimace. 'That's all hogwash," he said. "I never did hold with that psychological claptrap. It's you that's handing out the baloney, not me." "Then why are you being so vituperative about it? Hog- wash, claptrap, baloneyyou are working awfully hard to knock it down, for a man who doesn't believe in it." "Go away," he said suUenly. "I've got my orders. I'm obeying them." Stalemate. But there was no such thing as stalemate up here. Defeat was the word. The tape traveled. I did not know what to do. The last bomb problem

CIG had tackled had been one we had set up ourselves; we had arranged for a dud to be dropped in New York harbor, to test our own facilities for speed in determining the nature of the missile. The situation on board SV-I was completely different Whoa. Was it? Maybe I'd hit something there. "Colonel Gascoigne," I said slowly, "you might as well know now that it isn't going to work. Not even if you do get that bomb off." "Yes, I can. What's to stop me?" He hooked one thumb in his belt, just above the holster, so that his fingers tips rested on the breech of the automatic. "Your bombs. They aren't alive." Gascoigne laughed harshly and waved at the controls. "Tell that to the counter in the bomb hold. Go ahead. There's a meter you can read, right there on the bombardier board." "Sure," I said. 'The bombs are radioactive, all right. Have you ever checked their half life?" It was a long shot. Gascoigne was a weapons man; if it were possible to check half life on board the SV-I, he would have checked it. But I didn't think it was possible. "What would I do that for?" "You wouldn't, being a loyal airman. You believe what your superiors tell you. But I'm a civilian, Colonel. There's no element in those bombs that will either fuse or fission. The half life is too long for tritium or for lithium 6, and it's too short for uranium 235 or radio-thorium. The stuff is probably strontium 90in short, nothing but a bluff." "By the time I finished checking that," Gascoigne said, "the bomb would be launched anyhow. And you haven't checked it, either. Try another tack." "I don't need to. You don't have to believe me. We'll just sit here and wait for the bomb drop, and then the point will prove itself. After that, of course, you'll be court- martialed for firing a wild shot without orders. But since you're prepared to wipe out your own family, you won't mind a little thing like twenty years in the guardhouse." Gascoigne looked at the silently rolling tape. "Sure," he said, "I've got the orders, anyhow. The same thing would happen if I didn't obey them. If nobody gets hurt, so much the better." A sudden spasm of emotion1 took it to be grief, but I could have been wrongshook his whole frame for a moment. Again, he did not seem to notice it. I said: 'That's right. Not even your family. Of course the whole qrorld will know the station's a bluff, but if those are the orders" "I don't know," Gascoigne said harshly. "I don't know whether I even got any orders. I don't remember where I put them. Maybe they're not real." He looked at me confus- ediy, and his expression was frighteningly like that of a small boy making a confession. "You know something?" he said. "I don't know what's real any more. I haven't been able to tell, ever since yester- day. I don't even know if you are real, or your ID card either. What do you think of that?" "Nothing," I said. "Nothing! Nothing! That's my trouble. Nothing! I can't tell what's nothing and what's something. You say the bombs are duds. All right. But what if you're the dud, and the bombs are real? Answer me that!" His expression was almost triumphant now. 'The bombs are duds," I said. "And you've gone and steamed up your glasses again. Why don't you turn down the humidity, so you can see for three minutes hand running?" Gascoigne leaned far forward, so far that he was per- ilously close to toppling, and peered directly into my face. "Don't give me that," he said hoarsely. "Don'tgive me thatstuff." I froze right where I was. Gascoigne watched my eyes for a while. Then, slowly, he put his hand on his forehead and began to wipe it downward. He smeared it over his face, in slow motion, all the way down to his chin. Then he took the hand away and looked at it, as though it had just strangled him and he couldn't understand why. And finally he spoke. "Itisn't true," he said dully. "I'm not wearing any glasses. Haven't worn glasses since I was ten. Not since I broke my last pairplaying King of the Hill." He sat down before the bombardier board and put his head in his hands. "You win," he said hoarsely. "I must be crazy as a loon. I don't know what I'm seeing and what I'm not. You better take this gun away. If I fired it I might even hit something." "You're all right," I said. And I meant it; but I didn't waste any time all the same. The automatic first; then the tape. In that order, the sequence couldn't be reversed after- wards. But the sound of the programmer's journal clicking to "Off" was as loud in that cabin as any

gunshot. "He'll be all right," I told Joan afterwards. "He pulled himself through. I wouldn't have dared to throw it at any other man that fastbut he's got guts." "Just the same," Joan said, "they'd better start rotating the station captains faster. The next man may not be so toughand what if he's a sleepwalker?" I didn't say anything. I'd had my share of worries for that week. "You did a whale of a job yourself, Peter," Joan said. "I just wish we could bank it in the machine. We might need the data later." "Well, why can't we?" "The Joint Chiefs of Staff say no. They don't say why. But they don't want any part of it recorded in ULTIMAC or anywhere else." I stared at her. At first it didn't seem to make sense. And then it didand that was worse. "Wait a minute," I said. "Joandoes that mean what I think it means? Is 'Spatial Supremacy' just as bankrupt as 'Massive Retaliation' was? Is it possible that the satellite and the bombs . . . Is it possible that I was telling Gascoigne the truth about the bombs being duds?" Joan shrugged. "He that darkeneth counsel without wisdom," she said, "isn't earning his salary."

PHOENIX PLANET by James Blish (Author of "Callistan Cabal," "Citadel of Thought," etc.) Marshall went into space to seek extra-terrestrial life; he returned to find that what he had sought had paid his home planet a visit. And had come to stay! CHAPTER I GREGORY MARSHALL paced a five-foot circle around the metal floor. Five feet was the maximum diameter of the circle the tiny control cabin of the Icarus allowed for pacing, and for a man of Marshall's size and state of mind it was a very inadequate size indeed. For Gregory Marshall, first human being ever to leave the prisoning air of Earth, was going back to Earth again. Going home after ten of Earth's too-long years, ten years of eating vitamin concentrates, egg powder, milk powder, and the incredibly-tough leaves of the Martian plants he called "spinage" or "cabbich" as the mood struck him. Ten years of gasping for air at the slightest exertion. Ten years of freezing almost solid at night, and being painfully sun-burned at forty degrees Fahrenheit by day. Ten years of searching, searching, searching. Ten years it had taken him to assemble the metal for the device his landing had smashed. He caressed the crude thing, a cubical cage-work of wires placed just below the control window, and a little model of the Icarus which ran along the wires, and grinned ruefully to himself. It was the nature of the man that he could grin at all, with any other feeling than that of cynicism, for that landing misfortune and its consequences would have killed any other man's sense of humor completely. How neatly everything had been figured out! The pressed-cast wood ship, held together with metal rings every few feet like barrelhoops, with its single protective layer of heat-resistant plastic coated with a resin-base reflectant paint, had been so much lighter than a metal ship would have been, and the new fuel was so powerful--nothing but a miscalculation of orbit could have prevented his making the trip safely, and the return as well. And he had been picked from all the rest of the Society because of his cool head and his mathematical skill. He had not miscalculated. He had made Mars. And then, then the twanging collapse of parachute shrouds, the wild plunge, the violent shock as the Icarus dropped twenty feet and buried its nose in soft sand--and he came to consciousness in the midst of the crumpled control cage. . . . The metal had been very hard steel, and the fine wires had shivered and broken, cutting him badly. He didn't care about the cuts--they healed quickly in the sterile air of Mars--but that shivered metal, with its high molybdenum content, could never be reworked by any means at his disposal. He had plenty of fuel, yes. But the little space-flyer was useless without that control cage. The nightmare was over now. The new cage was of gold, pure, soft gold, obtained from the ruined city which lay buried in the "spinage" of the Mare Icarium. How he had longed to explore that incredibly ancient metropolis with the eyes of a scientist, as the Society had intended he should! But he had no

time for anything but hasty pictures filmed as he passed by in his endless search for malleable metal. That gold had come, ounce by precious ounce, from ornaments and jewelry found in deserted chambers, dug with gasping breath from red sand or found discarded carelessly in once-dark corridors. The Martians, dead untold centuries before his birth, had used no gold in architectural decoration. Only in those ornaments. And he had passed great frescoes, still brightly colored in the unmoving air of Mars; and strange, chilling statues; and buildings which were taller in the slighter gravitation of the planet than any imaginable Earth building; and he had made hurried films and gone on in despairing duplication of man's endless search for gold, now a symbol of life rather than mere greed. And each month, if he was lucky, saw one more queerly wrought, alien gold ornament added to the tiny pile in the cabin of the Icarus. The search never ceased except from exhaustion. He had gasped, and lost precious perspiration in the arid air, and been burned black and peeled acres of skin (which he ate, as he ate his nail parings and anything else offering rare proteins), and grew a little mad; and the stars looked down coldly, even in the vicious weak light of the sun, and watched this human being, the only one on an entire world, grub for gold in the ground like his brothers on Earth, and doubtless they did not understand. But that was all over now. Nine years' search for metal; one year drawing it into wire, making proper connections, and repairing the guilty parachute. And now behind him the roar of the rockets made the Icarus tremble, and Mars was a rusty ball dwindling behind it, illusory "canals" coming gradually into view, as it hurtled along Hohmann D toward the swelling blue star. He stopped his constant pacing and pressed his nose for the hundredth time against the green glass of the control window, polishing impatiently with his ragged sleeve as his breath misted the view of the blue star. What would it be like, being there again? There were so many things that might be different. What had the Society thought when he had failed to return? Had they sent another ship, later, one that had been lost somewhere in space, or burst in terrible glory like poor Klaus? He thought not. The Icarus had devoured the Society's last pitiful pennies, for Klaus' death had been expensive as well as tragic; the Daedelus had been a much bigger ship than Marshall's. Probably they had waited in dying hopefulness for a few years or so, and then, when the Earth and Mars had moved away from each other, had gone back to the other walks of life whence they had been summoned. And Anne. Had she, perhaps, forgotten too, in those years when the gulf of space had stretched between them? As ever the thought was a bright pain to him, and he felt a momentary twinge of the old madness of Mars. Ten years was a long time for a human woman to remain faithful. Pelleas and Melicent, yes--but they were but fiction. If she had waited, he was bringing her a better lover than she had known before. He had been an eager, idealistic kid when he spurned his planet in fire, a kid of twenty-two; he looked perhaps four years older now, thanks to the preservative influence of that embalmed rusty planet, but he was hardened physically to perfection; underweight, of course, but perfectly proportioned; and those ten years of hell had forged the irresponsible Greg Marshall into something finer than he had promised. He knew it without egotism, but with grim pride, and was glad of it for her. Yes, much might have changed upon the blue star, yet it was home, and paradise; return there was resurrection from the tomb which was Mars. Those years had at least been busy, too busy for him to develop the knack of solitaire or playing chess with himself, and now the inaction in the shining wooden box of the Icarus was tormenting. He could only pace in a five-foot circle, walk up and down the catwalk in a useless check of Kammerman's superb engines, make delicate adjustments of the little ship in the crude cage, and return again to smudge the port and lean on the walls as if to urge more speed. But the days went by, and Mars dwindled, and the blue star grew. And with it grew visions of forests, and oceans, and Anne, and an enormous steak, and thick, rich air.... ON THE two-hundred and fiftieth day the Icarus swept in close to the corpse-like moon, and shot by, while Marshall took the last foot of his film before turning on the forward

engines. He had managed to fill four whole days taking these pictures, and the sun, which had been his enemy so long, had turned fair-weather friend and illuminated the ''dark'' side with slanting rays which brought out every detail in sharp contrast to its own shadow. With a sigh he unpacked the magazine and stored it with the rest. Then he moved the little ship on the gold wires back a bit and up, and white, intense flame blotted out his vision. He wrote hasty calculations on the walls (since the Society had considered paper wasted weight). The Icarus, a comet with two opposed tails, fell gradually into the Oberth braking orbit, so carefully calculated for it by the Society ten years ago. No, over twelve, now, thanks to the time the two trips had added to the stay on Mars. Marshall fidgeted and paced his five-foot circle and could not sleep, though it would be ten hours before the first brush with the atmosphere. Instead he stood at the port every few minutes and looked down at the great planet of his home, the world of blue seas and green-brown continents and masses of white mist obscuring both. He longed to see a city, but he was too high up, and their lights at night he found also invisible. He filled the ten hours making nice adjustments on the gyroscope, compensating for the constant, nauseating shift in the down direction which occurred if the ship went through the orbit changing its relative position to Earth as inertia would have it do. Then the high thin screaming of the atmosphere, almost beyond the range of audibility, penetrated the Icarus and he charged up the catwalk to strap himself in and fire another burst through the forward tubes. The wood would not burn under ordinary conditions, protected as it was by the outside coatings, but it was not wise to take chances. Even stone meteors burned if they fell free through such gloriously thick atmosphere. During the next two hours the scream crept gradually down to a siren-like howl as he edged the ship toward the Earth a few hundred feet at a time. Once his fingers slipped and perspiration started out all over him as he had to apply rocket power. It would be ironic to be burned in the last lap. Then at last the sound, without changing pitch, died away to a whisper and the Icarus was back in space, speed greatly reduced, making the wide loop for the return. Seven hours now decelerating all the time in a constant, sickening surge. . . . This time the sound started as a howl and went down from there. In an hour he was but two miles up from home. Another hour, another mile down, while the dark mass of Europe slid below him and then the beautiful turquoise desert of the Atlantic. In half an hour he was making only two hundred miles an hour, so that an airplane could have paced him, and he slid out the retractable wings.... Five thousand feet from home. ... Evidently he was even more excited than he had imagined, for after finding a midge of a planet accurately in the eternal void, he missed New York and shot instead over an unfamiliar, heavily wooded section of the coast. Wooded. Real trees. But trees, for all their beauty and grateful familiarity, were not for now. He needed an airdrome. He swung north up the coast, shooting higher until he could see the Hudson; then, exultantly, he plunged the Icarus toward Manhattan. He would land at LaGuardia Field, but first he would give the old town a thrill. Maybe they had rockets now, transatlantic rockets or something--but that was doubtful, because if they had they would also have space rockets. His own adventure the Society had kept secret, for fear of the laughter of the newspapers. Probably there were just much better air planes now. Certainly no glittering meteors like the Icarus. In his imagination he could see the white expanse of startled, upturned faces in the streets of the city as he thundered deafeningly overhead. Conquering hero, returned from Mars. He chuckled. He had earned an ovation, by God. Also that steak and that soft bed and that air.... The old thought-chain brought him back to Anne again and he blinked a little. If she were there to meet him, his life would have reached its peak. And if she were not . . . well, old Earth was home, just the same.... He kicked himself for a sniveling schoolboy and concentrated on the gold cage. Good little space-vessel, but somewhat tricky in normal flight. He braked as Manhattan loomed nearer and the silver thread of the Hudson expanded to a metal ribbon,

and for a moment the flames obscured his forward vision. What a display the rockets made in air! Not quite such comet-like expansion as in space, but unparalleled brilliancy and even some smoke. How Kammerman would sputter when he told him about that smoke; it meant wasted power, and waste in a rocket engine was to Kammerman as leprosy in a man is to the normal woman. The air-speed indicator registered eighty now. Any slower and the Icarus would fall of its own weight, despite the stubby wings. He shut off the ocean of fire and peered eagerly downward-- But on Manhattan Island and all the land visible to Gregory Marshall, there was nothing but the dense, wild forest. CHAPTER II of PHOENIX PLANET IN SICK TERROR he sent the lcarus in as tight spirals as he dared, scanning the ground below, almost skimming the tree-tops. What could have happened to a whole city in twelve years? The forest was not as dense as it had looked from above; it was mostly scrub, and there were occasional thin spots and clearings. Nowhere, however did he see any sign of a building or even a ruin. New York--vanished! What could have been the cause? Some local epidemic, perhaps, which had caused the city to be abandoned? But the buildings would still be there, certainly--the great, familiar skyscrapers.... Abruptly he got a clear look at a larger clearing. The ground in it looked wrong, somehow--it seemed to glisten in spots, like lava-- It was lava. Whole areas had been fused as if with tremendous heat. He thought of the teeming millions in the city, and felt suddenly ill. Had the city been evacuated before the cataclysm, whatever it had been, had struck? Had there been adequate warning? Or--had the upheaval been even more widespread? Perhaps the war, crawling to an exhausted close when he left, had flared again. But what war weapon could wipe out a city so cleanly, melt it to glassy puddles like this? He thought for a moment of going on to Chicago, in what he strangely felt to be a hopeless quest for life, but his fuel meter warned him he could stay in the air only a few minutes longer. Desperately he swung the ship south and up, and moved the little metal oval almost halfway forward in the cage. The Icarus roared and he was forced into his seat. Then the rear tubes began to cough. He searched the board for the valve of Keller's favorite and much-discussed emergency pump ("Only thirteen pounds," he could hear the little man pleading, "and so handy for accidents."), twisted it hard, and the reserve in the forward tubes was forced back. Again the Icarus bucked and bounded upward, but the coughing began again and black smoke began to pour from the Venturi orifices, wreathing the tail of the ship in a trailing dense pall. Oxygen gone. The fuel was useless now--might as well save it; without oxygen the tubes had no more thrust than a blowtorch. He cut the feed throttles. The Icarus was falling now in a great arc, gliding on its truncated wings, losing speed rapidly. He searched the horizon, but if he were anywhere near Philadelphia, it must have been destroyed as well; there was nothing but the endless scrub forest. Bitterly he watched the speed, and when the ship could no longer stay in the air on momentum, he tripped the parachute lever. He could hear its opening boom through the hull, and the shock almost cut him in two on the safety belt. Swaying like a pendulum, the Icarus settled after twelve years on the surface of its home planet--from sterile desert to empty wilderness. Abruptly Gregory Marshall felt very tired. Dully he watched the green roof rise to meet him. Then he was rocked violently and branches crashed outside--another dull shock--and the Icarus swayed gently back and forth on the end of the tangled shrouds, perhaps a yard from the ground. "The Earth won't have me," he thought, smiling without humor. He unstrapped himself, and the entrance-port wheel squealed in his hands. For a moment he stood beside his suspended flyer, breathing deeply of the heady air, wine-like after Mars and the canned stuff in the ship. The strange, subtle odor of green things was everywhere, and when he stamped his feet on the rich black sod he knew again a long-forgotten natural weight. Home. Home changed very terribly, but still life after living death. He sighed and gave the Icarus a short inspection. There was a tiny fraction of gritty red sand wedged in a crack where the tubes joined the fuselage, and the knowledge that it was Martian gave him a greater sensation of awe than

all the films stored in the cabin. Nothing seemed to be damaged; the lightness of the steel-strong wood composition had protected it from coming to grief among the small trees. He whistled softly to himself and ran his fingers along a long, deep burn. The paint and protective plastic had been seared away and charred wood showed underneath. That must have happened during that accidental two-thousand-foot drop. Any more and--well, the Icarus wouldn't be spaceworthy again until he could have that spot repaired. Repaired. If he could find anybody or anyplace to repair it. The madness of the Martian loneliness touched him again, briefly. What had happened to the world, anyhow? Cities destroyed, vegetation running wild over miles of deserted territory-- His ears, subconsciously sensitive for the slightest human sound, and attuned more delicately by Mars' thin air which made a boom into a squeak, caught a subdued whisper behind him. He's unarmed, looks like," it said, and with an exclamation of delight he spun around on his heel. HE SAW NOTHING but a miniature open space, domed by branches, and the forest itself. "Where are you?" he called eagerly, his voice unnaturally loud in his ears. For a long moment there was silence. Then a gruff voice said, "No funny stuff, Turny. You're surrounded." "I've no weapons," he replied, puzzled. "I'm not a criminal. Come out where I can see you. I want to get some information." Again the silence, and then finally the undergrowth rustled and two men stepped cautiously into view. They were dressed in tattered, faded clothing of no identifiable nature; they had heavy beards and carried crude, flint-tipped spears. One of them had a belt, into which was thrust a rusty hatchet; the other was beltless, and his clothing hung on him like sacking. "What is this, anyhow, a masquerade?" said Marshall. "What's happened to everybody? I couldn't even find New York." "He don't talk like a turny," said the beltless man doubtfully. "Shut up," growled the other. "They're full o' tricks. Listen, mister, you picked a bad spot to have a forced landing in. We have special entertainments here regular for guys like you." He whistled shrilly and the open space suddenly held some ten more men, similarly dressed and ominously silent, spears ready and narrow eyes watching Marshall with strange, vigilant hatred. "I don't know what you're talking about," he snapped. "My name's Gregory Marshall, and I've just come back from ten years on Mars. What the hell has happened? What's a turny? Why is everybody gone?" The man with the belt, who seemed by that mark of distinction to be leader of the band, laughed shortly. "That's one lousy story. You oughta be able to do better'n that. We know your kind. Every decent man died in the fight. Just rats like us, who ran when the others stayed, are left. But we're better for all that than you guys that ran in the other direction." An angry murmur of affirmation ran around the ragged group. "We got no use for bloodhounds, see," the belted man went on in a low, deadly voice. "We don't like guys that hunt us so they can wear good clothes and own planes like them and live in the cities--" "Hey, boss," another voice cut in from directly behind Marshall. One of the men had circled cautiously around and was examining the suspended Icarus. "This ain't no invader's ship. Look here. It's made o' wood." The belted man snorted. "No kidding, boss. The shiny stuff's just paint. Look at this burnt spot. And here--this tube thing stickin' out the back--it's got 'Bethlehem Steel Co.' stamped on it." The leader frowned and strode past Marshall to look at the space-flyer himself. "It's a trick," he said suspiciously. "What about that there name?" He pointed to the legend on the bow. "Ick-er-uss. That ain't no human name." Marshall laughed. "That's the name of an old Greek, my friend--the first man to ever fly." "Wright was the first man to fly," snapped the belted man, but more doubtfully. "Naw, he wasn't," another one of the group said. "The guy's right, boss. This Greek and some wop named Davinky both flew before Wright. I read about it somewhere. The Greek had wax wings." "That's true," Marshall smiled, nodding at the man. "I'm glad somebody here knows something." The tense group seemed to relax a little. "Well, mebbe so," the belted man said more graciously. "Let's hear the story, bud." Marshall explained quickly the circumstances which had sent him to Mars and kept him

there so long, taking the leader inside to show him the painfully-built gold cage, two ornaments left over, and the magazines of exposed film. When he finished there was awe on every face. "So," said the leader, spitting reflectively. "Before all this happened--" he gestured at the wilderness and the ragged scarecrows of his men--"it would have been a great thing. Let's see: you left in forty-two, huh? You was lucky. You missed the party." He frowned and plucked a long piece of grass from the turf. "Well, startin' from the beginning--this all happened early in February of forty-three. Invasion, from outside. We thought it was Martians, considering H. G. Wells and all, but I guess if you say Mars is dead, why then they musta been from somewhere else. They had big ships, like Zeppelins, only they moved as fast as planes, and they had some kind of a searchlight that killed people, zip, like that, without even leavin' a mark on 'em. Everybody on Earth was fightin' with each other then, so we was what you might call prepared. We held 'em off for a month or so. "They didn't have no guns or anything that blew up when it hit, only these ray things, but they was bad enough. Finally, just when it looked like maybe we was goin' to clean up on 'em, they thought up a bomb o' their own. It did what you saw in New York. Three of 'em, they dropped there. No noise. Just puffs o' fire, blue-white like flash powder, and nothin' left but slag. The air was settlin' fine white dust all over everything for days afterwards. They say they went all around the Earth like that. Didn't miss a major city anywhere. We got a lot of 'em, but not enough, and after that they mopped up." The tragic recital had seemed to Gregory Marshall to become only a voice, a dead, empty voice threading dull pain through sightless night. The forest faded and the voice drifted as from far away across leagues of blackness deeper than space. Inside him the old bright agony was burning, and a meaningless word was going round and round in his brain; Anne, Anne, Anne, Anne . . . over and over again. Two sleepless, straining days flowed suddenly back over him. He passed a hand across his eyes and sat down on the cool, damp grass. "Nobody left but us," he said All dead . . . Anne, Anne! "A few," said the belted man "They's others. But none of 'em's worth a cent. The guys that live in the woods are the yellow-bellies like us, that ran and hid when the others was fighting." He spat again and chewed viciously on the end of the grass-stem. Wake up, Marshall. She's dead, Marshall. You should have stayed on Mars, Marshall. She's dead, Marshall. "How about these people in the cities--the 'turnies'?" "They ain't fit to talk about," said the belted man. "They're the only things that lets us live with ourselves. We ran, but they went to the invaders and played stool-pigeon and bloodhound. These guys hunt us out, and get nice clothes and food and women for it." "Rubbing you out. Why?" Doesn't matter, Marshall. Dead, Marshall. "I dunno. We put up a hell of a fight for a while. I think they're afraid of us. I don't think they're much good as fighters; we panicked 'em half a dozen times. With stuff like they had we coulda held 'em off." Gregory Marshall got up slowly. Anne was dead. Of course. He had come back to his home just in time for its final destruction. There were only two things to do, and suicide was not in Gregory Marshall's nature. He had fought a whole planet once for his own. Little sparks of hatred flared in his eyes. "We aren't licked yet," he said. CHAPTER III of PHOENIX PLANET A RELUCTANT COUNCIL of war sat in the rickety shack of Brains Barret, the man with the belt. It was made up of Barret, Gregory Marshall, a shabby aide of Barret's, and the leader of a neighboring community, Leland by name. Leland, despite his nondescript dress, reminded Marshall of that old story about the Britisher in the jungle; he had tried to battle his beard and keep as clean as possible. He had been an engineer at one time. "You don't get the layout at all," this visiting potentate told Marshall flatly. "What you suggest is impossible. The invaders, whoever they are, live entirely within their own cities, surrounded by batteries of those death-ray projectors. Any movement on our part will be spotted instantly by the turnies. It's hard enough for us to keep alive as it is." "Exactly," said Marshall. "As you are you're scurrying from rat-hole to rat-hole, and being rubbed out one by one. If this setup of Barret's is

anything to go by, you've got about one woman for every six men; you're eating bark and bird's eggs; and eventually you're picked off. You're being exterminated. All right. The best defense, as somebody said long ago, is an offense." "Have you seen the city to the west?" the aide asked softly. A swift vision passed through Marshall's mind--the shining, dreamlike pyramid of metal and glass rising from the endless wilderness, moving in smooth lines from the spire in the center to the dome-like, squat pillboxes at the periphery. An amazing, alien thing, rising evilly from the green Earth. For an instant his plans seemed transparent, ghost-like, futile, before the civilization which had raised that astounding metropolis in so short a time. Then he thought of Anne, and the hate-lightning blazed in his eyes. "Yes," he said. "I've seen the city. And there are certain things about it that are very significant to me. According to your story, and from what I've seen it's all too true, all effective resistance to the invaders has been destroyed. Yet that city, built after the battle was all over, is fortified like it was expecting Attila the Hun any minute." "I know what you mean," Barret agreed. "They're scared of us, sure. I told you our early counterattacks panicked 'em every time. The little suicide ships toward the end did it, too. But that ain't goin' t' help. Them forts just make it worse. They make bein' scared a luxury, and a safe one." "Besides," Leland followed, "you don't realize just how few of us there are. Barret's eighteen men and three women make up the largest community in these parts. Mostly we think it too dangerous to collect together like that--too easy for the turnies to spot us. Most everybody picks their own spot and lives alone. There's ten people in my bunch." "That's good," Marshall said instantly. "This is going to be guerilla warfare--striking at weaknesses and disappearing again." "The invaders ain't got no weaknesses," Barret retorted. "On the contrary. That fear psychosis is one. It's all out of proportion to our actual strength, and it was even when we were fully armed. That means one thing: the invaders are not a fighting race, as we are. A fighting race equipped with such weapons would have made short work of us, and cleanly and efficiently, without any panic. They came here of necessity--some plague on their world, perhaps, or another cataclysm approaching. They hoped to find this world unoccupied; they didn't, and they were equipped to fight for it; but they didn't want to. They didn't know how. And now they've another weakness; having erected that ring of forts around their city, they think they're safe, and we're licked. Well, they aren't, and we aren't, and that they think to the contrary is a big factor in our favor." There was a moment's silence. "I ran once," said Brains Barret slowly and carefully, "and I left a lot a people in the lurch I shoulda stayed by, to save my own skin. It prob'ly ain't goin' to do any good, but I won't run agin. Pick your plans, Marshall; I'm right behind you." "Thanks," said Marshall seriously. "And you, Leland?" Leland scratched his head. "I think it's futile, but I thought nobody'd ever reach Mars, too. Count me in. What are you going to do?" "I want to find out first what equipment we have. On my side there's the Icarus, which needs fuel and is consequently not much good." "Fuel?" asked Leland. "There's a smashed tank half buried near my place. One of the forty-ton jobs. The ray got it and it ran into a wall when the crew died. There's one tank of gas that didn't get burst." "Gasoline isn't very good, but it's better than nothing. How much is there?" "About twenty gallons." "That won't keep me in the air much more than an hour," said Marshall, shaking his head. "How much can you carry, for God's sake?" "Not quite ten tons--my own fuel. I've got maybe two gallons of that left. Well, we'll put the gas in; maybe we can use it, or find some more. How about weapons?" All three men grinned mirthlessly. "Twenty-one flint-tipped spears," listed Barret. "One hatchet, rusty; one bread-knife, also rusty; one rifle, plus eight shells to fit and about thirty-five or forty that don't; one bayonet for the rifle; one automatic with one clip of shells; one clip of shells for an auto-rifle, but no auto-rifle." "We've got an auto-rifle," Leland put in, astonished. "We used all the ammunition hunting. We've got a pile of nondescript stuff, too, some of which might fit your regular rifle.

If it's a U. S. rifle, no good." "It isn't," said Barret. "I don't know what it is, but the auto-rifle shells won't fit it." "Any grenades?" said Marshall. "Don't be funny," growled the aide. "What else have you, Leland?" "The usual spears and odd implements. Also an electro-magnetic machine gun, one that we salvaged from the tank; three belts of shells for it; and, grand anticlimax, no batteries to run it." "Good batteries in the Icarus. That's good. What else?" "I've got an automatic with one unspoiled clip of shells, like Barret's. Also another we filled partly from the scrap heap, and two that are empty, and probably rusted to the point of uselessness. Fetishes in the house of the chief." He grimaced. "It sounds funny," said Marshall slowly, "but I think we have the nucleus of a very useful arsenal there. Now, one question; do the invaders fly the big ships any more?" "Never for scouting. For communication with the other cities, yes, since they haven't built any roads, but the turnies use ordinary planes. We never did develop the rocket to where it could be used for anything but a suicide torpedo, and the big ships don't use rockets at all. We don't know what makes them fly. But they never bother us. Just the planes." "That's all I want to know," said Marshall, and the hate-lightnings were hot in his eyes. HE STOOD at the western edge of the forest, the cool morning breeze playing capriciously around him, rustling the leaves over him and the shining Icarus. The recently arisen sun sent molten gold across the tops of the trees and transformed the distant city into a thing of impossible splendor. In the tanks of the ship, resting hidden at the far end of a newly-made aisle reaching back from the forest's edge, were twenty-three gallons of gasoline, with two and one-half gallons of Marshall's fuel added. His compressor had been active for a week, charging the secondary tanks with liquid air--the closest he could come to liquid oxygen, since he had no equipment for fractional distillation. He remembered how long that compressor had had to strain to liquify enough of the thin Martian atmosphere, and how many times he'd had to charge the batteries to keep it going . . . But the Icarus was no longer a space-vessel. The protective plastic had been knocked away in an irregular small patch just below the center of the forward port, and a hole burned through the wood with a white-hot metal bar (there were no drills available, and the composition could not be drilled by ordinary methods, anyhow). Protruding through the opening was the muzzle of Leland's auto-rifle, fully loaded, and on the control board two more clips collected from the scrap heaps of nearby communities lay ready. When asked why he chose the auto-rifle instead of the far more dangerous electro, he merely said "Noisier," and let his associates puzzle it out. Barret's women had repaired and repacked the ship's parachute. Behind Marshall, hidden watchfully in the undergrowth, were the twenty-one individuals of Barret's tribe; Barret himself was in a tree-top directly above. "See anything?" Marshall called guardedly. "Not yet," Barret's voice drifted back from the matted leaves. "They get breakfast in bed, the slobs. Wup--wait a minute--yeah, there's one. Coming this way, too." As if in confirmation, a dull droning became audible from the direction of the city. Marshall jumped quickly into the ship, slammed the port; then his head bobbed out of the emergency at the top. "Your men out of the way of my exhaust, Brains?" he asked. "Yup," said Barret cheerfully. "Here comes your lamb to the slaughter. He'll pass a little to the right, I think. He is the lousiest pilot I ever saw. Slipping and sliding all over the place." "That helps," said Marshall. "Okay. You know what to do." There was a tightening of the tension among the men as the emergency port banged to. From the west the roar of the powerful scout plane grew momentarily. Then it was blotted out in a deeper thunder and a lightning-bolt launched itself from the cleared aisle and swooped up. "Grab that!" Barret screamed from his tree-top, and his men scurried briefly with pails of dirt to put out the small blazes which the Icarus had started. Then they refilled the pails and slipped back into hiding, indistinguishable from the shadows. But from what Barret could see, hiding was unnecessary, for the enemy scout was paying no attention to the ground. The Icarus had shot up past him

so fast that the trim little plane was yawing and rolling madly in a cyclone of disrupted air. Abruptly its pilot made a hasty, sloppy turn and headed back for the city. There was an unaccustomed hand on that stick. Barret grinned in exultant admiration as the Icarus plunged by again, screaming, and then zoomed in front of it. Again the plane struggled with the warped air currents, losing altitude, and making frantic efforts to keep out of Marshall's way. It was fast, but not fast enough. In a moment the silver meteor was cutting across its path again, and the auto-rifle fired a short warning burst. At the sound of the gun the pilot seemed to lose what little courage he had. He dived frantically under the Icarus as it passed and roared for home. With each attack, however, he had lost altitude, and now he was forced to climb to stay in the air. Instantly the auto-rifle barked and the silver ship plunged into what seemed to Barret to be collision. Then it was swooping up again, and the enemy was fluttering down out of a stall. "Good boy!" Barret screamed, utterly unheard even by himself in the noise of the two fighters. "He's headin' this way! Git ready!" The warning was inaudible, but unnecessary; the men below were tense and rigid, waiting for the plane to ground. One more burst from the auto-rifle, one more terrible screaming swoop of the Icarus, and the turncoat's plane did a ridiculous little flip-flop and lost flying speed. It struck nose first in the earth about two hundred feet from the edge of the forest and turned gently over. Something began to crackle, and Barret howled incoherent commands. The men pounded from concealment and out across the open, the tall grass reaching almost to their shoulders, their heavy pails slowing them. Before the first tongue of flame had gained much headway, however, the incipient fire had been stifled in sand and dirt, and they were stamping at the grass around the plane. As Marshall's parachute boomed behind them over the woods, something struggled free of the overturned fighter and arose into view: it was the pilot, holding up his hands. There was no question but that the defeated pilot wanted to surrender. He stood as high as he could on shrunken, bowed legs, and held up four hands. Barret heard a deadly growl from his men, and then two shots in quick succession. He shrugged his shoulders fatalistically at the waste of ammunition. CHAPTER IV of PHOENIX PLANET THE COUNCIL MET underground now, for Marshall's army numbered three hundred, recruited from many miles around, and they had dug in under the site of Leland's old community. With every new clan that arrived, Marshall scanned the faces of the women, and when he turned away the hate-lightnings raged more powerfully than ever in his eyes. Hidden in the earth also was the Icarus, fully fueled, four airplanes patched together from ten wrecks and also fully fueled and a cache containing perhaps thirty gallons of reserve gasoline. Each plane had its own electromagnetic machine gun, supplied by the enemy, and slung beneath the wings crude bombs made of gallon tins or bottles and the powder of misfit shells. The latest addition, a two-seater, bore a huge oil-drum similarly loaded. It also mounted a miniature of the death-ray projector, but nobody knew how to use it. "We have an easy dozen pilots in the 'army' now," Marshall told the assembled chieftains, "and we'll use only those who have flown these particular types of planes before. It's unfortunate that the one invader we caught trying to fly a plane was killed before we had a chance to get some information out of him; however, his behavior and the ear-pads he was wearing tell us something very important--another weakness--" "What's that?" interrupted a brawny Pennsylvania miner. "They're afraid of noise." "What!" "That's right. I imagined that might be the case when I noticed that their own weapons are all silent, even the atomic bombs. It's my theory that they lived originally on a world where the air was thin, like Mars, and didn't carry sound as well. I had a hard time getting used to the added volume of sounds when I came back, and I'll bet that if you've lived on a world like that all your life, your ears would be abnormally sensitive, and any weapon that made an impressive roar would be terrifying beyond all considerations of its actual military effect." There was a brief silence. "I've got every confidence in you, seeing what you've done," Leland

said finally, "and I suppose that is as significant as every other little weakness you've spotted and used to advantage. But I don't see now how it's going to help us." "You will," Marshall assured him. "That's beside the point anyhow," the miner broke in again. "We got a trial on," and he waved a filthy hand at the pale young man sitting on the platform between Barret and Leland, now Marshall's chief advisors. "We don't want no turnies here. What they did once they'll do again. We got enough mouths t' feed." "I've heard his story," said Marshall, "and it's my opinion that he's a welcome addition. We need every man we can get, especially those with intimate knowledge of the invaders. Suppose we let him speak for himself." "Well," the young man began uncertainly. He was unpleasantly aware of all the eyes upon him, and obviously expected to be eaten when he finished. "First off, Mr. Marshall, you're right about that noise business. They hate it. They seldom fly the planes at all, and when they do they wear those ear pads for fear of the engines. What noisy machines they do have they make us run. Their own ships fly on a gravity mechanism; none of us understand it." "Let's hear what you got to say for yaself," the miner growled. The young man looked even more frightened. "I'm a turny, right enough. But I was just married when the fight began, and I--my wife--" he paused and swallowed. "When I found out that the invaders did want men for their--own uses, I took her and went. I didn't want her to die for humanity when--when humanity was doomed anyhow." "I wish I'd done that," Barret said very bitterly, and all eyes turned in astonishment to the key man. The turncoat gained confidence. "All of us know now that the invaders plan to kill us, too, when they're finished with the--the outsiders," he said. "There's no safety inside or out of the cities. A lot of the turnies wanted to come over to you, but they're afraid to. The invaders have a regular little propaganda machine--it's entirely unconscious because they believe it as much as we do--a sort of legend about the ferocious cannibals that live outside the cities. I knew there was no more safety for my wife with the invaders, and I preferred to take my chances with you. When I was assigned to scouting, I took a small bomber instead--the one you shot down--and tried to get us both out--" He paused a moment, lines of pain around his eyes. "I don't know how they caught on, but they did. They killed her as we were trying to get off--with one of those little hand rays. I escaped. . . And by the way, they're beginning to get worried about this constant disappearance of planes." Again there was a pregnant silence, then someone arose to ask a question. He never got it out of his mouth. There was a pounding on the wooden stairs and a scared lookout poked his head in. "They're coming!" he cried. "One of the big ships, the spaceships. Raying the forest to the northwest." What followed was apparently pandemonium, but there was system in it. "Duclo, man the electro at point three," Marshall directed crisply above the uproar. "Henderson, you too. Dennison, Anders, point five. No planes up this time--too easy targets for the ray. Brains, Paul, this way." The room was miraculously empty except for the turncoat. He looked around, frightened, then went down the stairs at the back of the room. They led to the hangers. Marshall and Barret, leaving Leland with a small force to guard against a possible surprise from the ground, ran a specified distance to the north from the entrance tunnel and clambered like sailors up a dangling rope-ladder to a platform in the tree-tops. An electro, with attendant battery and belts of blown-steel ammunition, was bolted to a plank on a branch which ran in front of the platform. Cautiously Marshall pushed the leaves aside, Barret peering beside him. IT WAS THE FIRST of the monstrous craft of the invaders that he had seen, and again he felt the old chill of helplessness. The Icarus, though cramped, was no baby for size and the Daedelus had been fully twice as large; but these things, as Barret had once suggested, reminded one of the long-lost airship von Hindenburg. The wingless metal cigar was flying low, and slowly, and there was a peculiar distortion about it which suggested that space itself was being warped to keep its huge bulk in the air. Before it two broad white beams, intense even in full sunlight, were methodically sweeping the forest, and where they

touched, the green summer forest took on the withered brown of late autumn. "You can see they're no fighters," Barret whispered, as if afraid the aliens might hear him. "They ought to be about two thousand feet up, out of range, and they ought t' have attacked at night." "Good for us that they didn't," Marshall answered in similarly low tones, attaching a belt to the breech of the gun. "I have a hunch that the range of those rays is limited. These damn cartridges are rusty." "Martin brought them," Barret said. "They must be eight years old. Prob'ly a lot of 'em dead. I oiled 'em." "Never mind about the dead ones. The gun doesn't fire by percussion anyhow, and as long as the magnets hold out we're okay. The deaders just won't go off when they hit, that's all." He slipped a red-stained six-inch shell from the belt and examined it cursorily. "Just pray they don't stick in the barrel." There was a sudden muffled roar and then a crashing as a camouflage curtain rushed back, and a winged shape zoomed up from the forest. "I thought I said no planes," Marshall snapped. "Who is that fool?" "Dunno. But we'll have to get the big baby now. He's seen the location of the hide-out." Sure enough, the metal monster had swung slowly and was moving with unnecessary caution in their direction. A long white beam lashed out at the frantically climbing ship, but was a little short. Another ray searched the ground deliberately before the advance of the ship, and the forest crackled and sighed and withered. "Ready," whispered Marshall. Barret held the belt loosely in his hands, alert to start feeding it when the firing began. Already Duclo's gun was going, sending a little silver stream into the air toward the invader. A line of small explosions, about the size of hand grenade explosions, stitched its way redly along the metal hull. Suddenly it found a port and the explosions disappeared inside. The great thing jerked spasmodically, then righted, and the deadly white beam swept over toward point three. The stream of slugs swung directly upward and continued to flow, aimlessly, and a gaping hole was pounded among the trees to the north. Marshall ground his teeth at the waste of precious shells, and thought also of cheerful Duclo and his keen gunner's eye. Then his own gun was also within range. It trembled silently and little whooshes came from it as the air rushed in at the back of the barrel. Barret fed the belt steadily into the breech. Marshall's eye was as good as anyone's in the "army," and in a moment he had found the broken port where Duclo's gun had been firing. Again the big ship floundered uncertainly. "I don't think we're hurting anything," Marshall muttered over the roar of dinitron. "But they're scared, right enough." The aliens did seem to be confused. Dennison's gun had begun firing from point five, directly below it, pounding unwaveringly at a trap-door which was blown away almost immediately. The long white beam jerked downward, but could not point at a small enough angle to reach the imperturbable gunner. He was protected by the backward curve of the ship itself. There was no smoke from the electros and the aliens seemed uncertain as to the source of Marshall's miniature barrage. He moved the gun a little, seeking a port farther forward. A smaller ray leaped abruptly at him, falling slightly short, but he could feel a little of its effect. A wave of terrible nausea swept him. Then he swung the gun upon the white disc of the projector. Nothing happened. He moved the muzzle out of line and the explosions dotted the hull. Again he shifted to the ray orifice. Nothing happened. The giant craft was moving ever closer, and in the growing glare of the unwinking white eye the two men could barely continue firing. The sickness was unbearable . . . his brain whirled . . Then he was gratefully conscious that the horrible light was no longer playing on him; there was a roaring in his ears, and someone's voice-- "Marshall! Are you okay? We got him! Wake up, man!" Barret. Yes. He opened his eyes and struggled to his feet, still weak from sickness. "What--how--" "The plane. The turny was flying it--it was the one with the ray-tube, and he knew how to use it. How do you feel?" He shook his head to clear it. "I'm all right now. Come on, let's go down--I want to look it over. Is it all right?" "Perfect condition, except for one part where Duclo and us were shootin'. Dennison was just blowin' out the bottom of the cargo-hold--didn't harm it otherwise. All the

damn' monsters inside it are dead." They clambered down the ladder. CHAPTER V of PHOENIX PLANET THEY EXPECTED ANOTHER attack from the city, but apparently the invaders were too impressed by the fall of their first battleship to risk sending another. A full four days later one plane was sent out, but by that time everything had been moved underground and painted dark green to boot against further contingencies. After the plane was out of sight of the city they sent two of their own up after it. As soon as the attackers were within sight, the scout headed for a clearing and landed! Suspiciously, the two pilots circled over the spot. There was but one man in the enemy ship, and he was standing, hands upraised, obviously surrendering. They remembered the roasting Marshall had given the clan at the beginning of the career for shooting the invader when it had surrendered. One landed, the other circled watchfully overhead just in case. Subsequently they brought the man to Marshall, flying his own ship under the vigilant guns of the others. Marshall was still a little sick from the after-affects of the ray, and he was puzzling out plans to send to another rebel group which had contacted him from Atlanta, and he was annoyed. "Turny, boss," said one of his men. "Landed his ship when we jumped him. Says he wants to come over." The turncoat burst into rapid speech, as if afraid he would not be allowed to finish his story before being shot. "There's a revolt movement among the few of us in the city," he jerked out as if reading. "I was sent out to scout, and I'm supposed to bring back details of your position to the invaders. I'm also supposed to tell the rest of the humans whether or not you'll support the revolt from outside." Marshall looked at him. He was confused and tired; he had been under a constant strain for 48 hours, and the message from Atlanta had forced him to reorganize his plans on a large scale; and he was still a little sick from the ray. What should he do? Young Taylor was all right, but he agreed with the general blanket opinion concerning turnies. They were the scum of the earth, and not to be trusted. This one was typical: fat and soft, and crow's feet under his beady eyes, and all out of breath from unwonted action. But a few more planes as a gift wouldn't be at all harmful, and any confusion the turnies might cause inside the city would be all to the good. He closed his eyes for a moment. Perhaps he could set a night for their uprising, and then stay right here while they uprose. If they didn't, then he wouldn't have flown all his equipment into a trap. If they did he'd have plenty of time to mobilize and attack while there was still confusion. He opened his eyes again and looked at the turny. The man's own eyes were glittering with fright. "How many planes can you get us?'' "Ten, maybe." Marshall was conscious that Barret and Leland were watching him nervously. "We need twenty-five at least, and no maybes. Tell your pilots not to worry. Every man that brings a plane here will be taken care of properly." By which he meant execution, although the turny thought otherwise. "We don't trust you bloodhounds, of course. We want the equipment before we believe anything. Now get. No, not in the plane. You can walk back to the city. Tell them you were shot down and escaped." "But, boss," put in Barret without thinking. "Shut up," snapped Marshall. Then, "I'm sorry, Brains. I'm tired, that's all. Beat it, you." The turny obviously did not like the prospect of walking such a distance, but every eye in the room was on him, and there was no sympathy in any of them, only hatred--hatred which seemed to find a focus in the eyes of this giant Marshall. He turned hastily and left at a comical half-trot. There was a brief silence. "I never saw you make a mistake before, boss," Barret said slowly and carefully. "Don't you know that swine'll bring every big ship in the place back here, now that he knows where we are?" Again silence, tense, everybody looking at Marshall. He closed his eyes, then opened them again and smiled tiredly. "Yes. Yes, you're right, Brains. I've forced my own hand." He sat still for a moment, trying to think. He saw dimly what was to be done. "Never mind stopping him. Let him go. We have five planes in perfect condition; one rocket ship that smokes badly but otherwise is okay; and an invader's ship nobody knows how to run. Did anybody ask Taylor about that?" "He can't, either," said Leland. "But he showed us how to

use the ray-tubes, and we've mounted three of the small ones on the other planes in the same way it was on the bomber." "Good. Are there any more?" "Half a dozen, besides the big ones." "Have one put on this new buggy. Did you plant the big ones at the defense points?" "All there were." "How many?" "Three. There's one more that's busted. Taylor's repairing it, but he says we've got just enough powder to run the three we have, and no more, so we'll have to keep it for a reserve. We put 'em all on the city side and the electros were transferred to the other spots." "Keep the electros scattered--we don't want them all put out of action at once." "I thought of that, or rather, Martin did." "That's what I like to hear. Well, we're not going to wait for the turny to bring the big ships back here. It'll be night in half an hour, and we'll leave promptly at eight." There was another tense hush. "We're attacking the city?" "We are." And by this move Gregory Marshall, saved his bacon as a leader of the battle for the Earth. There was no doubt of its wisdom, no thought of the insufficiency of their weapons, only a fierce exultation at the prospect of at last striking a direct blow at the invaders. Every one of these men had lost family and friends in the invasion, and the prospect of revenge reinforced the confidence in their leader two-fold. "Only God and Gregory Marshall know what's flying, and God doesn't know much," Barret had said once, and everybody agreed with him. The underground retreat was once more a place of ordered, feverish preparation. THE CITY GLITTERED in the cool night air, demonstrating the invaders' ignorance of blackout technique. But then, perhaps they thought darkening the city too extreme a measure for the danger. In the squat pillboxes looking east, men and monsters crouched vigilantly over searchlight-like mechanisms, waiting as they had waited for many months for sudden attack they knew would never come. As soon as the sun had set three of the great spaceships had left for the hide-out of the annoying guerillas, the returned turncoat guiding them. As yet there was little sign of activity; only an occasional distant flash of a ray, and a dull droning as if planes were flying somewhere far off. Probably beating a hasty retreat. The invaders were nervous, but exultant. Those sounds meant the final destruction of this dangerous colony of men . . . From the darkness two miles above, two strange objects came twisting and tumbling. Had anybody seen them, they would have identified them as glass jugs which had probably contained cider in that remote era eleven years ago. Now they held a grey, granular substance, and they dropped silently toward the center of the city. A few seconds later two more followed, then an enormous oil drum, and finally a perfect hail of blown-steel cylinders about six inches long, a little rusty, but glistening with a thin film of oil. It was as if a junkman's truck had been overturned in the troposphere. Gravity clutched at the objects, and they fell faster through the dark, cold air. They dropped abruptly out of the night into the center of a broad square, landing in an area of about three hundred yards. The glass jugs went off immediately, sending deadly splinters hurtling in all directions. The gasoline drum buried itself deep in the ground and then burst with an astonishing scarlet concussion. The racking blast of dinitron smashed windows throughout the city. A towering metal spire wavered unsteadily and began to topple like a vast ten-pin. It was brought up short by a smaller, sturdier building, and seemed to break over it in a rain of brittle shards. The smaller building buckled and a heavy decorative cornice plunged into the street below. A number of squat, four-armed forms ran for cover; a larger number ignored it and sat rocking or rolled on the ground, clutching their ears and screaming. The electro shells began to patter down in a metallic hail. They fragmented easily and did little damage, being originally designed for use on infantry alone, but they made fully as much noise as the glass jugs. In the pillboxes, arcs flared and buzzed, and intense white shafts of light flared skyward, but nothing was visible as a target but the mocking stars. One of the beams brushed a roof-top, and a glass jug landing there failed to go off when it hit; the beam swung, caught another missile, followed it down. That one did not go off either, but the beam wiped a shaft

of death along a packed street of terrorized aliens, and did more damage than the rest of the attack put together before other aliens caught the frantic operator and swung his weapon up again. There were no further attempts at neutralizing the bombs. Another oil drum buried itself and blew up thunderously at the very base of the smaller damaged building, and again fragments roared into the streets. The white rays crisscrossed futilely through the empty sky, while the roar of plane engines gave the defenders visions of an immense armada far above. The jugs and cans stopped falling, but the electro shells burst ceaselessly, and sticks of raw explosive began to follow them. In the distance one of the three spaceships lumbered hastily homeward; the other two had been felled mysteriously by beams like their own, which had leapt from the midst of the featureless dark woods. The survivor climbed, deadly beams sweeping the sky for the black-camouflaged attackers, but these rays had not the range of the projectors on the ground and served only to mark the position of the metal craft. A silver thunderbolt swept down out of the blackness on flaming wings and vanished again, and a heavy casting smashed through the nose and burst in the control room. The ship faltered, sank and was hidden by the trees, and men swarmed into it. There was a last ear-splitting barrage of explosive bullets and then the raid was over. The screams of the defenders in the abrupt silence made dissonant counterpoint over the dying dreadful pedaltone of the retreating planes. The attack had lasted barely fifteen minutes, and the actual military damage, except for the loss of the spaceships, had been slight. But nobody counted the damage. There was too much terror in the city. The blow had been too much bigger than had been expected; too quickly struck, and too mysteriously ended. This was nothing like mild guerilla warfare upon the planes of the turnies; it seemed like a revival of the bloody battles of eleven years before, when the sky had been darkened by planes over the strongholds of the invaders. For none of them had seen the attacking force, and so they had no way of knowing that it consisted of four scout planes, one bomber, and a smoking one-man spaceship. GREGORY MARSHALL stood in plain view on the eastern edge of the forest and watched the invaders' spaceship settle slowly and unsteadily to the ground. It lay quiescent for a moment, its green-painted sides seeming to blend with the surrounding grass; then there was a clash of metal in the sunlight as the entrance port moved on massive gimbels and young Taylor emerged. "I've got it," he cried exultantly. "Little slow on the controls, but I can run it." "Good," Marshall's deceptively soft voice answered. "Train three more men as quickly as you can. I got a message today from Pittsburg; they have one there as well, and in Atlanta there's two more. Send out the instructions as quickly as you can." He looked west, toward where the terrorized city was hidden by the green, quiet trees, and the hate seemed to leap from his eyes. "Brains." The key man stepped out from behind him. "Remember when you told me we could beat the invaders if we had their weapons?" "Yeah," said Barret in quiet glee. "We got 'em now, eh, boss?" "We have. Send your own message with Taylor's. Tell the other groups to bring their ships here as soon as they can fly them well enough. We've four of the atomic bombs here, one on each ship, and they probably have one per ship as well. That seems to be a custom of the invaders' war office. One should be enough for this fancy collapsible city. I'll lead in the Icarus; I'll meet them all six miles above this spot on a date to be set by them. If they meet any enemy ships, tell them to keep away; the enemy knows the ships and right now can use them to better advantage than we can." "Right, boss," said Barret. He stood for a moment, looking at his giant leader, something akin to worship in his eyes; then he grunted and melted into the forest. Gregory Marshall remained where he was and looked at the captured vessel; and his thoughts were, strangely, on Mars. He was remembering those ten years, and those hopes of home, and he was pleased with the way he was winning his home back again. This was really but an extension of the Martian fight. He had come back across millions of miles of space to carry it on, but all in all it was still just the fight for home; and he was winning that home back, for

himself and humanity . . . But Gregory Marshall knew suddenly, with tired clarity, that humanity had not figured in this battle or in his considerations. It was only hatred. Revenge. And it seemed to Gregory Marshall an empty, sterile achievement, because there were certain things he could never win back . . . The forest was gone. The rocket jets of the battered Icarus roared behind him, and below in the packed streets of New York a sea of people turned startled faces upward. LaGuardia Field loomed with the swiftness of a dream, and the parachute boomed--the shock of striking the Earth--his feet on the green turf for the first time in twelve years and a woman's voice, crying "Greg, Greg! You're back! Darling, you came back!"-- The vision closed about him as a hand closes, and there was only the tall wild grass, and the whispering trees, and the alien bulk of a great spaceflyer. All hatred was washed from him, and the Earth was empty, for humanity would be saved, but home as Gregory Marshall knew it was dead forever. Perhaps he would not even see the final triumph. Still, man's chances were better now than they had been before Marshall's homecoming. How long would it be before the last monster was driven from the blue star? It did not matter, so long as they were all driven away; for, after all, in the midst of the greatest changes, old Earth was home.... He turned and disappeared among the trees.

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 out- side, 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 bull'seye 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 sec; 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 conjunc- tion, 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 per- haps 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 de- tached 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. Stand- ing 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 atmos- phere 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 har- ness 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 inter- planetary craft, Meikiejon's ship had no overall hull. She con- sisted 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 fa- miliar 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, snap- ping 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 par- alyzing 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 bad 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 unremember- ably 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 in- tense 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 as- signed 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 sin- gle spark of hope which the non-medical people on the Moon were constantly holding out toward Sweeney as the sole rea- son for his existence. The facts were simple and implacable. Sweeney was an Adapted Man -adapted, in this instance, to the bitter cold, 11 the light gravity, and the thin stink of atmosphere which pre- vailed on Ganymede. The blood that ran in his veins, and the sol substrate of his every cell, was nine-tenths liquid am- monia; 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 micro- surgery, competitive metabolic inhibition, and perhaps fifty more whose names he had never even heard -which collect- ively had been christened "pantropy." The word, freely re- translated, meant "changing everything" and it fitted. As the pantropists had changed in advance the human pat- tern 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 be- fore they had passed the zygote stage like one-celled animals, each one biassed 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. Alfven 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 experi- enced the birth trauma or been exposed to the Oedipus com- plex. He was a law unto himself, with most of the whereases blank. He noticed, of course, that Alfven failed to show up when his next round was due, but this was commonplace. Scientists came and went around the great sealed cavern, always ac- companied by the polite and beautifully uniformed private po- lice 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 periodi- cally 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 recap- tured 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 recap- tured -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 ques- tion 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 (ex- cept 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 Sween- ey 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

ex- pectation, and Sweeney's training helped to make him sus- picious 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 unex- pectedly 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 mon- itoring chamber on some trumped-up errand hardly a minute later. There were many such instances, but inevitably Sween- ey 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 com- mand 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 nor- mal 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 tempera- ture in the col was considerably below what had been allow- able 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 anony- mous. 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 an- ticipated. 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 Gany- mede had hardened him some. The pictures bad 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 bomb- shell you are. You must be Shirley Leverault's child, thenbut 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 ex- plosion 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 oc- casionally out here. "There were still some intercom lines left through to there; my mother used to spend a lot of time lis- tening 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 ac- cumulator 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 did." 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 re- spect, 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 Rob- ert 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." "/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. Rull- manor 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 scarce- ly bothered to notice it. Even 'the natural gravity and circulat- ing, 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. Some- one 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 mum- bling 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 com- mitted to memory every gesture, mannerism, dimple, shad- ing, 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. Micro- scope 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 es- sentially 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 noth- ing. Both the girl and Rullman were now also seated, at the bench, examining with microscopes the little puddles of di- luted blood Mike had taken from Sweeney. "Type 0, 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, Brad- bury-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 finger- tips. After she went back to the bench, Sweeney heard the sound

again, and saw her brush her own left middle finger- tip 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 indi- vidual, 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 ques- tions, 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 be- come just as obvious to the Ganymedians; only the plainly pathological introversion of his character as a whole had ex- cused him even thus far from a suspicion that he was duck- ing the hard ones. Sooner or later, Sweeney "fas 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 tele- pathy. 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 onethree and a half Earth days long, while the satellite was on the sunward side of Jup- iter, 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 M6bius- 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, espe- cially since they didn't know you were listening? It's sense- less." "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 re- member 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 rail- ing. 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 dan- gerous; 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 in- stance, 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 bad. 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 remem- ber 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 be- fore 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 bad protected it this long; nobody defends him- self, 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 couldas 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 dis- tant, heaped range on the other side. "They wanted you to think that everything your people had planned and done had come to nothingthat 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 ifd 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 shoul- ders. 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 nowlies, and nothing but lies! You've got to forget themforget them alljust 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 himit 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 be- coming 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 con- trary. In a small group like ours, the strongest and most im- mediate evolutionary influence is genetic drift. Unless we took steps to prevent it, there'd be a loss of unfixed 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 individ- uals: everybody would be alike in some crucial and abso- lutely unpredictable respect. No tabu is worth that kind of out- come." 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 bad not minded. He knew he was ignorant. Be- sides, 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 col- ony, with the sole possible exception of RuUman. 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 trueand at least everything be had been able to check had passed that testhad 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 peo- ple for Adaptation. There was no commerce-raiding going on now, that much was certain, and Sweeney was inclined to believe Mike's de- nial that there had. ever been any in the past. Once one under- stood 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 ob- jection, 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 nor- mal adult human being into an Adapted Manpantropy had to begin before conception, as it had been begun with Sween- ey. 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 himthough they had never made it directlythus 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 Ruttman 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 meantimewhile Sweeney waited, with a fatal- ism disturbed only by Mike Leverault, for Rullman to see through him to the other side of the gouge which was Sween- ey's frigid tangled substitute for a human soulthere re- mained 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 secre- cy. 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 com- mitted on Earth, it had been committed by the normal Earth- men 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 ques- tion away rather than deny it. Perhaps the crime had been his alone, since there was nobody else who could have com- mitted 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 es- sential 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 paniropy was a crime, that was what it was; and the Port cops had already told him that he must not fail to brins. back Rullman, no mat- ter how grievously he failed to fulfill all his other instruc- tions. 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 com- pounded that identical crimeby creating Sweeney? Belatedly, he quickened his pace. Mike had already disap- peared under the lowering brow of the great cavern. He. could not remember noticing, now, which of the dozen smaller en- trances 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 labyrintb, 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. MemorizatioTi was the only key, for no maps of the maze existed, and the colonists had a strictly en- forced law against drawing one. Sweeney had perhaps half of the maze committed to mem- ory. If he did not meet someone he knewfor after all, no- body was hiding from himhe 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 froln 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 fol- lowed him, as silently as possible. The noisy ventilation sys- tem 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 re- lated 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 al- most 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-conductas was evi- denced by the fact that Sweeney was travelling the same course without making any such noise. Indeed, Rullman him- self 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 noisewhich Sweeney could now identify definitely as that of pumps, many of themalso 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 gravita- tional 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 stab-well. Something, Sweeney thought, was radically wrong with the behaviour of the thermody-namic laws down here. He slouched cautiously ahead. After only a few steps, past the first of the laboring mechanismsyes, it was coldest by the shining coils, as if cold were actually radiating from them he found an undeniable aJrlock. 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 rightheat pumps. Their coils were frost-free only because there was no water vapor in Gany- mede'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 airlockand that RuUman 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 en- vironment of Ganymede as Ganymede's environment was to Earth's. A is to B as Bis towhat? 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 embra- sure which Sweeney had overlooked in the first shock. They said: r 59 Degrees F. Millibars 047 0140 Dew Point 02 Tens rnrn 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 measure- ment could have any meaning. Sweeney ran. He was no longer running by the time he had reached Rull- man's office, although he was still thoroughly out of breath. Knowing that he would be unable to cross back over the top of the pantrobe 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 ad- ditional discoveries which bad 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. RuUman 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," Rull- man 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. Rullmanwe'll be through in time." "And another thingoh, hello, Donald. What's the mat- ter? 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 sec- onds," 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 edu- cational methods leftwell, the cliche 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 111 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 registeror 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- prones. They are as susceptible to cancer as hemophiliacs are to bleeding to deathand 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 I" 3 The crisis on Ganymedethough 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 Jupiterand hence his fif- teen-fold family of moons and moonletsmakes 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 Gany- mede. 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 "hu- midity," 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 withdraw- ing entirely under the mountain; but for many reasons that course was no longer possible. There were now semi-perma- nent installationsweather stations, observatories, radio bea- cons, bench-marks and other surveying

monumentswhich 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 Ju- piter proper. We can expect similar effects, to scale, on Gany- mede. There's going to be trouble no matter how well we pre- pare. 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, every- body listened. The wind was audible even down here, howl- ing over the outlets and intakes of the ventilation system, car- ried, 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 sighan involuntary intake of breath against 'the easily imagined futurepassed through RuUman's audience.
He grinned. "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 parti- cularly 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 giv- ing us any leeway. "For those of you who know about the project only in out- line, 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 fittedif judgment based upon a single brief look could be trustedeither 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 noth- ing: it had something to do with the colony's long-term ar- rangements for circumventing the loss of unfixed penes. Pos- sibly-nobody would be less abTe to assess the possibility than Sweeneythe only connection this fact had with the "pro- ject" 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 im- portant 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 indi- vidualistnot bynature, but by design. Perhaps Rullman sensed it. Whether he did or not, the as- signment he gave Sweeney might have been perfectly calcu- lated 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; orto 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 crys- tals 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, con- stantly 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 jour- ney, 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 bur- rowed 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 be 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 arbitary 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 ad- mire 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 be- side the point. Any response would be inappropriate, since not one of the five signals fitted the actual situationdespite 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," what- ever that was, would go throughbut that wouldn't save the colony. It would take Earth a minimum of two generations to breed and mature another Sweeney from the artificially main- tained 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 lessand 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 consider- able amount of deuterium on Ganymede, some of it locked in the icy wastes of Neptune's Trident, a lesser amount scat- tered 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 alsothe probability was about ~s -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 com- mon 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 com- panionship, 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, ha 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 con- gruence made a classic example, had he been able to rec- ognize it, of the literary device called "the pathetic fallacy" but Sweeney had never read any fiction, and recognizing na- ture 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 Meikie- jon 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 pur- posesmysterious though they remainedor for his own, essentially hopeless though his own appeared to be. But any signal would take him off Ganymedeif 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 sin- gle word of condemnation of Sweeney had yet been forth- coming 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 iso- late an Adapted infant,

prevent him from becoming a human being at all, if you've sufficient ill-will to want to. Your be- havior 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 dividedthat is, would not change completely. And so here you are, trying to play both ends against the mid- dleyou yourself being the middleby betraying your mas- querade 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. '1 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 youas 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 fo- cussed, automatic respect for persons standing in loco par- entis. He discovered, suddenly, that he was furious with Rull- man. "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 waat 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 ef- fectively 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 hopelessand if I hadn't carefully picked the one message to send to Meik- iejon that I thought left the colony some hope. I'm not strad- dling. 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, l's not aloneand 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 backyou in particular, Dr. Rullman." "Butthat's common knowledge, Donald. All of it." "Maybe so. But it isn't common to meand 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 thunderstnick than he had when Sweeney made his original announcement. "They like to ap- pear 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 im- mune to

spying, because an Earth spy couldn't live here with- out 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 our- selves 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 be- side 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 pre- vent it, but perhaps he's given us an instrument for repairing it." "Meaning me?" "Yes. Ringer or no ringer, the blood you carryand the geneshave been with us from the beginning, and I know how they show their effects. I see them now. Sit down, Don- ald. 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, with- out 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 iq the Poconos by embat- tled 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 en)oyed legal protections not available to other private firms engaged in interstate com- merce. 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 amor- tization, Congress almost never invoked the Act against any Authority. Conseq.uently, 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 in- creasing at the rate of ten per cent a year. Some of the take went into the development of new facili- tiesmost 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 prertises. As the Au- thorities 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 operationswhich, almost alone among their projects, always showed a losstba.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 amortiza- tion of loans, no profits from the laws allowing them fast tax writeoffs for new construction, no profits from the indefi- nitely 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 at- mosphere flying for years, but the Greater Earth Port Autho- rity operated under its own set of precedents; it made land- ing 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 farces of the United States. It was not difficult to do, since the Greater Earth Port authority was actually a holding com- pany embracing every other Authority in the country, includ- ing 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: terrafonning. Terraformingremaking 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 Oceanonly a pittance to Earth, after all, and not 10 per cent of what would be needed later to terra- form 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 thap 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 re- coveredfor maintenance. And what, after all, the Authority asked reasonably, was the alternative? Nothing but domes. The Greater Earth Port Au- thority 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 re- luctance 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 pul- lulating 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 redisoover 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 modi- fying the human stock genetically to live on the planets as they were found, rather than changing the planets to accom- modate the people, had been old with Olaf Stapledon; it had been touched upon by many later writers; it went back, in es- sence, as far as Proteus,-and as deep into the human mind as the werewolf, the vampire, the fairy changeling, the trans- migrated soul. But suddenly it was possible; and, not very long afterwards, it was a fact. The Authority hated it. Pantropy involved a high initial in- vestment to produce the first colonists, but it was a method which with refinement would become cheaper arid 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. Pan- tropy, 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 ini- tial 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 skyand will be unable to return to Earth until after he dies, if then! Yes, even now there are plans afoot to change inno- cent 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 formtfavesties 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 expenseis called "pantropy." It is al- ready 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 Gany- mede'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 II'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 wireif 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, arid 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 pro vided 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 explor- atory 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 answernot 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 thatwell, 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 condi- tions. 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 betrayedeveryone! 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 colo- nize 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 childrenjust a small numbertrained to operate it, and adapted forwell, for someplace. 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 outeach 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 'seed- ing 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 colo- nists 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, growl- ing 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 high- lands 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 alum- inum 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 calibrea 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 ini- tiative, and was gathering strength. It had developed into a running stalemate. Though the in- surgents 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 evi- dently 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 inaccur- rate. The frequent starshells told their own story of bad visi- bility 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 dispo- sition. They were there, almost surely, because they had de- duced that Sweeney was leading the insurgentsbut they showed no desire to draw in and give Sweeney a hand. In- stead, they stood off, a little inside the orbit of Callisto, about 900,000 miles from Ganymedefar enough to give them- selves 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 . . . prob- ably 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 mo- ment 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 com- prised 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 ma- chines 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 disaf- fected colonists, a "Loyal Ganymedian Underground" or equivalent. Earth would assume, and would build the assump- tion into the computer, that many of the

colonists were dis- satisfied 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 mat- ter 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'a 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 thathe couldn't come down here and join my supposed underground group even if the idea oc- curred 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 toolsrpicks, adzes, sledges, spikes, coils of line rapidly unwindingbut it was se- curely strapped down. The miracle of fireworks chemistry Cand .specifically, Ganymedian chemistry) still slumbered in- side 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 Meikie- jon even existedthough the radio-telescope showed that he was still thereSweeney 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, plant- ing 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 stragetic move- ments 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 v/aiting 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 loy- alist 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' re- volt 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 dobut 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 offthe Earth ships were herebut it still looked as though the prep- arations 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 are-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 unwind- ing from around the four big snowmobile tires like an ex- piring 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 onthe ground became less littered as it rosewas 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 slob- ber 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, comparative- ly. Gritting his teeth, he unbuckled the safety and scrambled back to the radar set, checking the aluminum drum auto- matically as he went. There was much more sky showing on the screen now. It was impossible totriangulate 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 rightthey'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?" Mikesaid,"We're" Bang! Mike grabbed for the switch, and the engine died. "here," she finished, and then,

amazingly, began to gig- gle. Sweeney swallowed, and then discovered that he was grin- ning, 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 be- fore. 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 mas- sive, gnarled trunks, were the little instruments whose busy electronic chattering made this spot sound like a major mili- tary encampment to the ships lying off Ganymede. Photo- graphs, of course, would not be expected to show it: the visi- ble 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 ex- pended, and power sources moving aboutand 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 min- utes 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 back- wards, 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, sup- posing 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. Sween- ey 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 sur- vival 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 bombfor 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, espe- cially when all the instruments in the "encampment" had stopped transmitting simultaneouly 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 com- pounds and low-grade chemical explosives. But by that time, the survival ship would be gone beyond all possibility of trac- ing 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 cheerfullyand quite as tune- lessly as Rullmanand continued to plod north. On the other side of the pole, the Gouge was supposed to continue to be- come shallower as it proceeded into the Jupiter-ward hemis- phere of Ganymede. There was a twilight zone there, illumi- nated by the sun irregularly because of libration while Gany- mede 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 wo'Jld 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, be crossed the north pole. Nothing but peasants. At last be 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 desolatebut 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 un- spoken, but there was no doubt that Mike had fathomed it. But RuUman was no longer on Ganymede to share its beau- tiesthis 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 shipand taken his ex- portable knowledge with him. He had been, Sweeney knew, a great man. Greater, per- haps, 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 soiltfie 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?"

James Blish

SKYSIGN

CONTENTS

Und ein Schiff mit acht Segeln
Und mit fünfzig Kanonen
Wird entschwinden mit mir.'
Pirate-Jenny:*The Threepenny Opera* .

I

Carl Wade came back to consciousness slowly and with a dull headachy feeling, as though fighting off a barbiturate hangover - as under the circumstances was quite possible. He remembered right away that he had been one of the people who had volunteered to go aboard the alien spaceship which had been hanging motionless over San Francisco for the last month. The 'lay volunteer', the Pentagon men had insultingly called him. And it was likely that the aliens would have drugged him, because to them, after all, he was only a specimen, and therefore possibly dangerous

But that didn't seem quite right. Somehow, he could not bring his memory into focus. He hadn't actually been taken aboard the ship, as far as he could recall. On the night before he had been supposed to join the volunteer group, in honour of his own approaching martyrdom (as he liked to think of it) he and some friends from the local Hobbit Society, including the new girl, had cycled up to Telegraph Hill to take a look at the great ship. But it had only just continued to hang there, showing no lights, no motion, no activity of any kind except a faint Moon-highlight, as had been the case ever since it had first popped into view in the skies over Berkeley - it responded only to the answers to its own radio messages, only to answers, never to questions - and the club had quickly gotten bored with it.

And then what? Had they all gone off and gotten drunk? Had he managed to get the new girl to bed and was now about to have one of those morning-afters beside her? Or was he in a cell as an aftermath of a brawl?

No one of these ideas evoked any echo in his memory except old ones; and a persistent hunch that he *was* on the spaceship, all the same discouraged him from opening his eyes yet. He wondered what insanity had ever led him to volunteer, and what even greater insanity had led the Pentagon people to choose him over all other saucerites and other space nuts.

A vague clink of sound, subdued and metallic caught his attention. He couldn't identify it, but somehow it sounded surgical. As far as it went, this matched with the quiet around him, the clean coolness of the air, and the unrumpled, also apparently clean pallet he seemed to be lying on. He was neither in a jail nor in the pad of anybody he knew. On the other hand, he didn't feel ill enough to be in hospital ward; just a little drugged. The college infirmary? No, nonsense, he'd been thrown out of college last year.

In short, he*must* be on the ship, simply because this must be the day after yesterday. The thought made him squeeze his eyes still tighter shut. A moment later, further speculation was cut off by a feminine voice, unknown to him, and both pleasantly sexy and unpleasantly self-possessed, but obviously human. It said:

'I see you've given us his language, rather than him ours.'

'It cops out on - rules out - avoids - obviates making everyone else on board guard their tongues,' a man's voice replied. 'Man, I really had to dig for that one. He's got a constipated vocabulary; knows words, but hates them.'

'That's helpful, too,' the woman's voice responded. 'If he can't address himself precisely, it'll matter less what*we* say to him.'

Man, Carl thought, if I ever get that chick where I want her, I'll sell chances on her to wetbacks. But she was still talking:

'But what's he faking for, Brand? He's obviously wide awake.'

At this Carl opened his eyes and mouth to protest indignantly that he wasn't faking, realized his mistake, tried to close both again, and found himself gasping and goggling instead.

He could not see the woman, but the man called Brand was standing directly over him, looking down into his face. Brand looked like a robot - no; remembering the man's snotty remark about his vocabulary, Carl corrected himself: He looked like a fine silver statue, or like a silver version of Talos, the Man of Brass (and wouldn't Carl's damned faculty advisor have been surprised at how fast he'd come up with that one!). The metal shone brilliantly in the blue light of the surgery-like room, but did not look like plate metal. It did not look hard at all. When Brand moved, it flowed with the movement of the muscles under it, like skin.

Yet somehow Carl was dead sure that it wasn't skin, but clothing of some sort. Between the metallic eye-slits, the man's eyes were brown and human, and Carl could even see the faint webbing of blood-vessels in their whites. Also, when he spoke, the inside of his mouth was normal mucous membrane - black like a chow's mouth instead of red, but certainly not metal. On the other hand, the mouth, disconcertingly, vanished entirely when it was closed, and so did the eyes when they clinked; the metal flowed together as instantly as it parted.

"That's better,' the man said. 'Check his responses, Lavelle. He still looks a little dopey. Damn this language.'

He turned away and the woman - her name had certainly sounded like Lavelle - came into view, obviously in no hurry. She was metallic, too, but her metal was black, though her eyes were grey-green. The integument was exceedingly like a skin, yet seeing her Carl was even more convinced that it was either clothing or a body-mask, for there was nothing at all to see where Carl instantly looked. Also, he noticed a moment later, either she had had no hair or else her skull cap - if that was what she wore -was very tight, a point that hadn't occurred to him while looking at the man.

She took Carl's pulse, and then looked expertly under his upper eyelids. 'Slight fugue, that's all,' she said with a startling pink flash of tongue. Yet not quite so startling as Brand's speaking had been, since a pink mouth in a black face was closer to Carl's experience than was any sort of mouth in a silver face.'He can go down to the cages any time.'

Cages?

'Demonstration first,' Brand, now out of sight again, said in an abstracted voice. Carl chanced moving his head slightly and found that his horizon headache was actually a faint one-side earache, which made no sense to him at all. The movement also showed him the dimensions of the room, which was no larger than

an ordinary living room - maybe 12' by 13' - and painted an off-white. There was also some electronicapparatus here and there, but no more than Carl had seen in the pads of some hi-fi bugs he knew, and to his eyes not much more interesting. In a corner was a dropdown bunk, evidently duplicating the one he now occupied. Over an oval metal door - the only ship-like feature he could see - was a dial-face like that of a huge barometer or clock, its figures too small to read from where he lay, and much too closely spaced too.

Brand reappeared. After a moment, the shining black woman called Lavelle took up a position a few feet behind him and to his left.

'I want to show you something,' the man said to Carl. 'You can see just by looking at us that it would do you no good to jump us - to attack us. Do you dig - do you understand that?'

'Sure,' Carl said, rather more eagerly than he had intended. As a first word, it wasn't a very good one.

'All right.' Brand put both his hands on his hips, just below his waist, and seemed to brace himself slightly. 'But there's a lot more to it than you see at the moment. Watch closely.'

Instantly the silver man and Lavelle changed places. It happened so suddenly and without any transition that for a second Carl failed to register what he was supposed to have noticed. Neither of the two metal people had moved in the slightest. They were just each one standing where the other one had been standing before.

'Now -' the man said.

At once, he was back where he had been, but the gleaming black woman - man, that outfit was sexy! - was standing far back, by the oval door. Again, there'd been not a whisper or hint of any motion in the room.

'And once more -'

This time the result was much more confusing. The metal aliens seemed to have moved, but after a while Carl realized that they hadn't;*he* had. The switch was so drastic that for an instant he had thought they - all three of them - were in another room; even the hands of the dial-face looked changed. But actually, all that had happened was that he was now in the other bunk.

The switch made hash of a hypotheses he had only barely begun to work out: that the metal skins or suits made it possible for Brand and Lavelle to swap places, or jump elsewhere at will, by something like teleportation. If that was how it worked, then Carl might just hook one of those shiny suits, and then,*flup* ! and -

- and without benefit of suit white or black, he was in the other bunk, huddled in the ruins of his theory and feeling damned scared. On the face of a cathode-ray oscilloscope now in his field of view, a wiggly green trace diagrammed pulses which he was sure showed exactly how scared he was; he had always suspected any such instrument of being able to read his mind. The suspicion turned to rage and humiliation when Lavelle looked at the machine's display and laughed, in a descending arpeggio, like a coloratura soprano.

'He draws the moral,' she said.

Wetbacks. Also King Kong, if possible.

'Possibly,' said the silver man. 'We'll let it go for now, anyhow. It's time for the next subject. You can get up now.'

This last sentence seemed to be addressed to Carl. He stiffened for a moment, half expecting either the metal people or the room - or perhaps himself - to vanish, but since nothing at all changed, he slid cautiously to his feet.

Looking down at the feet, and on upward from there as far as he could without seeming vain about it, he discovered that he was wearing the same scuffed sneakers and soiled slacks he had been wearing when he had gone cycling with the Hobbit crowd, except that both the clothing and his own self under it had been given a thorough bath. He was offended by that discovery, but at the moment not very much. Did it mean that there really had been*no* events between that expedition to Telegraph Hill, and this nightmare?

'Am I on the ship?' he said. It was a difficult sentence to get out.

'Of course,' said the silver man.

'But I never got to join the official party - or I don't think -'

'Nobody will come aboard with the official party, Jack. We selected the few we wanted from among the cats your people designated. The rest will cool their heels.'

''Then what am I -'

'Too many answers,' Lavelle said.

'Never mind,' said the silver man. 'It won't matter for long, chicklet. Come along Mister - Wade? - yes; we'll interview you later, and answer some of your questions then, if we feel up to it. Lavelle, stay here and set up for the next live one. And Mister Wade, one other thing, should you feel ambitious, just bear in mind-'

The metal-skinned people changed places, silently, instantly, without the slightest preparation, without the slightest follow-through.

'- that we're a little faster on the draw than you are,' Brand finished from his new position, evenly, but his voice smiting Carl's other ear like a final insult. 'We need no other weapons. Dig me?'

'Yulp,' Carl said. As a final word, it was not much better than his first.

The sheathed man led him out of the oval door.

II

Numb as he had thought he was by now to everything but his own alarm, Carl was surprised to be surprised by the spaciousness of what they had called 'the cages'. His section of them reminded him more of an executive suite, or his imaginings of one - a large single bedroom, a wardrobe, a bathroom, and a sort of office containing a desk with a small TV screen and a headset like a cross between a hair-drier and a set of noise-mufflers.

He had been marched to this in total silence by the silver man, through a long corridor where they had

passed several others of the metal people, all of whom had passed them by wordlessly and with their eyes as blanked out as Little Orphan Annie's. Once they had arrived at the cage, however, Brand had turned affable, showing him the facilities, even including a stock of clean clothes and seating him at last at the desk.

'I'll talk to you further when there's more time,' the silver man said. 'At the moment we're still recruiting. If you want food, you can call for it through that phone. I hope you know that you can't get away. If you cut out of the cage, there'd be no place where you could wind up.'

Brand reached forward to the desk and touched something. Under Carl's feet, a circular area about the size of a snow-slider turned transparent, and Carl found himself looking down at the Bay area through nothing but ten miles or more of thin air. Even moderate heights had always made him sick; he clutched at the edge of the desk and was just about to lose his option when the floor turned solid again.

'I wanted you to see,' Brand said, 'that you really are aboard our ship. By the way, if you'd like to look through there again, the button for it's right here.'

'Thanks,' Carl said, calling up one of his suavist witticisms, 'but no thanks.'

'Suit yourself. Is there anything else you'd like until we meet again?'

'Well… you said you were bringing more, uh, Earth people up here. If you could bring my wife…?'

The answer to this was only of academic interest to Carl. He had been separated from Bea for more than a year, ever since the explosion about college; and on the whole it had been painless, since they had been civilized enough to have been married in the first place only at common law and that a little bit by accident. But it would have been nice to have had someone he knew up here, if only somebody with a reasonably pink skin. The silver man said:

'Sorry. None of the other males we expect to bring aboard will know you, or each other. We find it better to follow the same rule with females, so we won't have any seizures of possessiveness.'

He got up and moved toward the door, which was the usual shape for doors, not oval like the last one. He still seemed relatively gracious, but at the door he turned and added:

'We want you to understand from the outset that up here, you own nobody - and nobody owns you but us.' And with that, in a final silent non-explosion of arrogance, he flicked into nothingness, leaving Carl staring with glazed eyes at the unbroached door.

Of course no warning could have prevented Carl, or anyone else above the mental level of a nematode, from trying to think about escape; and Carl, because he had been selected as the one lay volunteer to visit the spaceship possibly because he had thought about spaceships now and then or read about them, thought he ought to be able to work out some sort of plan - if only he could stop jittering for a few minutes. In order to compose his mind, he got undressed and into the provided pyjamas - the first time he had worn such an outfit in ten years - and ordered the ship (through the desk phones) to send him a bottle of muscatel, which arrived promptly out of a well in the centre of the desk. To test the ship's good will, he ordered five more kinds of drinks, and got them all, some of which he emptied with conscious self-mastery down the toilet.

Then he thought, jingling a luxurious bourbon-and-ginger abstractedly; the sound of ice was peculiarly comforting. Why the hell*had* the Pentagon people picked him as the 'lay volunteer', out of so many? The

alien ship had asked for a sampling of human beings to go back to its far star, and of these, it had wanted one to be a man of no specialities whatsoever - or no specialities that the ship had been willing to specify. The Pentagon had picked its own samplings of experts, who probably had been ordered to 'volunteer'; but the 'lay volunteer' had been another matter.

Like everyone else, Carl had been sure the Pentagon would want the 'lay volunteer' actually to be a master spy among all possible master spies, not a James Bond but a Leamas type, a man who could pass for anything; but it hadn't worked that way. Instead, the Pentagon had approved Carl, one slightly beat and more than slightly broke dropout, who believed in magic and the possibility of spaceships, but - leave us face it, monsters and gents - didn't seem to be of much interest either to alien or to human otherwise.

Why, for instance, hadn't the 'lay volunteer' the aliens wanted turned out to be a Bircher, a Black Muslim, a Communist or a Rotarian - in short, some kind of fanatic who purported to deal with the*real* world - instead of a young man who was fanatic only about imaginary creatures called hobbits? Even the ordinary science-fiction fan would have been better; why was a sword-and-sorcery addict required to try to figure his way out of a classical spaceship clink?

Gradually, he began to feel - with pain, and only along the edges - that there was an answer to that. He got up and began to pace, which took him into the bedroom. Once there, he sat down nervously on the bed.

At once, the lights went out. Wondering if he had inadvertently sat on a trigger, he stood up again; but the darkness persisted.

Were the metal people reading his mind again - and trying to suppress any further thinking? It might work. He was damn-all tired, and he'd been out of practice at thinking anyhow. Well, he could lie down and pretend to be asleep. Maybe that would -

The lights went on.

Though he was dead sure that he hadn't fallen asleep, he knew that he was rested. He remembered that when he had looked down the sink-hole under the desk, lights had been coming on around the Bay. Gritting his teeth and swallowing to keep down the anticipated nausea, he went out to the desk and touched the button.

One glance was enough, luckily. It was high morning on Earth. A night had passed.

And what was the thought he had lost? He couldn't remember. The ship had finessed him - as easily as turning a switch.

III

He ordered breakfast; the ship delivered it. The bottles and glasses, he noticed, had been taken away. As an insulting aftermath, the ship also ran him another bath without his having ordered it. He took it, since he saw nothing to be gained by going dirty up here; it would be as unimpressive as carrying a poster around that sink-hole. No razor was provided; evidently the ship didn't object to his beard.

He then went after a cigarette, couldn't find any, and finally settled for a slow burn, which was easy enough to muster from all his deprivations, but somehow wasn't as satisfying as usual.*I'll show them* , he thought; but show them what? They looked invulnerable - and besides, he had no idea what they wanted him for; all the official clues had been snatched away, and no substitutes provided.

How about making a play for Lavelle?*That* would show that chrome-plated s.o.b. But how to get to her? And again, show him what? Carl knew nothing about these people's sexual taboos; they might just not give a damn, like most Earth people on a cruise. And besides, the girl seemed pretty formidable. But lush; it would be fun to break her down. He'd been through stuffier chicks in his time: Bea, for instance, or - well, Bea, for instance. And the separation hadn't really been his fault

His stomach twinged and he got up to pace. The trouble was that he had nothing to impress Lavelle with but his build, which really wasn't any better than Brand's. His encyclopedic knowledge of the habits of hobbits wasn't going to crush any buttercups around here, and he doubted that being able to sing*Fallout Blues* in two separate keys would, either. Dammit, they'd left him nothing to work with! It was unfair.

Abruptly remembering last night's drinks, he stopped at the desk and tried asking for cigarettes. They materialized instantly. Well, at least the aliens weren't puritans'- that was hopeful. Except that he didn't want a complaisant Lavelle; that wouldn't show anybody anything, least of all himself. There was no particular kick in swingers.

But if they gave him drinks and butts, they might just let him roam about, too. Maybe there was somebody else here that he could use, or some other prisoner who could give him clues. For some reason the thought of leaving the cage sparked a brief panic, but he smothered it by thinking of the ship as a sort of convention hotel, and tried the door.

It opened as readily as the entrance to a closet. He paused on the threshold and listened, but there was absolutely no sound except the half expected hum of machinery. Now the question was, supposing the opening of the door had been an accident, and he was not supposed to be prowling around the ship? But that was their worry, not his; they had no right to expect him to obey their rules. Besides, as Buck Rogers used to say under similar circumstances, there was only one way to find out.

There was no choice of direction, since the corridor's ends were both unknown. Moving almost soundlessly - one real advantage of tennis shoes -he padded past a succession of cage doors exactly like his own, all closed and with no clues for guessing who or what lay behind them. Soon, however, he became aware that the corridor curved gently to the right; and just after the curve passed a blind point, he found himself on the rim of a park.

Startled, he shrank back, then crept forward still more cautiously. The space down the ramp ahead was actually a long domed hall or auditorium, oval in shape, perhaps five city blocks in length and two across at the widest point, which was where the opening off the corridor debouched. It seemed to be about ten stories high at the peak, floored with grass and shrubbery, and rimmed with small identical patios - one of which, he realized with a dream-like lack of surprise, must back up against his own cage. It all reminded him unpleasantly of one of those enlightened zoos in which animals are allowed to roam in spurious freedom in a moated 'ecological setting'.

As he looked down into the park, there was a long sourceless sigh like a whisper of metal leaves, and doors opened at the back of each patio. Slowly, people began to come out - pink people, not metal ones. He felt a brief mixture of resentment and chagrin; had he stayed in his own cage, he would have been admitted to the park automatically now, without having had to undergo the jumpy and useless prowl down the companionway.

Anyway, he had found fellow prisoners, just as he had hoped; and it would be safer down there than up here. He loped eagerly downhill.

The ramp he was following ran between two patios. One of them was occupied by a girl, seated upon a perfectly ordinary chair and reading. He swerved, braking.

'Well, hi there!' he said.

She looked up, smiling politely but not at all as pleased to see another inmate as he could have hoped. She was small, neat and smoky, with high cheekbones and black hair-perhaps a Latin Indian, but without the shyness he usually counted upon with such types.

'Hello,' she said. 'What have they got you in for?'

That he understood; it was a standard jailhouse question.

'I'm supposed to be the resident fantasy fan,' he said, in an unusual access of humility. 'Or that's my best guess. My name's Carl Wade. Are you an expert?'

'I'm Jeanette Hilbert. I'm' a meteorologist. But as a reason for my being here, it's obviously a fake - this place has about as much weather as a Zeppelin hangar. Apparently it's the same story with all of us.'

'How long have you been here?'

'Two weeks, I think. I wouldn't swear to it.'

'So long? I was snatched only last night.'

'Don't count on it,' Jeanette said. 'Time is funny here. These metal people seem to jump all around in it - or else they can mess with your memory at will.'

Carl remembered the change in the clock face, back when Brand and Lavelle had been showing off their powers for him. It hadn't occurred to him that time rather than space might have been involved, despite that clue. He wished he had read more Hubbard - something about transfer of*theta* from one MEST entity to another - no, he couldn't recapture the concept, which he had never found very illuminating anyhow. Korzybski? Madame Blavatsky? The hell with it. He said:

'How'd you come on board?'

'Suddenly. It was taken right out of my apartment, a day after NASA volunteered me. Woke up in an EEG lab here, having my brain-prints taken.'

'So did I. Hmm. Any fuzzy period between?'

'No, but that doesn't prove anything.' She looked him over, slowly and deliberately. It was not an especially approving glance. 'Is that what fantasy fans usually wear?'

He was abruptly glad that his levis and shirt were at least clean, no matter how willy-nilly. 'Work clothes,' he explained.

'Oh. What kind of work?'

'Photography,' he said, masking a split-second's groping with his most winning smile. It was, he knew, a workable alias; most girls dream of posing. 'But they didn't bring my cameras and stuff along with me, so

I guess I'm as useless as you are, really.'

'Oh,' she said, getting up, 'I'm not sure I'm so useless. I didn't bring my barometer, but I still have my head.'

Dropping her book on the chair, she swung away and went back into her cage, moving inside her simple dress as flexibly as a reed.

'Hey, Jeanette - I didn't mean -just a -'

Her voice came back: 'They close the doors again after an hour.' Then, as if in mockery, her own door closed behind her, independently.

For want of anything else to do, he stepped into the patio and picked up the book. It was called *Experimental Design* , by one Sir Ronald Fisher, and the first sentence that he hit read: 'In fact, the statement can be made that the probability that the unknown mean of the population is less than a particular limit, is exactly*P* , namely*Pr (u<x+ts)=P* for all values of*P* , where*t* is known (and has been tabulated as a function of*P* and*N*).' He dropped the thin volume hastily. He had been wondering vaguely whether Jeanette had brought the book with her or the ship had supplied it, but suddenly he couldn't care less. It began to look as though all the chicks he encountered on this ship had been born to put him down.

Disappointed at his own indifference, he remembered her warning, and looked quickly back at the top of the gangway down which he had come. It was already closed. Suppose he was cut off? There were people down there in the park that he still wanted to talk to - but obviously not now. He raced along the esplanade.

He identified his own cage almost entirely by intuition, and it seemed that he was scarcely in it five minutes before the door to the patio slid shut. Now he had something else to think about, and he was afraid to try it, not only because it was painful, but because despite Jeanette's theories about time and memory, he still thought it very likely that Lavelle and her consort could read his mind. Experience, after all, supported all three theories indifferently, thus far.

But what about the*other* door? Increasingly it seemed to him that he hadn't been intended to go through it. He had been told that he couldn't get out of his cage; and the one hour's access to the park was nothing more than admission to a larger cage, not any sort of permission to roam. The unlocked outer door had to have been an accident. And if so, and if it were still open, there should still be all sorts of uses he might make of it

He froze, waiting to be jumped into the next day by the mind-readers. Nothing happened. Perhaps they could read his mind, but weren't doing it at the moment. They couldn't be reading everybody's mind ever minute of the day; they were alien and powerful, but also very obviously human in many important ways. All right. Try the outer door again. There was really nothing in the world that he wanted to do less, but the situation was beginning to make him mad, and rage was the only substitute he had for courage.

And after all, what could they do to him if they caught him, besides knock him out? The hell with them. Here goes.

Once more, the door opened readily.

IV

The corridor was as eventless as ever; the ramp to the park now closed. He continued along the long smooth curve, which obviously skirted the park closely, just outside the cage doors. Once he stopped to lay his ear to one of the cages. He heard nothing, but he did notice a circle with a pattern of three holes in it, like a diagram of a bowling ball, just where the lock to an ordinary door would be placed for someone of Brand's height.

That made him think again as he prowled. So the metal people needed handles and locks! Then they couldn't jump about in space as magically as they wanted you to think they could. Whatever the trick was, it wasn't teleportation or time-travel. It was an illusion, or something else to do with the mind, as both Carl and Jeanette had guessed: memory-blanking, or mind-reading. But which?

After he had crept along for what seemed like a mile, the elliptical pathway inflected and began to broaden. Also there was a difference in the quality of the light up ahead: it seemed brighter, and, somehow, more natural. The ceiling was becoming higher, too. He was coming into a new kind of area; and for some reason he did not stop to examine - perhaps only that the inside curve of the corridor was on his right, which as evidence was good for nothing - he felt that he was coming up on the front of the ship.

He had barely begun to register the changes when the corridor put forth a pseudopod: a narrow, shallow, metal stairway which led up to what looked like the beginning of a catwalk, off to the left. He detoured instinctively - in the face of the unknown, hide and peek!

As he went along the outward-curving catwalk, the space ahead of him continued to grow bigger and more complicated, and after a few minutes he saw that his sensation that he was going bow-wards had been right. The catwalk ran up and around a large chamber, shaped like a fan opened from this end, and ending in an immense picture window through which daylight poured over a cascade of instruments. On the right side of the room was a separate, smaller bank of controls, divided into three ranks of buttons each arranged in an oval, and surmounted by a large clock-face like the one Carl had noticed when he first awoke in the ship's EEG room. The resemblance to the cockpit of a jetliner, writ large, was unmistakable; this was the ship's control room.

But there was something much more important to see. Brand -or someone almost exactly like him - was sitting in one of two heavy swivel seats in front of the main instrument board, his silver skin scattering the light from the window into little wavelets all over the walls to either side of him. Occasionally he leaned forward and touched something, but in the main he did not seem to have much to do at the moment. Carl had the impression that he was waiting, which the little flicks of motion only intensified -like a cat watching a rubber mouse.

Carl wondered how long he had been there. From the quality of the light, the time was now either late morning or early afternoon - it was impossible to guess which, since Carl could not read the alien clock.

A movement to the right attracted both men's attention. It was a black metalled woman: Lavelle. Of this identification Carl was dead sure, for he had paid much closer attention to her than to her consort. Lifting a hand in greeting, she came forward and sat down in the other chair, and the two began to talk quietly, their conversation interspersed with occasional bursts of low laughter which made Carl uncomfortable for some reason he did not try to analyse. Though he could catch frequent strings of syllables and an occasional whole sentence, the language was not English, Spanish or French, the only ones he was equipped to recognize; but it was quite liquid, unlike a Germanic or Slavic tongue. Ship's language, he was certain.

Their shadows grew slowly longer on the deck; then it must be afternoon. That double prowl up the corridor must have taken longer than he had thought. He was just beginning to feel hungry when there was a change that made him forget his stomach completely.

As the metal people talked, their voices had been growing quieter and a little more husky. Now, Brand leaned forward and touched the board again, and instantly, like flowers unfolding in stop-motion photography, the metal suits - aha, they*were* suits! - unpeeled around them and seemed to dissolve into the chairs, leaving them both entirely nude.

*Now*would be the time to jump them, except that he was quite certain he couldn't handle both of them. Instead, he simply watched, grateful for the box seat. There was something about the girl besides her nudity that was disquieting, and after a while Carl realized what it was. Except for her baldness, she bore a strong resemblance to the first girl he had ever made time with by pretending to be a photographer, a similarity emphasized by the way she was sitting in the chair.

Obviously the pose was not lost on Brand either. He got to his feet with a lithe motion, and seizing her hand pulled her to her feet. She went to him freely enough, but after a moment struggled away, laughing, and pointing at the smaller control board, the one with the clock. Brand made an explosive remark, and then, grinning, strode over to the board and

the room was dark and empty. Blinking amazedly, Carl tried to stir, and found that his muscles were completely cramped as if he had been lying on the metal edge in the same position all night.

Just like that, he had the key in his hands.

He began to work out the stiffness slowly, starting with fingers and toes, and surveying the control room while he did so. The room was not really completely dark; there were many little stars gleaming on the control boards, and a very pale dawn was showing through the big window. The large hand on the clock face had jumped a full ninety degrees widdershins.

When he felt ready to take on a fight if he had to - except for his hunger, about which he could do nothing - Carl went back to the stairs and down into the control room, going directly to the smaller of the two boards. There was no doubt in his mind now about what those three ovals of buttons meant. If there was any form of dialogue he understood no matter what the language, it was the dialogue of making out. As plain as plain, the last two lines the denuded metal people had spoken had gone like this:

lavelle: But suppose somebody (my husband, the captain, the doctor, the boss) should come in?

brand: Oh hell, I'll (lock the door, take the phone off the hook, put out the lights) fix that!

Blackout.

What Brand had done was to put everyone on board to sleep. Out of the suits, he and Lavelle must have been immune to whatever effect he had let loose, so they could play their games at leisure. A neat trick; Carl wouldn't mind learning it - and he thought he was about to.

Because Carl himself was awake now, it was pretty clear that the other prisoners were also; maybe they had been freed automatically by the passage of the clock past a certain point in the morning, and would be put back to sleep just as automatically after supper. It also seemed clear that for the prisoners, the

effect didn't depend upon wearing one of the metal suits or being in the cages, since Carl had been knocked out up on the catwalk, almost surely unsuspected. The suits must be the captain's way of controlling the crew - and that meant that Brand (or Brand and Lavelle) must run the shop, since this board was too powerful to allow just anybody to fool with it. Carl rubbed his hands together.

One of these three circles must represent the crew; another, the cages; the third - well, there was no telling who was controlled by those buttons - maybe crew and prisoners at once. But the oval in the middle had the fewest number of buttons, so it was probably a safe bet that it controlled the cages. But how to test that?

Taking a deep breath, Carl systematically pressed each and every button on the left-hand oval. Nothing happened. Since he himself was not now sprawled upon the deck, unconscious again, he could now assume that the crew was once more fast asleep -with the unavoidable exception of any, who had been out of their suits, like the lovers.

Now for the sparser oval. Trying to remind himself that he now had plenty of time, Carl worked out by painful memory and counting upon his fingers just where the button which represented his cage probably was. Then, starting one button away from it, he went again all around the circle until he was one button on the opposite side of what he thought was his own.

It took him a long time, sweating to work himself up to touching either of those two bracketting buttons, but at last, holding his breath, he pressed them both at once, watching the clock as he did so.

He did not fall and the clock did not jump.

The ship was his.

He was not in the slightest doubt about what he was going to do with it. He had old scores by the millions to pay off, and was going to have himself one hell of a time doing it, too. With an instrument like this, no power on Earth could stop him.

Of course he'd need help: somebody to figure out the main control board with him, somebody with a scientific mind and some technical know-how, like Jeanette. But he'd pick his help damn carefully.

The thought of Jeanette made him feel ugly, a sensation he rather enjoyed. She'd been damn snippy. There might be other women in the cages too; and the aborted scene of last night in the control room had left him feeling more frustrated that usual. All right; some new scores, and then he'd get around to the old ones.

V

It was high morning when he got back to the control room, but still it was earlier than he'd expected it to be. There hadn't been many women in the cages, but either they got less and less attractive as he went along, or the recent excitement and stress had taken more out of him physically than he'd realized. Otherwise he was sure he could have completed such a programme handily, maybe even twice around. Oh well, there was plenty of time. Now he needed help.

The first thing to do was to disconnect the clock in some way. That proved to be easy: a red bar under it simply stopped it. Since nobody, obviously, had visited the control room since his last tampering, he now had the whole ship in permanent coma.

Next, he counted down to Jeanette's button and pushed it. That ought to awaken her. The only remaining problem was to work out how that three-hole lock on her cage worked.

That didn't turn out to be easy at all. It took an hour of fumbling before it suddenly sank inward under his hand and the door slid back.

Jeanette was dressed, and stared at him with astonishment.

'How did you do that?' she said. 'What's wrong with the phone Where's the food? Have you been doing something stupid?'

He was just about to lash back at her when he realized that this was no time to start the breaking-off routine, and instead put on his best master-of-the-situation smile, as if he were just starting up with her.

'Not exactly,' he said. 'But I've got control of the ship. Mind if I come in?'

'Control of the ship? But - well, all right, come in. You're in anyhow.'

He came forward and sat down at her version of his desk. She backed away from him, only a little, but quite definitely.

'Explain yourself,' she said.

He didn't; but he told her the rudiments of the story, in as earnest and forthright a manner as he had ever managed to muster in his life. As he had expected, she asked sharp technical questions, most of which he parried, and her superior manner dissolved gradually into one of intense interest.

All the same, whenever he made the slightest movement to stand up, she stepped lightly away from him, a puzzled expression flitted across her face and then vanished again as he fed her new details. He was puzzled in turn. Though the enforced ship's-sleep hadn't prevented her from being highly responsive - in fact, it was his guess that it had helped - he was sure that she had never awoken even for a second during the morning and hence had nothing to blame him for. Yet it was obvious that she knew, somewhere in the back of her mind that*something* had happened to her, and associated it with him. Well, maybe that would be helpful too, in the long run; a cut cake goes stale in a hurry.

When he was through, she said reluctantly: 'That was close observation, and quick thinking.'

'Not very quick. It took me all morning to work it out.'

Again the flitting, puzzling expression. 'You got the right answer in time. That's as quick as anybody needs to be. Did you wake anybody else?'

'No just you. I don't know anybody else here, and I figured you could help me. Besides, I didn't want a mob of released prisoners running around the ship kicking the crew and fooling with things.'

'Hmm. Also sensible. I must say, you surprise me.' Carl couldn't resist a grin at this, but took care to make it look bashful. 'Well - what do you suggest we do now?'

'We ought to figure out the main control board. See if it's possible for us to run the ship without anybody from the crew to help - and how many hands from the cages we'd need to do the job.'

'Yes,' she said thoughtfully. 'At a guess, the main control board is as rational as the sleep-board is. And the two captains -Brand and Lavelle - must be able to run the ship from there all by themselves in a pinch; otherwise the threat of knocking all the rest of the crew out wouldn't have sufficient force. Interesting social system these people must have. I don't think I like them.'

'Me neither,' Carl said with enthusiasm. 'I hate people who whip serfs.'

Jeanette's eyebrows rose. 'The crew can't be serfs. They wear the metal suits - a powerful tool in any hands - and can take them off whenever they like if they want to duck the sleep-compulsion. But obviously they don't. They can't be serfs; they must be something like chattel slaves, who'd never dream of changing status except to other owners. But that's not nearly the most interesting problem.'

'What is, then?'

'How the buttons put*us* to sleep. We don't wear the suits.'

Since this was the problem Carl most badly wanted to solve secretly and for himself alone, it was the one he most badly wanted Jeanette not to think about; yet since he had no clues at all, he had to chance at least a tentative sounding before trying to divert her from it. He said: 'Any ideas?'

'Not at the first moment. Hmm… Did you have a headache when you first woke up on board?'

'I've got it still,' he said, patting the back of his neck tenderly. 'Why? Does that signify?'

'Probably not. I'll just have to look at the board, that's all. We'd better go take a thorough look around.'

'Sure. This way.'

She was very thorough - exasperatingly so. Long after he would have been sure that he had seen everything, she would return to some small instrument complex she had looked at three or four times before, and go over it again as if she had never seen it before. She volunteered nothing except an occasional small puff of surprise or interest; and to his questions, she replied uniformly, 'I don't know yet.' Except once when after she had bent over a panel of travelling tapes for what must have been twenty minutes, she had said instead, 'Shut up for ten seconds, will you?'

In the meantime, the sun was reddening towards afternoon again, and Carl was becoming painfully conscious of the fact that he had had nothing to eat since breakfast the day before. Every minute added without any food shortened his temper, reduced his attention span and cut into his patience. Maybe the girl was getting results, and maybe not, but he was more and more sure that she was putting him on. Didn't she know who was boss here?

Maybe she thought she could make a dash for the sleep-panel and turn*him* off. If she tried that, he would knock her down. He had never been that far away from the panel; he was on guard.

Suddenly she straightened from the main board and sat down in one of the heavy swivel chairs. It promptly began to peel her clothes off. Though he had not told her anything about this trick, she got up quickly so that it left her only slightly shredded around the edges. She eyed the chair thoughtfully, but said nothing. For some reason this was her most galling silence of all.

'Got anything?' he said harshly.

'Yes, I think so. These controls require an optimum of three people, but two can run them in an emergency. Ordinarily I think they use five, but two of those must be standbys.'

'Could one man handle them?'

'Not a chance. There are really three posts here: pilot, engineer, navigator. The pilot and the navigator can be the same person if it's absolutely necessary. Nobody can substitute for the engineer. This ship runs off a Nernst-effect generator, a very tricky form of hydrogen fusion. The generators idle very nicely, but when they're drawing real power they have to be watched - more than that, it takes a real musician's hand to play them.'

'Could you do it?'

'I'd hate to try. Maybe with a month of ant-steps, saying "May I" all the way. But if the thing blew at this altitude it'd take out the whole West Coast - at a minimum. There's an awful lot of hydrogen in the Pacific; I wouldn't answer for what a Nernst fireball would really start.'

'Good.'

She swung on him, her brows drawing together. 'What's good about it? What are you up to, anyhow?'

'Nothing very awful,' he said, trying to be placating. Til tell you in a minute. First of all, have you figured out how to get the grub moving again? I'm starving.'

'Yes, that's what the third oval on the sleep board is - the phone system locks. There's a potentiometer system on the side of the board that chooses what's activated - food, phones, doors, and so on. If you'll move over a minute, I'll show you.'

'In a minute,' he said. 'It's not that I don't trust you, Jeanette, but you know how it is - now that I've got my mitts on this thing I hate to let go of it.'

"That figures. What are you going to do with it?'

'I don't know till I've got it doped better. First, how about this business of putting the prisoners crumped without any suits?'

'No,' she said.

'Whadd'ya mean, no?' he said, feeling the ugliness rise again. 'Listen, chick -'

He caught himself, but with an awful feeling that it was too late. She watched him damping himself down with sober amusement, and then said:

'Go on. That was the true hyena laugh.'

He clenched his fists, and again fought himself back to normal, aware that she was observing every step of the process.

He said:

'I'm sorry. I'm tired and hungry. I'll try not to snarl at you again. Okay?'

'Okay.' But she said nothing more.

'So what about this crump effect?'

'Sorry I won't answer any more questions until you've answered one of mine. It's very simple. Once you've really got control of the ship - and you can't get it without me - what do you plan to do with it? You keep telling me you'll tell me "in a minute". Tell me now.'

'All right,' he said, his teeth on edge. 'All right. Just remember that you asked me for it. If you don't like it, tough tibby - it's not my fault. I'm going to use this ship and everybody on it to set things straight. The warmongers, the blue-noses, the fuzz, the snobs, the squares, the bureaucrats, the Uncle Toms, the Birchers, the Fascists, the rich-bitches, the… everybody who's ever been*against* anything is going to get it now, right in the neck. I'm going to tear down all the vested interests, from here to Tokyo. If they go along with me, okay. If they don't, blooey! If I can't put them to sleep I can blow 'em up. I'm going to strike out for freedom for*everybody* , in all directions, and all at once.There'll never be a better chance. There'll never be a better weapon than this ship. And there'll never be a better man than me to do it.'

His voice sank slightly. The dream was catching hold. 'You know damn well what'd happen if I let this ship get taken over by the Pentagon or the fuzz. They'd suppress it - hide it - make a weapon out of it. It'd make the cold war worse. And the sleep gadget - they'd run all our lives with it. Sneak up on us. Jump in and out of our pads. Spy. All the rest. Right now's our chance to do justice with it. And that by God is what I'm going to do with it!'

'Why you?' Jeanette said. Her voice sounded very remote.

'Because I know what the underdog goes through. I've gone through it all. I've been put down by every kind of slob that walks the Earth. And I've got a long memory. I remember every one of them. Every one. In my mind, every one of them has a front name, a hind name, and an address. With a thing like this ship, I can track every man jack of them down and pay them off. No exceptions. No hiding. No mercy… just justice. The real, pure simple thing.'

'Sounds good.'

'You bet it's good!'

'What about the Soviets? I missed them on your list, somehow.'

'Oh sure; I hate Communists. And also the militarists - it was the Pentagon that sucked us into this mess up here to begin with, you know that. Freedom for everybody - at one stroke!'

She seemed to consider that. 'Women, too?'

'Of course, women! The hell with the double standard! On both sides!'

'I don't quite follow you,' she said. 'I thought the double standard only had one side - the men could and the women couldn't.'

'You know damn well that's not so. It's the women who control the situation - they always can, they're the ones who get to say*no* . The real freedom is all on their side.'

'How'd you fix that?' she said, in a voice almost sleepy.

'I… well, I haven't had much of a chance to think about it -'

'I think you've thought about it quite a lot.'

Her shredded dress trailing streamers, Jeanette walked steadily away from the control board toward the corridor. Carl put his finger over her button.

'Stop!'

She stopped and turned, shielding her thighs with one hand in a peculiarly modest gesture, considering everything.

'Well?'

'I don't give a damn what you think. If you don't dig it, that's your nuisance - sorry about that, Chief. But I need you; I'll have you.'

'No you won't. You can put me to sleep and rape me, but you won't have me.'

'Yes I will. I can wake you up. And I won't feed you. You'll spend the rest of your time in your cage-hungry and wide awake. In the meantime,*I'll* fool with the boards. Maybe I'll wake somebody else who'll be willing to help. Maybe even one of the crew. Or maybe I'll make a mistake and blow everything up - if you weren't putting me on about that. Think about*that* for a while. Co-operate, or blooey! How about that?'

'I'll think about it,' she said. But she went right on walking.

Carl bit his tongue savagely and turned back to the main boards. These goddam do-gooders. In the pinch, they were all alike. Give them a chance to*do* something and they chicken out.

Now it was up to him. It would be nice to know where to find Lavelle. But it was nicer to be sure that Jeanette had him dead wrong. He had a mission now and was above that stuff, at least for the time being. Once he'd reduced the world, he could do better than either of them. Mmmmm.

Raging with hunger, he scraped his fingernails at the powerful little lights.

VI

But he had at last to admit that much of his threat had been simple bravado. The instruments and controls on the board were in obviously related groups, but without technical training he could not even figure out the general categories; and though everything was labelled, the very script the labels were written in was as unbreakable to him as an oscilloscope trace (which it strongly resembled).

Besides, his thinking was obviously not being improved by his having been without a meal for more than a whole day. He decided that he had better be reasonable. The only other course was to wake some crew member, on the chance that a random choice would net him a slave rather than an officer, and try to force him to read the inscriptions; but the risks in that were obvious and frightening. Unless he really wanted to blow up the joint - which in fact he had no intention of chancing - he had to make another try with Jeanette.

She didn't look nearly as haggard as he had hoped, but after all she had both eaten and slept a good deal more recently than he had. Realizing at the same time that he was not only haggard, but untrimmed and dirty, he made an extra effort to be plausible.

'Look, I'm sorry I frightened you. I'm tired, I'm hungry, and I'm on edge. Let's try to talk it all over again sensibly, like civilized people.'

'I don't talk to jailers,' she said coldly.

'I don't blame you. On the other hand, as long as you're bucking me, I have to keep some sort of control over you. You're the only prisoner who knows as much as I know. Hell, you know*more* than I know about some things.'

'The last I heard, you weren't just going to keep me locked up. You were going to torture me.'

'What? I said no such -'

'No sleep, no food - what do you call it? Punishment? Persuasion? I know what I call it.'

'All right,' he said. 'I was wrong about that. Why don't we start there? You tell me how to turn the food deliveries back on, and I'll do it. There's no harm in that. We'd both benefit.'

"That's right, you're hungry too. Well, it's controlled by that knob on the side of the sleep-board, as I told you. I'm not sure, but I think it's the third setting on the left - counter-clockwise, that is.'

'Good. I'll see to it that you get fed, and then maybe we can yak again.'

'Maybe.'

At the door, he turned back suddenly. 'This had better not be a gag. If that third setting wakes everybody up or something like that-'

'I don't guarantee a thing,' Jeanette said calmly. 'It's only my best guess. But I don't want the slavers awake again any more than you do. You're no picnic, but I like them even less.'

The point was all the more penetrating for its bluntness. Back in the control room, he set the dial as per instructions, and then raced back to his own cage to try it out. The ship promptly delivered the meal he ordered, and he stuffed himself gorgeously. As an afterthought, he ordered and got a bottle of brandy. He was still determined to puzzle out the control boards as far as possible by himself, and in his present stage of exhaustion a little lubricant might make all the difference.

He knocked on Jeanette's door in passing, but there was no answer.

'Jeanette!' he shouted. 'Jeanette, the food's on!'

Still no response. He wondered if the metal door would pass sound. Then, very faintly, he heard something like a whimper. After a long pause there was another.

He went on, satisfied. He was a little surprised to find that she was able to cry - up to now she had seemed as hard as nails except in her sleep - but it would probably do her good. Besides, it was

satisfying to know that she had a breaking point; it would make his persuasions all the more effective, in the long run. And in the meantime, she had heard him announce that there was food available, so she should have a little better opinion of his good faith.

He went on up the corridor, cheerfully whistling*Fallout Blues* in two keys at once.

The control room window showed deep night, and had for a long time, when he decided to call himself defeated - temporarily, of course. The brandy had calmed some of his jumpiness and done wonders for his self-confidence, but it hadn't brought into his head any technical knowledge or any safe inspirations, either. And suddenly he was reelingly sleepy. The headache was worse, too.

There should be no danger in catching a little sack time. Everybody was already out except Jeanette, and she was locked in. Of course, she was a sharp apple, and might figure some way of getting out. It would be better to crump her. She'd probably appreciate it, too. It would give him two plusses to start the next conversation with.

He pressed the button that controlled her, and then, avoiding the strip-tease chairs, rolled himself comfortably under the big board.

He awoke slowly and naturally; he had almost forgotten how it felt, after the popped-out-of-nothingness effect that the ships' imposed awakenings produced, and for a little while he simply luxuriated in it. After all, there was no danger. The ship was his.

But it was unusually noisy this morning; a distant snarling of engines, an occasional even more distant murmer of voices

Voices! He shot upright in alarm.

He was no longer aboard the ship.

Around him was the sunlit interior of a small room, unmistakably barracks-like, with a barred window, furnished only by the narrow single bed in which he had been lying. He himself was clad in grey military-hospital pyjamas, and touching his face, he found that he was clean-shaven - his beard was gone - and had been given a GI haircut. A standard maroon military-hospital robe was folded neatly over the foot of the bed.

An aircraft engine thrummed again outside. Swearing, he ran to the window.

He was indeed locked up beside a military airfield - which one, he had no way of telling, but at least it was American. It was also huge. There was a lot of traffic.

And there was the alien spaceship, right in front of him, grounded. It was probably as much as three miles away, but it was still so enormous as to cut off most of the horizon.

It had been captured - and Carl Wade with it.

He wasted no time wondering how it had been done, or lamenting the collapse of his fantasies, in which, he realized, he had never really believed. The only essential thing now was -*get away* !

He spun to the door, and finding it locked, rattled it furiously.

'Hey!' he shouted furiously. 'Let me out of here! You've got no right - I'm a civilian - and a citizen -'

The lock clicked under his hand, and as he jumped back, there was the sound of a bolt being shot. The door opened and Jeanette came in, followed by two large, impassive, alert Air Force policemen. The girl looked fresh and beautiful; but she too had had a close haircut, all on one side; and there was a massive surgical compress taped under that ear.

'Good morning,' she said.

He continued to back away until he found himself sitting on the bed.

'I might have guessed,' he said. 'So you got the upper hand and sold out.'

'Sold out?' she said, her eyes flashing. 'I had nothing to sell. I couldn't use the ship properly. I turned it over to people who could. My own people - who else?'

'All right, then you chickened out,' Carl said. 'It's the same thing. What are you going to do with me?'

"They tell me you'll be questioned and let go. In your circles, nobody'd be likely to believe anything you say. Just in case any reporter looks you up, the Pentagon's arranged an interview with*Time* . They'll treat your remarks as science-fiction and that'll be the end of you as any sort of witness.'

'And that's all?' he said, amazed.

"That's enough. You're not accused of any crime. Of course, I suspect you committed one against me - but considering that it didn't even wake me up, it can't have been very much more than a token; just kid's stuff.'

This blow to his pride was almost more than he could take, but he was not going to try to set her straight with those two huge flics standing there. He said dully:

'How did you do it?'

'I figured out how the metal people induced sleep in us without our having to wear metal suits. When they first took us on board, they installed a little broadcaster of the sleep-waves, surgically, right next to our skulls - under the right mastoid process. That was what the headache was.'

Carl caressed his neck automatically. The headache was gone all that was left was a neat and painless scar.

'But what did you do?'

'I took it out, with your help. When you turned the food service back on, I ordered a tough steak, and I got a sharp knife along with it. Awake, the metal people probably wouldn't have allowed that, but the computers are brainless. So I cut the gadget out. As soon as I got the bleeding stopped, I went forward, found you asleep under the control board, and pressed*your* button. The rest was simple.'

He remembered the faint whimpers he had heard when he had passed the door that night. And he had thought she was softening up!

The worst of it was, in the like circumstances he could never have done it. He was afraid of blood, especially his own.

'Jeanette…*Why* did you do it?'

She was silent a long time. At last she said:

'Do you believe in God?'

'Of course not?' he said indignantly. 'Do you?'

'I don't know whether I do or not. But there's one thing I was sure of, right from the start: You'd be a damn poor substitute.'

Book 3 Surface Tension Prologue Dr. Chatvieux took a long time over the microscope, leaving la Ventura with nothing to do but look at the dead landscape of Hydrot. Waterscape, he thought, would be a better word. From space, the new world had shown only one small, trian- gular continent, set amid endless ocean; and even the con- tinent was mostly swamp. The wreck of the seed-ship lay broken squarely across the one real spur of rock which.Hydrot seemed to possess, which reared a magnificent twenty-one feet above sea-level. From this eminence, la Ventura could see forty miles to the horizon across a flat bed of mud. The red light of the star Tau Ceti, glinting upon thousands of small lakes, pools, ponds and puddles, made the watery plain look like a mosaic of onyx and ruby. "If I were a religious man," the pilot said suddenly, "I'd call this a plain case of divine vengeance." Chatvieiix said: "Hmn?" "It's as if we'd been struck down foris it hubris? Pride, arrogance?" "Hybris," Chatvieux said, looking up at last. "Well, is it? I don't feel swollen with pride at the moment. Do you?" ."I'm not exactly proud of my piloting," la Ventura ad- mitted. "But that isn't quite what I mean. I was thinking about why we came here in the first place. It takes a lot of 'arro- gance to think that you can scatter men, or at least things very much like men, all over the face of the galaxy. It takes even more pride to do the jobto pack up all the equipment and move from planet to planet and actually make men, make them suitable for every place you touch." "I suppose it does," Chatvieux said. "But we're only one of several hundred seed-ships in this limb of the galaxy, so I doubt that the gods picked us out as special sinners." He smiled. "If they had, maybe they'd have left us our ultra- phone, so the Colonization Council could hear about our cropper. Besides, Paul, we don't make men. We adapt them adapt them to Earthlike planets, nothing more than that. We've sense enoughor humility enough, if you-tike-tfest" betterto know that we can't adapt men to a planet like Ju- piter, or to the surface of a sun, like Tau Ceti." "Anyhow, we're here," la Ventura said grimly. "And we aren't going to get off. Phil tells me that we don't even have our germ-cell bank any more, so we can't seed this place in the usual way. We've been thrown onto a dead world and dared to adapt to it. What are the pantropes going to do with our recalcitrant carcassesprovide built-in waterwings?" "No," Chatvieux said calmly. "You and I and all the rest of us are going to die, Paul. Pantropic techniques don't work on the body; that was fixed for you for life when you were conceived. To attempt to rebuild it for you would only maim you. The pantropes affect only the genes, the inheritance- carrying factors. We can't give you built-in waterwings, any more than we can give you a new set of brains. I think we'll be able to populate this world with men, but we won't live to see it." The pilot thought

about it, a lump of cold blubber collect- , ing gradually in his stomach. "How long do you give us?" he said at last. "Who knows? A month, perhaps." The bulkhead leading to the wrecked section of the ship was pushed back, admitting salt, muggy air, heavy with carbon dioxide. Philip Strasvogel, the communications officer, came in, tracking mud. Like la Ventura, he was now a man without a function, and it appeared to bother him. He was not well equipped for introspection, and with his ultraphone totally smashed, unresponsive to his perpetually darting hands, he had been thrown back into his own mind, whose resources were few. Only the tasks Chatvieux had set him to had pre- vented him from setting like a gelling colloid into a perma- nent state of the sulks. He 'unbuckled from around his waist a canvas belt, into the loops of which plastic vials were stuffed like cartridges. "More samples. Doc," he said. "All alikewater, very wet. I have some quicksand in one boot, too. Find anything?" "A good deal, Phil. Thanks. Are the others around?" Strasvogel poked his head out and hallooed. Other voices rang out over the mudflats. Minutes later, the rest of the sur- vivors of the crash were crowding into the pantrope deck: Saltonstall, Chatvieux' senior assistant, a perpetually sanguine, perpetually youthful technician willing to try anything once, including dying; Eunice Wagner, behind whose placid face rested the brains of the expedition's only remaining ecologist; Eleftherios Venezuelos, the always-silent delegate from the Colonization Council; and Joan Heath, a midshipman whose duties, like la Ventura's and Phil's, were now without mean- ing, but whose bright head and tall, deceptively indolent body shone to the pilot's eyes brighter than Tau Ceti brighter, since the crash, even than the home sun. Five men and two womento colonize a planet on which "standing room" meant treading water. They came in quietly and found seats or resting places on the deck, on the edges of tables, in corners. Joan Heath went to stand beside la Ventura. They did not look at each other, but the warmth of her shoulder beside his was all that he needed. Nothing was as bad as it seemed. Venezuelos said: "What's the verdict, Dr. Chatvieux?" "This place isn't dead," Chatvieux said. "There's life in the sea and in the fresh water, both. On the animal side of the ledger, evolution seems to have stopped with the Crustacea; the most advanced form I've found is a tiny crayfish, from one of the local rivulets, and it doesn't seem to be well dis- tributed. The ponds and puddles are well-stocked with small metazoans of lower orders, right up to the rotifersincluding a castle-building genus like Earth's Floscularidae. In addi- tion, there's a wonderfully variegated protozoan population, with a dominant ciliate type much like Pammoecium, plus various Sarcodines, the usual spread of phyto-flagellates, and even a phosphorescent species I wouldn't have expected to see anywhere but in salt water. As for the plants, they run from simple blue-green algae to quite advanced thallus-producing typesthough none of them, of course, can live out of the water." "The sea is about the same," Eunice said. "I've found some of the larger simple metazoansjellyfish and so onand some crayfish almost as big as lobsters. But it's normal to find QI salt-water species running larger than fresh-water. Ana there's the usual plankton and nannoplankton population." "In short," Chatvieux said, "we'll survive hereif we fight." "Wait a minute," la Ventura said. "You've just finished tell- ing me that we wouldn't survive. And you were talking about us, the seven of us here, not about the genus man, because we don't have our germ-cells banks any more. What's" "We don't have the banks. But we ourselves can contribute germ-cells, Paul. I'll get to that in a moment." Chatvieux turned to Saltonstall, "Martin, what would you think of our taking to the sea? We came out of it once, long ago; maybe we could come out of it again on Hydrot." "No good," Saltonstall said immediately. "I like the idea, but I don't think this planet ever heard of Swinburne, or Homer, either. Looking at it as a colonization problem alone, as if we weren't involved in it ourselves, I wouldn't give you an Oc dollar for epi oinopa ponton. The evolutionary pressure there is too high, the competition from other species is prohibitive; seeding the sea should be the last thing we attempt, not

the first. The colonists wouldn't have a chance to learn a thing before they'd be gobbled up." "Why?" la Ventura said. Once more, the death in his stomach was becoming hard to placate. "Eunice, do your sea-going Coelenterates include anything like the Portuguese man-of-war?" The ecologist nodded. "There's your answer, Paul," Saltonstall said. "The sea is out. It's got to be fresh water, where the competing creatures are less formidable and there are more places to hide." "We can't compete with a jellyfish?" la Ventura asked, swal- lowing. "No, Paul," Chatvieux said. "Not with one that dangerous. The pantropes make adaptations, not gods. They take human germ-cellsin this case, our own, since our bank was wiped out in the crashand modify them genetically toward those of creatures who can live in any reasonable environment. The result will be manlike, and intelligent. It usually shows the donors' personality patterns, too, since the modifications are usually made mostly in the morphology, not so much in the mind, of the resulting individual. "But we can't transmit memory. The adapted man is worse than a child in the new environment. He has no history, no techniques, no precedents, not even a language. In the usual colonization project, like the Tellura affair, the seeding teams more or less take him through elementary school before they leave the planet to him, but we won't survive long enough to give such instruction. We'll have to design our colonists with plenty of built-in protections and locate them in the most fa- vorable environment possible, so that at least some of them will survive learning by experience alone." The pilot thought about it, but nothing occurred to him which did not make the disaster seem realer and more inti- mate with each passing second. Joan Heath moved slightly closer to him. "One of the new creatures can have my per- sonality pattern, but it won't be able to remember being me. Is that right?" "That's right. In the present situation we'll probably make our colonists haploid, so that some of them, perhaps many, will have a heredity traceable to you alone. There may be just the faintest of residuums of identitypantropy's given us some data to support the old Jungian notion of ancestral memory. But we're all going to die on Hydrot, Paul, as self- conscious persons. There's no avoiding that. Somewhere we'll leave behind people who behave as we would, think and feel as we would, but who won't remember la Ventura, or Dr. Chatvieux, or Joan Heathor the Earth." The pilot said nothing more. There was a gray taste in his mouth. "Saltonstall, what would you recommend as a form?" The pantropist pulled reflectively at his nose. "Webbed ex- tremities, of course, with thumbs and big toes heavy and thorn-like for defense until the creature has had a chance to learn. Smaller external ears, and the eardrum larger and closer to the outer end of the ear-canal. We're going to have to reorganize the water-conservation system, I think; the glo- merular kidney is perfectly suitable for living in fresh water, but the business of living immersed, inside and out, for a creature with a salty inside means that the osmotic pressure inside is going to be higher than outside, so that the kidneys are going to have to be pumping virtually all the time. Under the circumstances we'd best step up production of urine, and that means the antidiuretic function of the pituitary gland is going to have to be abrogated, for all practical purposes." "What about respiration?" "Hm," Saltonstall said. "I suppose book-lungs, like some of the arachnids have. They can be supplied by intercostal spiracles. They're gradually adaptable to atmosphere-breath- ing, if our colonist ever decides to come out of the water. Just to provide for that possibility. I'd suggest that the nose be re- tamed, maintaining the nasal cavity as a part of the otologi- cal system, but cutting off the cavity from the larynx with a membrane of cells that are supplied with oxygen by direct irrigation, rather than by the circulatory system. Such a mem- brane wouldn't survive for many generations, once the crea- ture took to living out of the water even for part of its life- time; it'd go through two or three generations as an amphib- ian, and''then one day it'd suddenly find itself breathing through its larynx again." "Ingenious," Chatvieux said.' "Also, Dr. Chatvieux, I'd suggest that we have it adopt spOTulation. As an aquatic animal, our colonist is going

to have an indefinite life-span, but we'll have to give it a breed- ing cycle of about six weeks to keep up its numbers during the learning period; so there'll have to be a definite oreak of some duration in its active year. Otherwise it'll hit the popu- lation problem before it's learned enough to cope with it." "And it'd be better if our colonists could winter over in- side a good, hard shell," Eunice Wagner added in agreement. "So sporulation's the obvious answer. Many other microscopic creatures have it." "Microscopic?" Phil said incredulously. "Certainly," Chatvieux said, amused. "We can't very well crowd a six-foot man into a two-foot puddle. But that raises a question. We'll have tough competition from the rotifers, and some of them aren't strictly microscopic; for that matter even some of the protozoa can be seen with the naked eye, just barely, with dark-field illumination. I don't think your average colonist should run much under 250 microns, Sal- tonstall. Give them a chance to slug it out." "I was thinking of making them twice that big." "Then they'd be the biggest animals in their environment," Eunice Wagner pointed out, "and won't ever develop any skills. Besides, if you make them about rotifer size, it will give them an incentive for pushing out the castle-building rotifers, and occupying the castles themselves, as dwellings." Chatvieux nodded. "All right, let's get started. While the pantropes are being calibrated, the rest of us can put our heads together on leaving a record for these people. We'll micro-engrave the record on a set of corrosion-proof metal leaves, of a size our colonists can handle conveniently. We can tell them, very simply, what happened, and plant a few sug- gestions that there's more to the universe than what they find in their puddles. Some day they may puzzle it out." "Question," Eunice Wagner said. "Are we going to tell them they're microscopic? I'm opposed to it. It may saddle their entire early history with a gods-and-demons mythology that they'd be better off without." 94 "Yes, we are," Chatvieux said; and la Ventura could tell by the change in the tone of his voice that he was speaking now as their senior on the expedition. "These people will be of the race of men, Eunice. We want them to win their way back into the community of men. They are not toys, to be protected from the truth forever in a fresh-water womb." "Besides," Saltonstall observed, "they won't get the record translated at any time in their early history. They'll have 'to develop a written language of their own, and it will be im- possible for us to leave them any sort of Rosetta Stone or other key. By the time they can decipher the truth, they should be ready for it." "I'll make that official," Venezuelos said unexpectedly. And that was that. And then, essentially, it was all over. They contributed the cells that the pantropes would need. Privately, la Ventura and Joan Heath went to Chatvieux and asked to contribute jointly; but the scientist said that the microscopic men were to be haploid, in order to give them a minute cellular structure, with nuclei as small as Earthly rickettsiae, and therefore each person had to give germ-cells individuallythere would be no use for zygotes. So even that consolation was denied them; in death they would have no children, but be in- stead as alone as ever. They helped, as far as they could, with the text of the message which was to go on the metal leaves. They had their personality patterns recorded. They went through the mo- tions. Already they were beginning to be hungry; the sea- crayfish, the only things on Hydrot big enough to eat, lived in water too deep and cold for subsistence fishing. After la Ventura had Set his control board to rightsa useless gesture, but a habit he had been taught to respect, and which in an obscure way made things a little easier to bear he was out of it. He sat by himself at the far end of the rock ledge, watching Tau Ceti go redly down, chucking pebbles into the nearest pond. After a while Joan Heath came silently up behind him, and sat down too. He took her hand. The glare of the red sun was almost extinguished now, and together they watched it go, with la Ventura, at least, wondering somberly which nameless puddle was to be his Lethe. He never found out, of course. None of them did. Cycle One In a forgotten comer of the galaxy, the watery world of Hy- drot hurtles endlessly around the red star, Tau Ceti. For many months its single small continent has been snowbound, and

the many pools and lakes which dot the continent have been locked in the grip of the ice. Now, however, the red sun swings closer and closer to the zenith in Hydrot's sky; the snow rushes in torrents toward the eternal ocean, and the ice recedes toward the shores of the lakes and ponds . . . The first thing to reach the consciousness of the sleeping Lavon was a small, Intermittent scratching sound. This was followed by a disquieting sensation in his body, as if the worldand Lavon with itwere being rocked back and forth. He stirred uneasily, without opening his eyes. His vastly slowed metabolism made him feel inert and queasy, and the rocking did not help. At his slight motion, however, both the sound and the motion became more insistent. It seemed to take days for the fog over his brain to clear, but whatever was causing the disturbance would not let him rest. With a groan he forced his eyelids open and made an abrupt gesture with one webbed hand. By the waves of phos- phorescence which echoed away from his fingers at the motion, he could see that the smooth amber walls of his spherical shell were unbroken. He tried to peer through them, but he could see nothing but darkness outside. Well, that was nat- ural; the amnionic fluid inside the spore would generate light, but ordinary water did not, no matter how vigorously it was stirred. Whatever was outside the sphere was rocking it again, with the same whispering friction against its shell. Probably some nosey diatom, Lavon thought sleepily, trying to butt its way through an object it Was too stupid to go around. Or some early hunter, yearning for a taste of the morsel inside the spore. Well, let it worry itself; Lavon had no intention of breaking the shell just yet. The fluid in which he had slept for so many months had held his body processes static, and had slowed his mind. Once out into the water, he would have to start breathing and looking for food again, and he could tell by the unrelieved darkness outside that it was too early in the spring to begin thinking about that. He flexed his fingers reflectively, in the disharmonic motion from little finger to thumb that no animal but man can copy, and watched the widening wavefronts of greenish light re- bound in larger arcs from the curved spore walls. Here he was, curled up quite comfortably in a little amber ball, where he could stay until even the depths were warm and light. At this moment there was probably still some ice on the sky, and certainly there would not be much to eat as yet. Not that there was ever much, what with the voracious rotifers coming awake too with the first gust of warm water The rotifers I That was it. "There was a plan afoot to drive them out. Memory returned in an unwelcome rush. As if to help it, the spore rocked again. That was probably one of the Protos, trying to awaken him; nothing man-eating ever came to the Bottom this early. He had left an early call with the Paras, and now the time had come, as cold and early and dark as he had thought he wanted it. Reluctantly, Lavon uncurled, planting his webbed toes and arching his backbone as hard as he could, pressing with his whole body against his amber prison. With small, sharp, crepitating sounds, a network of cracks raced through the translucent shell. Then the spore wall dissolved into a thousand brittle shards, and he was shivering violently with the onslaught of the icy water. The warmer fluid of his winter cell dissipated silently, a faint glowing fog. In the brief light he saw, not far from him, a familiar shape: a transparent, bubble-filled cylinder, a colorless slipper of jelly, spirally grooved, almost as long as he was tall. Its surface was furred with gently vibrating fine hairs, thickened at the base. The light went out. The Proto said nothing; it waited while Lavon choked and coughed, expelling the last remnants of the spore fluid from his book-lungs and sucking in the pure, ice- cold water. "Para?" Lavon said at last. "Already?" "Already," the invisible cilia vibrated in even, emotionless tones. Each separate hair-like process buzzed at an independ- ent, changing rate; the resulting sound waves spread through the water, intermodulating, reinforcing or cancelling each other. The aggregate wave-front, by the time it reached human ears, was rather eerie, but nevertheless recognizable human speech. "This is the time, Lavon." 'Time and more than time," another voice said from the returned darkness. "If we are to. drive Flosc from his castles." "Who's that?" Lavon

said, turning futilely toward 'the new voice. "I am Para also, Lavon. We are sixteen since the awaten- ing. If you could reproduce as rapidly as we" "Brains are better than numbers," Lavon said. "As the Eat- ers will find out soon enough." "What shall we do, Lavon?" The man drew up his knees and sank to the cold mud of the .Bottom to think. Something wriggled tinder his buttocks and a tiny spirillum corkscrewed away, identifiable only by feel. He let it go; he was not hungry yet, and he had the Eat- ersthe rotifersto think about. Before long they would be swarming in the upper reaches of the sky, devouring every- thing, even men when they could catch them, even their nat- ural enemies the Protos now and then. And whether or not the Protos could be organized to battle them was a question still to be tested. Brains are better than numbers; even that, as a proposition, was still to be tested. "The Protos, after all, were intelligent after their fashion; and they knew their world, as the men did not. Lavon could still remember how hard it had been for him to get straight in his head the various clans of beings in this world, and to make sense of their confused names; his tutor Shar had drilled him unmercifully until it had begun to penetrate. When you said "Man," you meant creatures that, generally speaking, looked alike. The bacteria were of three kinds, the rods and the globes and the spirals, but they were all tiny and edible, so he had learned to differentiate them quickly. When it came to the Protos, identification became a real prob- lem. Para here was a Proto, but he certainly looked very dif- ferent from Stent and his family, and the family of Didin was unlike both. Anything, as it turned out, that was not green and had a visible nucleus was a Proto, no matter how strange its shape might be. The Eaters were all different, too, and some of them were as beautiful as the fruiting crowns of water- plants; but all of them were deadly, and all had the whirling crown of cilia which could suck you into the incessantly grinding mastex in a moment. Everything which was green and had an engraved shell of glass, Shar had called a diatom, dredging the strange word as he dredged them all from some Bottom in his skull which none of the rest of them could reach, and even Shar could not explain. Lavon arose quickly. "We need Shar," he said. "Where is his spore?" "On a plant frond, far up near the sky." Idiot! The old man would never think of safety. To sleep near the sky, where he might be snatched up and borne off by any Eater to chance by when he emerged, sluggish with win- ter's long sleep! How could a wise man be so foolish? "We'll have to hurry. Show me the way." "Soon; wait," one of the Paras said. "You cannot see. Noc is foraging nearby." There was a small stir in the texture of the 'darkness as the swift cylinder shot away. "Why do we need Shar?" the other Para said. "For his brains, Para. He is a thinker." "But his thoughts are water. Since he taught the Protos man's language, he has forgotten to think of the Eaters. He thinks forever of the mystery of how man came here. It is a mysteryeven the Eaters are not like maa. But understand- ing it will not help us to live." Lavon turned blindly toward the creature. "Para, tell me something. Why do the Protos side with us? With man, I mean? Why do you need us? The Eaters fear you." There was a short silence. When the Para spoke again, the vibrations of its voice were more blurred than before, more even, more devoid of any understandable feeling. "We live in this world," the Para said. "We are of it. We rule it. We came to that state long before the coming of men, in long warfare with the Eaters. But we think as the Eaters do, we do not plan, we share our knowledge and we exist Men plan; men lead; men are different from each other; men want to remake the world. And they hate the Eaters, as we do. We will help." "And give up your rule?" "And give it up, if the rule of men is better. That is reason. Now we can go; Noc is coming back with light." Lavon looked up. Sure enough, there was a brief flash of cold light far overhead, and then another. In a moment the spherical Proto had dropped into view, its body flaring reg- ularly with blue-green pulses. Beside it darted the second Para. "Noc brings news," the second Para said. "Para is twenty- four. The Syn are awake by thousands along the sky. Noc spoke to a Syn colony, but they will not help us; they all ex- pect to be dead before the Eaters awake." "Of course," said the first Para. "That always happens. And the

Syn are plants; why should they help the Protos?" "Ask Noc if he'll guide us to Shar," Lavon said impatiently. The Noc gestured with its single short, thick tentacle. One of the Paras said, "That is what he is here for." "Then let's go. We've waited long enough." The mixed quartet soared away from the Bottom' through the liquid darkness. "No," Lavon snapped. "Not a second longer. The Syn are awake, and Nothoica of the Eaters is due right after that. You know that as well as I do, Shar. Wake upl" "Yes, yes," the old man said fretfully. He stretched and yawned. "You're always in such a hurry, Lavon. Where's Phil? He made his spore near mine." He pointed to a still-unbroken amber sphere sealed to a leaf of the water-plant one tier below. "Better push him off; he'll be safer on the Bottom." "He would never reach the Bottom," Para said. "The ther- mocline has formed." Shar looked surprised. "It has? Is it as late as all that? Wait while I get my records together." He began to search along the leaf in the debris and the piled shards of his spore. Lavon looked impatiently about, found a splinter of stonewort, and threw it heavy end first at the bubble of Phil's cell just below. The spore shattered promptly, and the husky young man tum- bled out, blue with shock as the cold water hit him. "Woughl" he said. "Take it easy, Lavon." He looked up. "The old man's awake? Good. He insisted on staying up here for the winter, so of course I had to stay too." "Aha," Shar said, and lifted a thick metal plate about the length of his forearm and half as wide. "Here is one of them. Now if only I haven't misplaced the other" Phil kicked away a mass of bacteria. "Here it is. Better give them both to a Para, so they won't burden you. Where do we go from here, Lavon? It's dangerous up this high. I'm just glad a Dicran hasn't already shown up." "I here," something droned just above them. Instantly, without looking up, Lavon flung himself out and down into the open water, turning his head to look back over his shoulder only when he was already diving as fast as he could go. Shar and Phil had evidently sprung at the same instant. On the next frond above where Shar had spent his winter was the armored, trumpet-shaped body of the rotifer Dicran, contracted to leap after them. The two Protos came curving back out of nowhere. At the same moment, the bent, shortened body of Dicran flexed in its armor plate, straightened, came plunging toward them. There was a soft plop and Lavon found himself struggling in a fine net, as tangled and impassible as the matte of a lichen. A second such sound was followed by a muttered imprecation from Phil. Lavon struck out fiercely, but he was barely able to wriggle in the web of wiry, transparent stuff. "Be still," a voice which he recognized as Para's throbbed behind him. He managed to screw his head around, and then kicked himself mentally for not having realized at once what had happened. The Paras had exploded the trichocysts which lay like tiny cartridges beneath their pellicles; each one cast forth a liquid which solidified upon contact with the water in a long slender thread. It was their standard method of defense. Farther down, Sharand Phil drifted with the second Para in the heart of a white haze, like creatures far gone in mold. Dicran swerved to avoid it, but she was evidently unable to give up; she twisted and darted around them, her corona buzzing harshly, her few scraps of the human language for- gotten. Seen from this distance, the rotation of the corona was revealed as an illusion, created by the rhythm of pulsa- tion of the individual cilia, but as far as Lavon was con- cerned the point was solely technical and the distance was far too short. Through the transparent armor Lavon could also see the great jaws of Dicran's mastax, grinding away me- chanically at the fragments which poured into her unheeding mouth. High above them all, Noc circled indecisively, illuminating the whole group with quick, nervous flashes of his blue light. He was a flagellate, and had no natural weapons against the rotifer; why he was, hanging around drawing attention to himself Lavon could not imagine. Then, suddenly, he saw the reason: a barrel-like creature about Noc's size, ringed with two rows of cilia and bearing a ram-like prow. "Didin!" he shouted, unnecessarily. "This way!" The Proto swung gracefully toward them and seemed to survey them, though it was hard to tell how he could see them without eyes. The Dicran saw

him at the same time and began to back slowly away, her buzzing rising to a raw snarl. She regained the plant and crouched down. For an instant Lavon thought she was going to give up, but experience should have told him that she lacked the sense. Suddenly the lithe, crouched body was in full spring again, this time straight at Didin. Lavon yelled an incoherent warning. The Proto didn't need it. The slowly cruising barrel darted to one side and then forward, with astonishing speed. If he could sink that poisoned seizing-organ into a weak point in the rotifer's armor Noc mounted higher to keep out of the way of the two fighters, and in the resulting weakened light Lavon could not see what was happening, though the furious chumirig of the water and the buzzing of the Dicran continued. After a while the sounds seemed to be retreating; Lavon crouched in the gloom inside the Para's net, listening intently. Finally there was silence. "What's happened?" he whispered tensely. "Didin does not say." More eternities went by. Then the darkness began to wane as Noc dropped cautiously toward them. "Noc, where did they go?" Noc signaled with his tentacle and turned on his axis toward Para. "He says he lost sight of them. Wait1 hear Didin." Lavon could hear nothing; what the Para "heard" was some one of thesemi-telepathic impulses which made up the Proto's own language. "He says Dioran is dead." "Good! Ask him to bring the body back here." There was a short silence. "He says he will bring it. What good is a dead rotifer, Lavon?" "You'll see," Lavon said. He watched anxiously until Didin glided backwards into the lighted area, his poisonous ram sunk deep into the flaccid body of the rotifer, which, after the delicately-organized fashion of its kind, was already b&- ginning to disintegrate. "Let me out of this net, Para." The Proto jerked sharply for a fraction of a turn on its long axis, snapping the threads off at the base; the movement had to be made with great precision, or its pellicle would tear as well. The tangled mass rose gently with the current and drifted off over the abyss. Lavon swam forward and, seizing one buckled edge of Dicran's armor, tore away a huge strip of it. His hands plunged into the now almost shapeless body and came out again holding two dark spheroids: eggs. "Destroy these, Didin," he ordered. The Proto obligingly slashed them open. "Hereafter," Lavon said, "that's to be standard procedure with every Eater you kill." "Not the males," one of the Para pointed out. "Para, you have no sense of humor. All right, not the males but nobody kills the males anyhow, they're harmless." He looked down grimly at the inert mass. "Rememberdestroy the eggs. Killing the beasts isn't enough. We want to wipe out the whole race." "We never forget," Para said emotionlessly. The band of over two hundred humans, with Lavon and Shar and a Para at its head, fled swiftly through the warm, light waters of the upper level. Each man gripped a wood splinter, or a fragment of lime chipped from stonewort, as a club; and two hundred pairs of eyes darted watchfully from side to side. Cruising over them was a squadron of twenty Didins, and the rotifers they encountered only glared at them from single red eyespots, making no move to attack. Overhead, near the sky, the sunlight was filtered through a thick layer of living creatures, fighting and feeding and spawning, so that all the depths below were colored a rich green. Most of this heavily populated layer was made up of algae and diatoms, and there the Eaters fed unhindered. Sometimes a dying diatom dropped slowly past the army. The spring was well advanced; the two hundred, Lavon thought, probably represented all of the humans who had survived the winter. At least no more could be found. The othersnobody would ever know how manyhad awakened too late in the season, or had made 'their spores in exposed places, and the rotifers had snatched them up. Of the group, more than a third were women. That meant that in another forty days, if they were unmolested, they could double the size of their army. If they were unmolested. Lavon grilmed and pushed an agitated colony of Eudorina out of his way. The phrase re- minded him of a speculation Shar had brought forth last year: If Para were left unmolested, the oldster had said, he could reproduce fast enough to fill this whole universe with a solid mass of Paras before the season was out. Nobody, of course, ever went unmolested in this world;

nevertheless, Lavon meant to cut the odds for people considerably below anything that had heretofore been thought of as natural. His hand flashed up, and down again. The darting squad- rons plunged after him. "The light on the sky faded rapidly, and after a while Lavon began to feel slightly chilly. He signaled again. Like dancers, the two hundred swung their bodies in mid-flight, plunging now feet first toward the Bot- tom. To strike the thermocline in this position would make their passage through it faster, getting them out of the upper level where every minute, despite the convoy of Protos, con- centrated danger. irn Lavon's feet struck a yielding surface, and with a splash he was over his head in icy water. He bobbed up again, feeling the icy division drawn across his shoulders. Other splashes began to sound all along the thermocline as the army struck it, although, since there was water above and below, Lavon could not see the actual impacts. Now they would have to wait until their body temperatures fell. At this dividing line of the universe, the warm water ended and the temperature dropped rapidly, so that the water below was much denser and buoyed them up. The lower level of cold reached clear down to the Bottoman area which the rotifers, who were not very clever, seldom managed to enter. A moribund diatom drifted down beside Lavon, the green- ish-yellow of its body fading to a sick orange, its beautifully- marked, oblong, pillbox-like shell swarming with greedy bacteria. It came to rest on the thermocline, and the trans- parent caterpillar tread of jelly which ran around it moved feebly, trying vainly to get traction on the sliding water inter- face. Lavon reached out a webbed hand and brushed away a clot of vibrating rods which had nearly forced its way into the shell through a costal opening. "Thank . . ." the diatom said, in an indistinct, whispering voice. And again, "Thank . . . Die . . ." The gurgling whisper faded. The caterpillar tread shifted again, then was motion- less. "It is right," a Para said. "Why do you bother with those creatures? They are stupid. Nothing can be done for them." Lavon did not try to explain. He felt himself sinking slow- ly, and the water about his trunk and legs no longer seemed cold, only gratefully cool after the stifling heat of that he was breathing. In a moment the cool still depths had closed over his head. He hovered until he was reasonably sure that all the rest of his army was safely through, and the long ordeal of search for survivors in the upper level really ended. Then he twisted and streaked for the Bottom, Phil and Para beside him, Shar puffing along with the vanguard. A stone loomed; Lavon surveyed it in the half-light Almost immediately he saw what he had hoped to see: the sand-built house of a caddis-worm, clinging to the mountain- ous slopes of the rock. He waved in his special cadre and pointed. Cautiously the men spread out in a U around the stone, the mouth of the U facing the same way as the opening of the worm's masonry tube. A Noc came after them, drifting like a star-shell above the peak; one of the Paras approached the door of the worm's house, buzzing defiantly. Under cover of this challenge the men at the back of the U settled on the rock and began to creep forward. The house was three times as tall as they were; the slimy black sand grains of which it was composed were as big as their heads. There was a stir inside, and after a moment the ugly head of the worm peered out, weaving uncertainly at the buzzing Para which had disturbed it. The Para drew back, and the worm, in a kind of blind hunger, followed it. A sudden lunge brought it nearly halfway out of its tube. Lavon shouted. Instantly the worm was surrounded by a howling horde of two-legged demons, who beat and prodded it mercilessly with fists and clubs. Somehow it made a sound, a kind of bleat as unlikely as the bird-like whistle of a fish, and began to slide backwards into its homebut the rear guard had already broken in back there. It jerked forward again, lashing from side to side under the flogging. There was only one way now for the great larva to go, and the demons around it kept it going that way. It fell toward the Bottom down the side of the rock, naked and ungainly, shaking its blind head and bloating. Lavon sent five Didin after it. They could not kill it, for it was far too huge to die under their poison, but they could sting it hard enough to keep it travelling. Otherwise, it would be almost sure to return to the rock

to start a new house. Lavon settled on an abutment and surveyed his prize with satisfaction. It was more than big enough to hold his entire clana great tubular hall, easily defended once the breach in the rear wall was rebuilt, and well out of the usual haunts of the Eaters. The muck the caddis-worm had left behind would have to be cleaned up, guards posted, vents knocked out to keep the oxygen-poor water of the depths in motion inside. It was too bad that the amoebae could not be detailed to scavenge the place, but Lavon knew better than to issue such an order. The Fathers of the Protos could not be asked to do useful work; that had been made very clear. He looked around at his army. They were standing around him in awed silence, looking at the spoils of their attack upon the largest creature in the world. He did not think they would ever again feel as timid toward the Eaters. He stood up quickly. "What are you gaping at?" he shouted. "It's yours, all of it. Get to work!" Old Shar sat comfortably upon a pebble which had been hoUowed out and cushioned with spirogyra straw. Lavon stood nearby at the door, looking out at the maneuvers of his legions. They numbered more than three hundred now, thanks to the month of comparative quiet which they had enjoyed in the great hall, and they handled their numbers well in the aquatic drill which Lavon had invented for them. "They swooped and turned above the rock, breaking and re- assembling their formations, fighting a sham battle with in- visible opponents whose shape they could remember only too well. "Noc says there's all kinds of quarreling going on among the Eaters," Shar said. "They didn't believe we'd joined with the Protos at first, and then they didn't believe we'd all worked together to capture the hall. And the mass raid we had last week scared them. They'd never tried anything of the kind before, and they knew it wouldn't fail. Now they're fighting with each other over why it did. Cooperation is something new to this world, Lavon; it's making history." "History?" Lavon said, following his drilling squadrons with a technical eye. "What's that?" "These." The old man leaned over one arm of the pebble and touched the metal plates which were always with him. Lavon turned to follow the gesture, incuriously. He knew the plates well enoughthe pure uncorroded shining, graven deeply on both sides with characters no-one, not even Shar, could read. The Protos called the plates Not-staffneither wood nor flesh nor stone. "What good is that? I can't read it. Neither can you." "I've got a start, Lavon. I know the plates are written in our language. Look at the first word: ha ii ss tub oh or ee exactly the right number of characters for 'history'. That can't be a coincidence. And the next two words have to be 'of the'. And going on from there, using just the Characters I already know" Shar bent and traced in the sand with a stick a new train of characters: illerstel I or el I elition. "What's that?" "It's a start, Lavon. Just a start. Some day we'll have more." Lavon shrugged. "Perhaps, when we're safer. We can't afford to worry about that kind of thing now. We've never had that kind of time, not since the First Awakening." The old man frowned down at the characters in the sand. "The First Awakening. Why does everything seem to stop there? I can remember in the smallest detail nearly everything that happened to me since then. But what happened to our childhoods, Lavon? None of us who survived the First Awakening seems to have had one. Who were our parents? Why were we so ignorant of the world, and yet grown men and women, all of us?" "And the answer is in the plates?" "I hope so," Shar said. "I believe it is. But I don't know. The plates were beside me in the spore at the First Awaken- ing. That's all I know about them, except that there's nothing else like them in the world. The rest is deduction, and I haven't gotten very far with it. Some day . . . some day." "I hope so too," Lavon said soberly. "I don't mean to mock, Shar, or to be impatient. I've got questions, too; we all have. But we're going to have to put them off for a while. Suppose we never find the whole answer?" "Then our children will." "But there's the heart of the problem, Shar: we have to live to have children. And make the kind of a world in which they'll have time to study. Otherwise" Lavon broke off as a figure darted between the guards at the door of the hall and twisted to a halt "What news, lhil?" "The same," Phil said, shrugging with his whole body. His feet

touched the floor. "The Flosc's castles are going up all along the bar; they'll be finished with them soon, and then we won't dare to get near them. Do you still Mnic you can drive them out?" Lavon nodded. "But why?" "First, for effect. We've been on the defensive so far, even though we've made a good job of it. We'll have to follow that up with an attack of our own if we're going to keep the Eaters confused. Second, the castles Flosc builds are all ' tunnels and exits and entrancesmuch better than worm- houses for us. I hate to think of what would have happened if the Eaters had thought of blockading us inside this hall. And we need an outpost in enemy country, Phil, where there are Eaters to kill." "This is enemy country," Phil said. "Stephanost is a Bottom-dweller." "But she's only a trapper, not a hunter. Any time we want to kill her, we can find her right where we left her last. It's the leapers like Dicran and Nothoica, the swimmers like Rotar, the colony-builders like Flosc that we have to wipe out first." "Then we'd better start now, Lavon. Once the castles are finished" "Yes. Get your squads together, Phil. Shar, come on; we're leaving the hall." "To raid the castles?" "Of course." Shar picked up his plates. "You'd better leave those here; they'll be in your way in the fighting." "No," Shar said determinedly. "I don't want them out of my sight. They go along." Vague forebodings, all the more disturbing because he had felt nothing quite like them ever before, passed like clouds of fine silt through Lavon's mind as the army swept away from the hall on the Bottom and climbed toward the thermocline. As far as he could see, everything seemed to be going as he had planned it. As the army moved, its numbers were swelled by Protos who darted into its ranks from all sides. Discipline was good; and every man was armed with a long, seasoned splinter, and from each belt swung a. stonewort- flake hand-axe, held by a thong run through a hole Shar had taught them all how to drill. There would probably be much death before the light of today faded, but death was common enough on any day, and this time it should heavily disfavor the Eaters. But there was a chill upon the depths that Lavon did not like, and a suggestion of a current in the water which was unnatural below the thermocline. A great many days had been consumed in collecting the army, recruiting from stragglers, and in securing the hall. The intensive breeding which had followed, and the training of the new-born and the newly recruited, had taken still more time, all of it es- sential, but all irrevocable. If the chill and the current marked the beginning of the fall turnover . . . If it did, nothing could be done about it. The turnover could no more be postponed than the coming of day or night. He signaled to the nearest Para. The glistening torpedo veered toward him. Lavon pointed up. "Here comes the thermocline, Para. Are we pointed right?" "Yes, Lavon. That way is the place where the Bottom rises toward the sky. Flosc's castles are on the other side, where she will not see us." "The sand bar that runs out from the north. Right. It's getting warmer. Here we go." Lavon felt his flight suddenly quicken, as if he had been shot like a seed from some invisible thumb and forefinger. He looked over his shoulder to watch the passage of the rest through the temperature barrier, and what he saw thrilled him as sharply as any awakening. Up to now he had had no clear picture of the size of his forces, or the three-dimen- sional beauty of their dynamic, mobile organization. Even the Protos had fitted themselves into the squads; pattern after pattern of power came soaring after Lavon from the Bottom: first a single Noc bowling along like a beacon to guide all the rest, then an advance cone of Didin to watch for in- dividual Eaters who might flee to give the alarm, and then the men, and the Protos, who made up the main force, in tight formations as beautiful as the elementary geometry from which Shar had helped derive them. The sand-bar loomed ahead, as vast as any mountain range. Lavon soared sharply upward, and the tumbled, raw-boned boulders of the sand grains swept by rapidly beneath him in a broad, stony flood. Far beyond the ridge, towering up to the sky through glowing green obscurity, were the be- fronded stems of the plant jungle which was their objective. It was too dim with distance to allow him to see the clinging castles of the Flosc yet, but he knew that the longest part of the

march was over. He narrowed his eyes and cleft the sunlit waters with driving, rapid strokes of his webbed hands and feet. The invaders poured after him over the crest of the bar in an orderly torrent. Lavon swung his arm in a circle. Silently, the following squadrons glided into a great paraboloid, its axis pointed at the jungle. The castles were visible now; until the formation of the army, they had been the only products of close co- operation that this world had ever seen. They were built of single brown tubes, narrow at the base, attached to each other in a random pattern in a-n ensemble as delicate as a branching coral. In the mouth of each tube was a rotifer, a Flosc, distinguished from other Eaters by the four-leaf- clover of its corona, and by the single, prehensile finger springing from the small of its back, with which it ceaselessly molded its brown spittle into hard pellets and cemented them carefully to the rim of its tube. As usual, the castles chilled Lavon's muscles with doubt They were perfect, and they had always been one of the major, stony flowers of summer, long before there had been any First Awakening, or any men. And there was surely something wrong with the water in the upper level; it was warm and sleepy. The heads of the Flosc hummed content- ediy at the mouths of their tubes; everything was as ft should be, as it bad always been; the army was a fantasm, the attack a failure before it had begun Then they were spied. The Flosc vanished instantly, contracting violently into their tubes. The placid humming of their continuous feeding upon everything that passed was snuffed out; spared motes drifted about the castle in the light. Lavon found himself smiling. Not long ago, the Flosc would only have waited until the humans were close enough, and then would have sucked them down, without more than a few struggles here and there, a few pauses in the humming while the out-size morsels were enfolded and fed into the grinders. Now, instead, they hid; they were afraid. "Go!" he shouted at the top of his voice. "Kill them! Kill them while they're down!" The army behind him swept after him with a stunning composite shout. Tactics vanished. A petalled corona unfolded in Lavon's face, and a buzzing whirlpool spun him toward its black heart. He slashed wildly with his edged wooden splinter. The sharp edge sliced deeply into the ciliated lobes. The rotifer screamed like a siren and contracted into her tube, closing her wounded face. Grimly, Lavon followed. It was pitch dark inside the castle, and the raging currents of pain which flowed past him threw him from one pebbly wall to another. He gritted his teeth and probed with the splinter. It bit into a yielding surface at once, and another scream made his ears ring, mixed with mangled bits of words in Lavon's own language, senseless and horrible with agony. He slashed at them until they stopped, and continued to slash until he could control his terror. As soon as he was able, he groped in the torn corpse for the eggs. The point found their life and pricked it. Trembling, . he pulled himself back to the mouth of the tube, and without stopping to think pushed himself off at the first Eater to pass it. The thing was a Dicran; she doubled viciously upon him at once. Even the Eaters had learned something about co- operation. And the Dicrans fought well in open water. They were the best possible reinforcements the Flosc could have called. The Dicran's armor turned the point of Lavon's splinter easily. He jabbed frantically, hoping to hit a joint, but the agile creature gave him no time to aim. She charged him irresistibly, and her humming corona folded down around his head, pinned his forearms to his sides The Eater heaved convulsively and went limp. Lavon half slashed, half tore his way free. A Didin was drawing back, pulling out its seizing-organ. The body floated downward. "Thanks," Lavon gasped. The Proto darted off without re- plying; it lacked sufficient cilia to imitate human speech. Possibly it lacked the desire as well; the Didins were not sociable. A tearing whirlpool sprang into being again around him, and he flexed his sword-arm. In the next five dreamlike minutes he developed a technique for dealing with the sessile, sucking Flosc. Instead of fighting the current and swinging the splinter back and forth against it, he gave in to the vortex, rode with it, and braced the splinter between his feet, point down. The results were even

better than he had hoped. The point, driven by the full force of the Flosc's own .trap, pierced the soft, wormlike body half through while it gaped for the human quarry. After each encounter, Lavon doggedly went through the messy ritual of destroying the eggs. At last he emerged from a tube to find that the battle had drifted away from him. He paused on the edge to get his breath back, clinging to the rounded, translucent bricks and watching the fighting. It was difficult to make any military sense out of the melee, but as far as he could tell the rotifers were getting the worst of it. They did not know 'how to meet so carefully organized an attack, and they were not in any real sense intelligent. The Didin were ranging from one side of the fray to the other, in two tight, vicious efficient groups, englobing and de- stroying free-swimming rotifers in whole flocks at a time. Lavon saw no fewer than half a dozen Eaters trapped by teams of Paras, each pair dragging a struggling victim in a trichocyst net remorselessly toward the Bottom, where she would inevitably suffocate. He was astonished to see yone of the few Noes that had accompanied his army scouring a cringing Rotar with its virtually harmless tentacle; the Eater seemed too astonished to fight back, and Lavon for once knew just how she felt. A figure swam slowly and tiredly up to him from below. It was old Shar, puffing hard. Lavon reached a hand down to him and hauled him onto the lip of the tube. The man's face wore a frightening expression, half shock, half'pure grief. "Gone, Lavon," he said. "Gone. Lost." "What? What's gone? What's the matter?" "The plate. You were right. I should have known." He sobbed convulsively. "What plate? Calm down. What happened? Did you lose one of the history platesor both of them?" Slowly his tutor seemed to be recovering control of his breathing. "One of them," he said wretchedly. "I dropped it in the fight. I hid the other one in an empty Flosc tube. But I dropped the first onethe one I'd just begun to decipher. It went all the way down to the Bottom, and I couldn't get free to go after itall I could do was watch it go, spinning down into the darkness. We could sift the mud forever and never find it." He dropped his face into his hands. Perched on the edge of the brown tube in the green glow of the waters, he looked both pathetic and absurd. Lavon did not know what to say; even he realized that the loss was major and perhaps final, that the awesome blank in their memories prior to the First Awakening might now never be filled. How Shar felt about it he could comprehend only dimly. Another human figure darted and twisted toward him. "Lavon!" Phil's voice cried. "It's working, it's working! The swimmers are running away, what's left of them. There are still some Flosc in the castles, hiding in the darkness. If we could only lure them out in the open" Jarred back to the present, Lavon's mind raced over the pos- sibilities. The whole attack could still fail if the Flosc en- trenched themselves successfully. After all, a big kill had not been the only object; they had started out to capture the castles. . "Shardo these tubes connect with each other?" "Yes," the old man said without interest. "It's a continuous system." Lavon sprang out upon the open water. "Come on, Phil. We'll attack them from the rear." Turning, he plunged into the mouth of the tube, Phil on his heels. It was very dark, and the water was fetid with the odor of the tube's late owner, but after a moment's groping Lavon found the opening which lead into the next tube. It was easy to tell which way was out because of the pitch of the walls; everything the Flosc built had a conical bore, differing from the next tube only in size. Determinedly Lavon worked his way toward the main stem, going always down and in. Once they passed beneath an opening beyond which the water was in furious motion, and out of which poured muffled sounds of shouting and a defiant buzz. Lavon stopped to probe through the hole with his sword. The rotifer gave a shrill, startled shriek and jerked her wounded tail upward, involuntarily releasing her toe-hold upon the walls of th? tube. Lavon moved on, grinning. The men above would do the rest. Reaching the central stem at last, Lavon and Phil went methodically from one branch to another, spearing thp sur- prised Eaters from behind or cutting them loose so that the men outside could get at them as they drifted upward, pro- pelled by the drag of their own coronas. The trumpet

shape of the tube* prevented the Eaters from turning to fight, and from following them through the castle to surprise them from behind; each Plosc had only the one room, which she never left. The gutting of the castles took hardly fifteen minutes. The day was just beginning to end when Lavon emerged with Phil at the mouth of a turret to look down upon the first. City of Man. He lay in darkness, his forehead pressed against his knees, as motionless as a dead man. The water was stuffy, cold, the blackness complete. Around him were the walls of a tube of Flosc's castle; above him a Para laid another sand grain upon a new domed roof. The rest of the army rested in other tubes, covered with other new stony caps, but there was no sound of movement or of voices. It was as quiet as a ne- cropolis. Lavon's thoughts were slow and bitter as drugged syrup. He had been right about the passage of the seasons. He had had barely enough time to bring all his people from the hall to the castles before the annual debacle of the fall overturn. Then the waters of the universe had revolved once, bringing the skies to the Bottom, and the Bottom to the skies, and then mixing both. The thermocline was destroyed until next year's spring overturn would reform it. And inevitably, the abrupt change in temperature and oxygen concentration had started the spore-building glands again. The spherical amber shell was going up around Lavon now, and there was nothing he could do about it. It was an in- voluntary process, as dissociated from his control as the beat- ing of his heart. Soon the light-generatin)? oil which filled the spore would come pouring out, expelling and replacing the cold, foul water, and then sleep would come ... And all this had happened just as they had made a real gain, had established themselves in enemy country, had come within reach of the chance to destroy the Eaters wholesale and forever. Now the eggs of the Eaters had been laid, and next year it would have to be done all over again. And there was the loss of the plate; he had hardly begun to reflect upon what that would mean for the future. There was a soft chunk as the last sand grain fell into place on the roof. The sound did not quite bring the final wave of despair against which he had been fighting in advance. In- stead, it seemed to carry with it a wave of obscure content- ment, with which his consciousness began to sink more and more rapidly toward sleep. They were safe, after all. They could not be ousted from the castle. And there would be fewer Eaters next year, because of all the eggs that had been de- stroyed, and the layers of those eggs . . . There was one plate still left... Quiet and cold; darkness and silence. In a forgotten corner of the galaxy, the watery world of Hydrot hurtles endlessly around the red star, Tau Ceti. For many months life has swarmed in its lakes and pools, but now the sun retreats from the zenith, and the snow falls, and the ice advances from the eternal ocean. Life sinks once more toward slumber, simulating death, and the battles and lusts and ambitions and defeats of a thousand million microscopic creatures retreat in to the limbo where such things matter not at all. No, such things matter not at all when winter reigns on Hydrot; but winter is an inconstant king. Cycle Two Old Shar set down the thick, ragged-edged metal plate at last, and gazed instead out the window of the castle, apparently resting his eyes on the glowing green-gold obscurity of the summer waters. In the soft fluorescence which played down upon him, from the Noc dozing impassively in the groined vault of the chamber, Lavon could see that he was in fact a young man. His face was so delicately formed as to suggest that it had not been many seasons since he had first emerged from his spore. But of course there had been no real reason to have ex- pected an old man. All the Shars had" been referred to tradi- tionally as "old" Shar. The reason, like the reasons for every- thing else, had been forgotten, but the custom had persisted. The adjective at least gave weight and dignity to the office that of the center of wisdom of all the people, as each Lavon had been the center of authority. The present Shar belonged to the generation XVI, and hence would have to be at least two seasons younger than Lavon himself. If he was old, it was only in knowledge. "Lavon, I'm going to have to be honest with you," Shar said at last, still looking out of the tall, irregular window. "You've come to me at your maturity for the secrets on the metal plate, just

as your predecessors did to mine. I can give some of them to youbut for the most part, I don't know what they mean." "After so many generations?" Lavon asked, surprised. "Wasn't it Shar III who made the first complete translation? That was a long time ago." The young man turned and looked at Lavon with eyes made dark and wide by the depths into which they had been staring. "I can read what's on the plate, but most of it seems to make no sense. Worst of all, the record's incomplete. You didn't know that? It is. One of the plates was lost in a battle during the first war with the Eaters, while these castles were still in their hands." "What am I here for, then?" Lavon said. "Isn't there any- thing of value on the remaining plate? Did they really contain 'the wisdom of the Creators,' or is that another myth?" "No. No, it's true," Shar said slowly, "as far as it goes." He paused, and both men turned and gazed at the ghostly creature which had appeared suddenly outside the window. Then Shar said gravely, "Come in, Para." The slipper-shaped organism, nearly transparent except for the thousands of black-and-silver granules and frothy bubbles which packed its interior, glided into the chamber and hov- vered, with a muted whirring of cilia. For a moment it re- mained silent, speaking telepathically to the Noc floating in the vault, after the ceremonious fashion of all the Protos. No human had ever intercepted one of these colloquies, but there was no doubt about their reality; humans had used them for long-range communication for generations. Then the Para's cilia vibrated once more. "We are arrived, Shar and Lavon, according to the custom." "And welcome," said Shar. "Lavon, let's leave this matter of the plates for a while, until you hear what Para has to say; that's a part of the knowledge Lavons must have as they come into their office, and it comes before the plates. I can give you some hints of what we are. First Para has to tell you something about what we aren't." Lavon nodded, willingly enough, and watched the Proto as it settled gently to the surface of the hewn table at which Shar had been sitting. There was in the entity such a perfection and economy of organization, such a grace and surety of move- ment, that he could hardly believe m his own new-won ma- turity. Para, like all the Protos, made him feel, not perhaps poorly thought-out, but at least unfinished. "We know that in this universe there is logically no place for man," the gleaming, now immobile cylinder upon the table droned abruptly. "Our memory is the common property of all our races. It reaches back to a time when there were no such creatures as man here, nor any even remotely like men. It remembers also that once upon a day there were men here, suddenly, and in some numbers. Their spores littered the Bot- tom; we found the spores only a short time after our season's Awakening, and inside them we saw the forms of men, slum- bering. "Then men shattered their spores and emerged. At first they seemed helpless, and the Eaters devoured them by scores, as in those days they devoured everything that moved. But that soon ended. Men were intelligent, active. And they were gifted with a trait, a character, possessed by no other creature in this world. Not even the savage Eaters had it. Men organized us to exterminate the Eaters, and therein lay the difference. Men had initiative. We have the word now, which you gave us, and we apply it, but we still do not know what the thing is that it labels." "You fought beside us," Lavon said. "Gladly. We would never have thought of that war by our- selves, but it was good and brought good. Yet we wondered. We saw that men were poor swimmers, poor walkers, poor crawlers, poor climbers. We saw that men were formed to make and use tools, a concept we still do not understand, for so wonderful a gift is largely wasted in this universe, and there is no other. What good are tool-useful members such as the hands of men? We do not know. It seems plain that so radical a thing should lead to a much. greater rulership over the world than has, in fact, proven to be possible for men." Lavon's head was spinning. "Para, I had no notion that you people were philosophers." "The Protos are old," Shar said. He had again turned to look out the window, his hands locked behind his back. "They aren't philosphers, Lavon, but they are remorseless logicians. Listen to Para." "To this reasoning there could be but one outcome," the Para said. "Our strange ally, Man, was

like nothing else in this universe. He was and is unfitted for it. He does not belong here; he has beenadapted. This drives us to think that there are other universes besides this one, but where these universes might lie, and what their properties might be, it is impossible to imagine. We have no imagination, as men know." Was the creature being ironic? Lavon could not tell. He said slowly. "Other universes? How could that be true?" "We do not know," the Para's uninfleoted voice hummed. Lavon waited, but obviously the Proto had nothing more to say. Shar had resumed sitting on the window sill, clasping his knees, watching the come and go of dim shapes in the lighted gulf. "It is quite true," he said. "What is written on the plate makes it plain. Let me tell you now what it says. "We were made, Lavon. We were made by men who were not as we are, but men who were our ancestors all the same. They were caught in some disaster, and 'they made us, and put us here in our universeso that, even though they had to die, the race of men would live." Lavon surged up from the woven spirogyra mat upon which he had been sitting. "You must think I'm a fool," he said sharply. "No. You're our Lavon; you have a right to know the facts. Make what you like of them." Shar swung his webbed toes back into the chamber. "What I've told you may be hard to believe, but it seems to be so; what Para says backs it up. Our unfitness to live here is self-evident. I'll give you some ex- amples: 'The past four Shars discovered that we won't get any far- ther in our studies until we learn how to control heat. We've produced enough heat chemically to show 'that even the water around us changes when the temperature gets high enough or low enough, that we knew from the beginning. But there we're stopped." "Why?" "Because heat produced in open water is carried off as rap- idly as it's produced. Once we tried to enclose that heat, and we blew up a whole tube of the castle and killed everything in range; the shock was terrible. We measured the pressures that were involved in that explosion, and we discovered that no substance we know could have resisted them. Theory sug- gests some stronger substancesbut we need heat to form them! "Take our chemistry. We live in water. Everything seems to dissolve in water, to some extent. How do we confine a chemical test to the crucible we put it in? How do we main- tain a solution at one dilution? I don't know. Every avenue leads me to the same stone door. We're thinking creatures, Lavon, but there's something drastically wrong in the way we think about this universe we live in. It just doesn't seem to lead to results." Lavon pushed back his floating hair futilely. "Maybe you're thinking about the wrong results. We've had no trou- ble with warfare, or crops, or practical things like that. If we can't create much heat, well, most of us won't miss it; we don't need more than we "have. What's the other universe supposed to be like, the one our ancestors lived in? Is it any better than this one?" "I don't know," Shar admitted. "It was so different that it's hard to compare the two. The metal plate tells a story about men who were travelling from one place to another in a container that moved by itself. The only analogue I can think of is 'the shallops of diatom shells that our youngsters used to sled along the thennocline; but evidently what's meant is something much bigger. "I picture a huge shallop, closed on all sides, big enough to hold many peoplemaybe twenty or thirty. It had to - travel for generations through some kind of medium where there wasn't any water to breathe, so the people had to carry their own water and renew it constantly. There were no seasons; no ice formed on the sky, because there couldn't be any sky in a closed shallop; and so there was no spore formation. "Then the shallop was wrecked somehow. The people in it knew they were going to die. They made us, and put us here, as if we were their children. Because they had to die, they wrote their story on the plates, to tell us what had happened. I suppose we'd Understand it better if we had the plate Shar I lost during the warbut we don't." "The whole thing sounds like a parable," Lavon said, shrug- ging. "Or a song. I can see why you don't understand it. What I can't see is why you bother to try." "Because of the plate," Shar said. "You've handled it your- self now, so you know that we've nothing like it. We have crude, impure metals we've hammered out, metals that

last for a while and then decay. But the plate shines on, genera- tion after generation. It doesn't change; our hammers and our graving tools break against it; the little heat we can gen- erate leaves it unharmed. That plate wasn't formed in our universeand that one fact makes every word on it impor- tant to me. Someone went to a great deal of trouble to make those plates indestructible, and to give them to us. Someone to whom the word 'stars' was important enough to be worth fourteen repetitions, despite the fact that the word doesn't seem to mean anything. I'm ready to think that if our makers repeated a word even twice on a record that seems likely to last forever, then it's important for us to know what it means." Layon stood up once more. "All these extra universes and huge shallops and meaning- less words1 can't say that they don't exist, but I don't see what difference it makes," he said. "The Shars of a few generation's ago spent their whole lives breeding better algae crops for us, and showing us how to cultivate them, instead of living haphazardly on bacteria. Farther back, the Shars devised war engines, and war plans. All that was work worth doing. The Lavons of those days evidently got along without the metal plate and its puzzles, and saw to it that the Shars did, too. Well, as far as I'm concerned, you're welcome to the plate, if you like it better than crop improvementbut I think it ought to be thrown away." "All right," Shar said, shrugging. "If you don't want it, that ends the traditional interview. We'll go our" There was a rising drone from the table-top. The Para was lifting itself, waves of motion passing over its cilia, like the waves which went silently across the fruiting stalks of the fields of delicate fungi with which the Bottom was planted. It had been so silent that Lavon had forgotten it; he could tell from Shar's startlement that Shar had, too. "This is a great decision," the waves of sound washing from the creature throbbed. "Every Proto has heard it, and agrees with it. We have been afraid of this metal plate for a long time, afraid that men would learn to understand it and follow what it says to some secret place, leaving the Protos behind. Now we are not afraid." "There wasn't anything to be afraid of," Lavon said indul- gently. "No Lavon before you, Lavon, had ever said so," the Para said. "We are glad. We will throw the plate away, as Lavon orders." With that, the shining creature swooped toward the em- brasure. With it, it bore away the remaining plate, which had been resting under it on the tabletop, suspended delicately in the curved tips of its supple ventral cilia. Inside its pellucid body, vacuoles swelled to increase its buoyancy and enable it to carry the heavy weight. With a cry, Shar plunged through the water toward the window. "Stop, Para!" i But Para was already gone, so swiftly that it had pot even beard the call. Shar twisted his body and brought up one shoulder against the tower wall. He said nothing. His face was enough. Lavon could not look into it for more than an instant. The shadows of the two men began to move slowly along the uneven cobbled floor. The Noc descended toward them from the vault, its tentacle stirring the water, its internal light flaring and fading irregularly. It, too, drifted through the window after its cousin, and sank: slowly away toward the Bottom. Gently its living glow dimmed, flickered in the depths, and winked out. For many days, Lavon was able to avoid thinking much about the loss. There was always a great deal of work to be done. Maintenance of the castles was a never-ending task. The thousand dichotomously-branching wings tended to crumble with time, especially at their bases where they sprouted from one another, and no Shar had yet come forward with a mortar as good as the rotifer-spittle which had once held them together. In addition, the breaking through of windows and the construction of chambers in the early days had been haphazard and often unsound. The instinctive architecture of the Eaters, after all, had not been meant to meet the needs of human occupants. And then there were the crops. Men no longer fed precar- iously upon passing bacteria snatched to the mouth; now there were the drifting mats of specific water-fungi and algae, and the mycelia on the Bottom, rich and nourishing, which had been bred by five generations of Shars. These had to be tended constantly to keep the strains pure, and to keep the older and less

intelligent species of the Protos from grazing on them. In this latter task, to be sure, the 'more intricate and far-seeing Proto types cooperated, but men were needed to supervise. There had been a time, after the war with the Eaters, when it had been customary to prey upon the slow-moving and stupid diatoms, whose exquisite and fragile glass shells were so easily burst, and who were unable to learn that a friendly voice did not necessarily mean a friend. There were still people who would crack open a diatom when no one else was looking, but they were regarded as barbarians, to the puzzle- ment of the Protos. The blurred and simple-minded speech of the gorgeously engraved plants had brought them into the category of community petsa concept which the Protos were utterly unable to grasp, especially since men admitted that diatoms on the half-frustrule were delicious. Lavon had had to agree, very early, that the distinction was tiny. After all, humans did eat the desmids, which differed from the diatoms only in three particulars: Their shells were flexible, they could not move (and for that matter neither could all but a few groups of diatoms), and they did not speak. Yet to Lavon, as to most men, there did seem to be some kind of distinction, whether the Protos could see it or not, and that was that. Under the circumstances he felt that it was a part of his duty, as the hereditary leader of men, to protect the diatoms from the occasional poachers who browsed upon them, in defiance of custom, in the high levels of the sunlit sky. Yet Lavon found it impossible to keep himself busy enough to forget that moment when the last clues to Man's origin and destination had been seized, on authority of his own care- less exaggeration, and borne away into-dim space. It might be possible to ask Para for the return of the plate, explain that a mistake had been made. The Protos were creatures of implacable logic, but they respected men, were used to illogic in men, and might reverse their deci- sion if pressed We are sorry. The plate was carried over the bar and re- leased in the gulf. We will have the Bottom there searched, but... With a sick feeling he could not repress, Lavon knew that that would be the answer, or something very like it. When the Protos decided something was worthless, they did not hide it in some chamber like old women. They threw it away efficiently. Yet despite the tormenting of his consicence, Lavon was nearly convinced that the plate was well lost. What had it ever done for Man, except to provide Shais with useless things to think about in the late seasons of their lives? What the Shars themselves had done to benefit Man, here, in the water, in the world, in the universe, had been done by direct experimentation. No bit of useful knowledge had ever come from the plates. There had never been anything in the sec- ond plate, at least, but things best left unthought. The Protos were right. Lavon shifted his position on the plant frond, where he had been sitting in order to overlook the harvesting of an experi- mental crop of blue-green, oil-rich algae drifting in a clotted mass close to the top Of the sky, and scratched his back gently against the coarse bole. The Protos were seldom wrong, after all. Their lack of creativity, their inability to think an orig- inal thought, was a gift as well as a limitation. It allowed them to see and feel things at all times as they werenot as they hoped they might be, for they had no ability to hope, either. "La-voni Laa-vah-on!" The long halloo came floating up from the sleepy depths. Propping one hand against the top of the frond, Lavon bent and looked down. One of the harvesters was looking up at him, holding loosely the adze with which he had been split- ting free from the raft the glutinous tetrads of the algae. "I'm up here. What's the matter?" "We have the ripened quadrant cut free. Shall we tow it away?" 'Tow it away," Lavon said, with a lazy gesture. He leaned back again. At the same instant, a brilliant reddish glory burst into being above him, and cast itself down toward the depths like mesh after mesh of the finest-drawn gold. The great light which lived above the sky during the day, bright- ening or dimming according to some pattern no Shar ever had fathomed, was blooming again. Few men, caught in the warm glow of that light, could re- sist looking up at itespecially when the top of the sky itself wrinkled and smiled just a moment's climb or swim away. Yet, as always, .Lavon's bemused upward look gave him back nothing but his own

distorted, hobbling reflection, and a re- flection of the plant on which he rested. Here was the upper limit, the third of the three surfaces of the universe. The first surface was the Bottom, where the water ended. The second surface was the thermocline, definite enough in summer to provide good sledding, but easily penetrable if you knew how. The third surface was the sky. One could no more pass through that surface than one could penetrate the Bottom, nor was there any better reason to try. There the universe ended. The light which played over it daily, waxing and wan- ing as it chose, seemed to be one of its properties. Toward the end of the season, the water gradually became colder and more difficult to breathe, while at the same time the light grew duller and stayed for shorter periods between darknesses. Slow currents started to move. The high waters turned chill and started to fall. The Bottom mud stirred and smoked away, carrying with it the spores of the fields of fungi. The thermocline tossed, became choppy, and melted away. The sky began to fog with particles of soft silt carried up from the Bottom, the walls, the corners of the universe. Before very long, the whole world was cold, inhospitable, flocculent with yellowing, dying creatures. The world died until the first tentative current of warm water broke the win- ter silence. That was how it was when the second surface vanished. If the sky were to melt away . . . "Lavoni" Just after the long call, a shining bubble rose past Lavon. He reached out and poked it, but it bounded away from his sharp thumb. The gas bubbles which rose from the Bottom in late summer were almost invulnerableand when some especially hard blow or edge did penetrate them, they broke into smaller bubbles which nothing could touch, leaving be- hind a remarkably bad smell. Gas. There was no water inside a bubble. A man who got inside a bubble would have nothing to breathe. But, of course, it was impossible to enter a bubble. The surface tension was too strong. As strong as Shar's metal plate. As strong as the top of the sky. As strong as the top of the sky. And above thatonce the bubble was brokena world of gas instead of water? Were all worlds bubbles of water drifting in gas? If it were so, travel between them would be out of the question, since it would be impossible to pierce the sky to begin with. Nor did the infant cosmography include any pro- visions for Bottoms for the worlds. And yet some of the local creatures did burrow into the Bottom, quite deeply, seeking something in those depths which was beyond the reach of Man. Even the surface of the ooze, in high summer, crawled with tiny creatures for which mud was a natural medium. And though many of the en- tities with which man lived could not pass freely between the two countries of water which were divided by the thermo- cline, men could and did. And if the new universe of which Shar had spoken existed at all, it had to exist beyond the sky, where the light was. Why could not the sky be passed, after all? The fact that bubbles could sometimes be broken showed that the surface skin had formed between water and gas wasn't completely in- vulnerable. Had it ever been tried? Lavon did not suppose that one man could butt his way through the top of the sky, any more than he could burrow into the Bottom, but there might be ways around <he diffi- culty. Here at his back, for instance, was a plant which gave every appearance of continuing beyond the sky; its upper fronds broke off and were bent back only by a trick of re- flection. It had always been assumed that the plants died where they touched the sky. For the most part, they did, for frequently the dead extension could be seen, leached and yellow, the boxes of its component cells empty, floating unbedded in the perfect mirror. But some were simply chopped off, like the one which sheltered him now. Perhaps that was only an il- lusion, and instead it soared indefinitely into some other placesome place where men might once have been born, and might still live ... Both plates were gone. "There was only one other way to find out. Determinedly, Lavon began to climb toward the wavering mirror of the sky. His thorn-thumbed feet trampled oblivi- ously upon the clustered sheaths of fragile stippled diatoms. The tulip-heads of Vortae, placid and murmurous cousins of Para, retracted startledly out of his way upon coiling stalks, to make silly gossip behind him. Lavon did not hear them. He continued to climb doggedly toward the light, his fingers and toes gripping

the plant-bole. "Lavon! Where are you going? Lavoni" He leaned out and looked down. The man with the adze, a doll-like figure, was beckoning to him from a patch of blue- green retreating over a violet abyss. Dizzily he looked away, clinging to the bole; he had never been so high before. He had, of course, nothing to fear from falling, but the fear was in his heritage. Then he began to climb again. After a while, he touched the sky with one hand. He stopped to breathe. Curious bacteria gathered about the base of his thumb where blood from a small cut was fogging away, scattered at his gesture, and wriggled mindlessly back toward the dull red lure. He waited until he no longer felt winded, and resumed climbing. The sky pressed down against the top of his head, against the back of his neck, against his shoulders. It seemed to give slightly, with a tough, frictionless elasticity. The water here was intensely bright, and quite colorless. He climbed another step, driving his shoulders against that enor- mous weight. It was fruitless. He might as well have tried to penetrate a cliff. Again he had to rest. While he panted, be made a curious discovery. All around the bole of the water plant, the steel surface of the sky curved upward, making a kind of sheath. He found that he could insert his hand into itthere was al- most enough space to admit his head as well. Clinging closely to the bole, he looked up into the inside of the sheath, probing it with his injured hand. The glare was blinding. There was a tind of soundless explosion. His whole wrist was suddenly encircled in an intense, impersonal grip, as if it were being cut in two. In blind astonishment, he lunged upward. The ring of pain travelled smoothly down his upflung arm as he rose, was suddenly around his shoulders and chest. Another lunge and his knees were being squeezed in the cir- cular vise.

Another Something was horribly wrong. He clung to the bole and tried to gasp, but there wasnothing to breathe. The water came streaming out of his body, from his mouth, his nostrils, the spiracles in his sides, spurting in tangible jets. An intense and fiery itching crawled over the surface of his body. At each spasm, long knives ran into him, and from a great distance he heard more water being expelled from his book-lungs in an obscene, frothy sputtering. Inside his head, a patch of fire began to eat away at the floor of his nasal cavity. Lavon was drowning: With a final convulsion, he kicked himself away from the splintery bole, and fell. A hard impact shook him; and then the water, who had clung to him so tightly when he had first attempted to leave her, took him back with cold violence. Sprawling and tumbling grotesquely, he drifted, down and down and down, toward the Bottom. For many days, Lavon lay curled insensibly in his spore, as if in the winter sleep. The shock of cold which he had felt on re-entering his native universe had been taken by his body as a sign of coming winter, as it had taken the ozygen-starvation of his brief sojourn above the sky. The spore-forming glands had at once begun to function. Had it not been for this, Lavon would surely have died. The danger of drowning disappeared even as he fell, as the air bubbled out of his lungs and readmitted the life-giving water. But for acute desiccation and third degree sunburn, the sunken universe knew no remedy. The healing amniomc fluid generated by the spore-forming glands, after the trans- parent amber sphere had enclosed him, offered Lavon his only chance. The brown sphere, quiescent in the eternal winter of the Bottom, was spotted after some days by a prowling ameba. Down there the temperature was always an even 4, no matter what the season, but it was unheard of that a spore should be found there while the high epilimnion was still warm and rich in oxygen. Within an hour, the spore was surrounded by scores of astonished protos, jostling each other to bump their blunt eyeless prows against the shell. Another hour later, a squad of worried men came plunging from the castles far above to press their own noses against the transparent wall. Then swift orders were given. Pour Para grouped themselves about the amber sphere, and there was a subdued explosion as their trichocysts burst. The four Paras thrummed and lifted, tugging. Lavon's spore swayed gently in the mud and then rose slowly, entangled in the fine web. Nearby, a Noc cast a cold pulsating glow over the operation, for the benefit of the baf- fled knot of men. The sleeping figure of Lavon, head bowed, knees

drawn up into its chest, revolved with an absurd so- lemnity inside the shell as it was moved. "Take him to Shar, Para." The young Shar justified, by minding his own business, the traditional wisdom with which his hereditary office had in- vested him. He observed at once that there was nothing he could do for the encysted Lavon which would not be classi- fiable as simple meddling. He had the sphere deposited in a high tower room of his castle, where there was plenty of light and the water was warm, which should suggest to the estivating form that spring was again on the way. Beyond that, he simply sat and watched, and kept his speculations to himself. Inside the spore, Lavon's body seemed to be rapidly shed- ding its skin, in long strips and patches. Gradually, his curi- ous shrunkenness disappeared. His withered arms and legs and sunken abdomen filled out again. The days went by while Shar watched. Finally he could discern no more changes, and, on a hunch, had the spore taken up to the topmost battlements of the tower, into the di- rect daylight. An hour later, Lavon moved in his amber prison. He uncurled and stretched, turned blank eyes up toward the light. His expression was that of a man who had not yet awakened from a ferocious nightmare. His whole body shone with a strange pink newness. Shar knocked gently on the walls of the spore. Lavon turned his blind face toward the sound, life coming into his eyes. He smiled tentatively and braced his hands and feet against the inner wall of the shell. The whole sphere fell abruptly to pieces with a sharp crack- ling. The amnionic fluid dissipated around him and Shar, carrying away with it the suggestive odor of a bitter struggle against death. Lavon stood among the shards and looked at Shar silently. At last he said: "SharI've been above the sky." "I know," Shar said gently. Again Lavon was silent. Shar said, "Don't be humble, Lavon. You've done an epoch-making thing. It nearly cost you your life. You must tell me the restall of it." "The rest?" "You taught me a lot while you slept. Or are you still op- posed to 'useless' knowledge?" Lavon could say nothing. He no longer could tell what he knew from what he wanted to know. He had only one ques- tion left, but he could not utter it. He could only look dumb- ly into Shar's delicate face. "You have answered me," Shar said, even more gently than before. "Come, my friend; join me at my table. We will plan our journey to the stars." There were five of them around Shar's big table: Shar him- self, Lavon, and the three assistants assigned by custom to the Shars from the families Than, Tanol and Stravol. The duties of these three menor, sometimes, womenunder many previous Shars had been simple and onerous: to put into effect in the field the genetic changes in the food crops which the Shar himself had worked out in little, in laboratory tanks and flats. Under other Shars more interested in metal- working or in chemistry, they had been-smudged mendig- gers, rock-splitters, fashioners and cleaners of apparatus. Under Shar XVI, however, the three assistants had been more envied than usual among the rest of Lavon's people, for they seemed to do very little work of any kind. They spent long hours of every day talking with Shar in his chambers, poring over records, making miniscule scratch-marks on slate, or just looking intently at simple things about which there was no obvious mystery. Sometimes they actually worked with Shar in his laboratory, but mostly they just sat. Shar XVI had, as a matter of fact, discovered certain rudi- mentary rules of inquiry which, as he explained it to Lavon, he had recognized as tools of enormous power. He had become more interested in passing these on to future workers than in the seductions of any specific experiment, the journey to the stars perhaps excepted. The Than, Tanol and Stravol of his generation were having scientific method pounded into their heads, a procedure they maintained was sometimes more painful than heaving a thousand rocks. That they were the first of Lavon's people to be taxed with the problem of constructing a spaceship was, therefore, in- evitable. The results lay on the table: three models, made of diatom-glass, strands of algae, flexible bits of cellulose, flakes of stonewort, slivers of wood, and organic glues collected from the secretions of a score of different plants and animals. Lavon picked up the nearest one, a fragile spherical con- struction inside which little beads of dark-brown

lavaac- tually bricks of rotifer-spittle painfully chipped free from the wall of an unused castlemoved freely back and forth in a kind of ball-bearing race. "Now whose is this one?" he said, turning the sphere curiously to and fro. "That's mine," Tanol said. "Frankly, I don't think it comes anywhere near meeting all the requirements. It's just the only design I could arrive at that I think we could build with the materials and knowledge we have to hand now." "But how does it work?" "Hand it here a moment, Lavon. This bladder you see in- side at the center, with the hollow spirogyra straws leading out from it to the skin of the ship, is a buoyancy tank. The idea is that we trap ourselves a big gas-bubble as it rises from the Bottom and install it in the tank. Probably we'll have to do that piecemeal. Then the ship rises to the sky on the buoy- ancy of the bubble. The little paddles, here along these two bands on the outside, rotate when the crewtfiat's these bricks you hear shaking around insidewalks a treadmill that runs around the inside of the hull; they paddle us over to the edge of the sky. I stole that trick from the way Didin gets about. Then we pull the paddles inthey fold over into slots, like thisand, still by weight-transfer from the inside, we roll ourselves up the slope until we're out in space. When we hit another world and enter the water again, we let the gas out of the tank gradually through the exhaust tubes represented by these straws, and sink down to a landing at a controlled rate." "Very ingenious," Shar said thoughtfully. "But I can fore- see some difficulties. For one thing, the design lacks stability." "Yes, it does," Tanol agreed. "And keeping it in motion is going to require a lot of footwork. But if we were to sling a freely-moving weight from the center of gravity of the ma- chine, we could stabilize it at least partly. And the biggest ex- penditure of energy involved in the whole trip is going to be getting the machine up to the sky in the first place, and with this design that's taken care ofas a matter of fact, once the bubble's installed, we'll have to keep the ship tied down until we're ready to take off." "How about letting the gas out?" Lavon said. "Will it go out through those little tubes when we want it to? Won't it just cling to the walls of the tubes instead? The skin between water and gas is pretty difficult to deformto that I can tes- tify." Tanol frowned. "That I don't know. Don't forget that the tubes will be large in the real ship, not just straws as they are in the model." "Bigger than a man's body?" Than said. "No, hardly. Maybe as big through as a man's head, at the most." "Won't work," Than said tersely. "I tried it. You can't lead a bubble through a pipe that small. As Lavon says, it clings to the inside of the tube and won't be budged unless you put pressure behind itlots of pressure. If we build this ship, we'll just have to abandon it once we hit our new world; we won't be able to set it down anywhere." "That's out of the question," Lavon said at once. "Putting aside for the moment the waste involved, we may have to use the ship again in a hurry. Who knows what the new world will be like? We're going to have to be able to leave it again if it turns out to be impossible to live in." "Which is your model, Than?" Shar said. "This one. With this design, we do the trip the hard way crawl along the Bottom until it meets the sky, crawl until we hit the next world, and crawl wherever we're going when we get there. No aquabatics. She's treadmill-powered, like Tanol's, but not necessarily man-powered; I've been thinking a bit about using motile diatoms. She steers by varying the power on one side or the other. For fine steering we can also hitch a pair of thongs to opposite ends of the rear axle and swivel her that way." Shar looked closely at the tube-shaped model and pushed it experimentally along the table a little way. "I like that," he said presently. "It sits still when you want it to. With Than's spherical ship, we'd be at the mercy of any stray current at home or in the new worldand for all I know there may be currents of some sort in space, too, ga& currents perhaps. Lavori, what do you think?" "How would we build it?" Lavon said. "It's round in cross- section. That's all very well for a model, but how do you make a really big tube of that shape that won't fall in on itself?" "Look inside, through the front window," Than said. "You'll see beams that cross at the center, at right

angles to the long axis. They hold the walls braced." "That 'consumes a lot of space," Stravol objected. By far the quietest and most introspective of the three assistants, he had not spoken until now since the beginning of the confer- ence. "You've got to have free passage back and forth inside the ship. How are we going to keep everything operating if we have to be crawling around beams all the time?" "All right, come up with something better," Than said, shrugging. "That's easy. We bend hoops." "Hoops!" Tanol said. "On that scale? You'd have to soak your wood in mud for a year before it would be flexible enough, and then it wouldn't have the strength you'd need." "No, you wouldn't," Stravol said. "I didn't build a ship model, I just made drawings, and my ship isn't as good as Than's by a long distance. But my design for the ship is also tubular, so I did build a model of a hoop-bending machine that's it on the table. You lock one end of your beam down in a heavy vise, like so, leaving the butt striking out on the other side. Then you tie up the other end with a heavy line, around this notch. Then you run your line around a windlass, and five or six men wind up the windlass, like so. That pulls the free end of the beam down until the notch engages with this key-slot, which you've pro-cut at the other end. Then you un- lock the vise, and there's your hoop; for safety you might drive a peg through the joint to keep the thing from spring- ing open unexpectedly." "Wouldn't the beam you were using break after it had bent a certain distance?" Lavon asked. "Stock timber certainly would," Stravol said. "But for this trick you use green wood, not seasoned. Otherwise you'd have to soften your beam to uselessness, as Tanol says. But live wood will flex enough to make a good, strong, single-unit hoopor if it doesn't, Shar, the little rituals with numbers that you've been teaching us don't mean anything after alll" Shar smiled. "You can easily make a mistake in using num- bers," he said. "I checked everything." "I'm sure of it. And I think it's well worth a trial. Anything else to offer?" "Well," Stravol said, "I've got a kind of live ventilating sys- tem I think should be useful. Otherwise, as I said, Than's ship strikes me as the type we should build; my own's hope" lessly cumbersome." "I have to agree," Tanol said regretfully. "But I'd like to try putting together a lighter-than-water ship sometime, maybe just for local travel. If the new world is bigger than ours, it might not be possible to swim everywhere you might want to go." "That never occurred to me," Lavon exclaimed. "Suppose the new world is twice, three times, eight times as big as ours? Shar, is there any reason why that couldn't be?" "None that I know of. The history plate certainly seems to take all kinds of enormous distances practically for granted. All right, let's make up a composite design from what we have here. Tanol, you're the best draftsman among us, sup- pose you draw it up. Lavon, what about labor?" "I've a plan ready," Lavon said. "As I see it, the people who work on the ship are going to have to be on the job full time. Building the vessel isn't going to be an overnight task, or even one that we can finish in a single season, so we can't count on using a rotating force. Besides, this is technical work; once a man learns how to do a particular task, it would be wasteful to send him back to tending fungi just because somebody else has some time on his hands. "So I've set up a basic force involving the two or three most intelligent hand-workers from each of the various trades. Those people I can withdraw from their regular work without upsetting the way we run our usual concerns, or noticeably in- creasing the burden on the others in a given trade. They will do the skilled labor, and stick with the ship until it's done. Some of them will make up the crew, too. For heavy, un- skilled jobs, we can call on the various seasonal pools of un- skilled people without disrupting our ordinary life." "Good," Shar said. He leaned forward and rested linked hands on the edge of the tablealthough, because of the web- bing between his fingers, he could link no more than the fin- gertips. "We've really made remarkable progress. I didn't ex- pect that we'd have matters advanced a tenth as far as this by the end of this meeting. But maybe I've overlooked some- thing important. Has anybody any more suggestions, or any questions?" "I've got a

question," Stravol said quietly. "All right, let's hear it." 'Where are we going?" ' There was quite a long silence. Finally Shar said: "Stravol, I can't answer that yet. I could say that we're going to the stars, but since we still have no idea what a star is, that an- swer wouldn't do you much good. We're going to make this trip because we've found that some of the fantastic things that the history plate says are really so. We know now that the sky can be passed, and that beyond the sky there's a re- gion where there's no water to breathe,, the region our an- cients called 'space.' Both of these ideas always seemed to be against common sense, but nevertheless we've found that they're true. "The history plate also says that there are other worlds than ours, and actually that's an easier idea to accept, once you've fofind out that the other two are so. As for the stars well, we just don't know yet, we haven't any information at all that would allow us to read the history plate on that sub- ject with new eyes, and there's no point in mating wild guesses unless we can test the guesses. The stars are in space, and presumably, once we're out in space, we'll see them and the meaning of the word will become clear. At least we can confidently expect to see some clueslook at all the informa- tion we got from Lavon's trip of a few seconds above the skyl "But in the meantime, there's no point in our speculating in a bubble. We think there are other worlds somewhere, and we're devising means to make the trip. The other questions, the pendant ones, just have to be put aside for now. We'll an- swer them eventuallythere's no doubt in my mind about that. But it may take a long time." Stravol grinned ruefully. "I expected no more. In a way, I think the whole project in crazy. But I'm in it right out to the end, all the same." Shar and Lavon grinned back. All of them had the fever, and Lavon suspected that their whole enclosed universe would share it with them before long. He said: "Then let's not waste a minute. There's still a huge mass of detail to be worked out, and after that, all the hard work will just have begun. Let's get moving!" The five men arose and looked at each other. Their expres- sions varied, but in all their eyes there was in addition the same mixture of awe and ambition: the composite face of the shipwright and of the astronaut. Then they went out, severally, to begin their voyages. It was two winter sleeps after Lavon's disastrous climb be- yond the sky that all work on the spaceship stopped. By then, Lavon knew that he had hardened and weathered into that temporarily ageless. state a man enters after he has just reached his prime; and he knew also that there were wrinkles engraved on his brow, to Stay and to deepen. "Old" Shar, too, had changed, his features losing some of their delicacy as 'he came into his maturity. Though the wedge~ shaped bony structure of his face would give him a withdrawn and poetic look for as long as he lived, participation in 'the plan had given his expression a kind of executive overlay, which at best made it assume a mask-like rigidity, and at worst coarsened it somehow. Yet despite the bleeding away of the years, the spaceship was still only a hulk. It lay upon a platform built above the tumbled boulders of the sandbar which stretched out from one wall of the world. It was an immense hull of pegged wood, broken by regularly spaced gaps through which the raw beams of its skeleton could be seen. Work upon it had progressed fairly rapidly at first, for it was not hard to visualize what kind of vehicle would be needed to crawl through empty space without losing its water; Than and his colleagues had done that job well. It had been recognized, too, that the sheer size of the machine would en- force a long period of construction, perhaps as long as two full seasons; but neither Shar and his assistants nor Lavon had anticipated any serious snag. For that matter, part of the vehicle's apparent incomplete- ness was an illusion. About a third of its fittings were to con- sist of living creatures, which could not be expected to install themselves in the vessel much before the actual takeoff. Yet time and time again, work on the ship had to be halted for long periods. Several times whole sections needed to be ripped out, as it became more and more evident that hardly a single normal, understandable concept could be applied to the problem of space travel. The lack of the history plate, which the Para

steadfastly refused to deliver up, was a double handicap. Immediately upon its loss, Shar had set himself to reproduce it from mem- ory; but unlike the more religious of his ancestors, he had never regarded it as holy writ, and hence had never set him- self to memorizing it word by word. Even before the theft, he had accumulated a set of variant translations of passages pre- senting specific experimental problems, which were stored in his library, carved in wood. Most of these translations, how- ever, tended to contradict each other, and none of them re- lated to spaceship construction, upon which the original had been vague in any case. No duplicates of the cryptic characters of the original had ever been made, for the simple reason that there was nothing in the sunken universe capable of destroying the originals, nor of duplicatihg their apparently changeless permanence. Shar remarked too late that through simple caution they should have made a number of verbatim temporary records but after generations of green-gold peace, simple caution no longer covers preparation against catastrophe. (Nor, for that matter, does a culture which has to dig each letter of its simple alphabet into pulpy water-logged wood with a flake of stonewort encourage the keeping of records in triplicate.) As a result, Shar's imperfect memory of the contents of the history plate, plus the constant and miUenial doubt as to the accuracy of the various translations, proved finally to be the worst obstacle to progress on the spaceship itself. "Men must paddle before they can swim," Lavon observed belatedly, and Shar was forced to agree with him. Obviously, whatever the ancients had known about space- ship construction, very little of that knowledge was usable to a people still trying to build its first spaceship from scratch. In retrospect, it was not surprising that the great hulk rested in- complete upon its platform above the sand boulders, exuding a musty odor of wood steadily losing its strength, two genera- tions after its flat bottom had been laid down. The fat-faced young man who headed the strike delega- tion to Shar's chambers was Phil XX, a man two generations younger than Shar, four younger than Lavon. There were crow's-feet at the comers of his eyes, which made him look both like a querulous old man and like an infant spoiled in the spore. ' "We're calling a halt to this crazy project," he said bluntly. "We've slaved away our youth on it, but now that we're our own masters, it's over, that's all. It's over." "Nobody's compelled you," Lavon said angrily. "Society does-, our parents do," a gaunt member of the del- egation said. "But now we're going to start living in the real world. Everybody these days knows that there's no other world but this one. You oldsters can hang on to your super- stitions if you like. We don't intend to." Baffled, Lavon looked over at Shar. The scientist smiled and said, "Let them go, Lavon. We have no use for the faint- hearted." The fat-faced young man flushed. "You can't insult us into going back to work. We're through. Build your own ship to no place!" "All' right," Lavon said evenly. "Go on, beat it. Don't stand around here orating about it. You've made your decisions and we're not interested in your self-justifications. Goodbye." The fat-faced young man evidently still had quite a bit of heroism to dramatize which Lavon's dismissal had short-cir- cuited. An examination of Lavon's stony face, however, seemed to convince him that he had to take his victory as he found it. He and the delegation trailed ingloriously out the archway. "Now what?" Lavon asked when they had gone. "I must admit, Shar, that I would have tried to persuade them. We do need the workers, after all." "Not as much as they need us," Shar said tranquilly. "I know all those young men. I think they'll be astonished at the runty crops their fields will produce next season, after they have to breed them without my advice. Now, how many volunteers have you got for the crew of the ship?" "Hundreds. Every youngster of the generation after Phil's wants to go along. Phil's wrong about the segment of the pop- ulace, at least. The project catches the imagination of the very young." "Did you give them any encouragement?" "Sure," Lavon said. "I told them we'd call on them if they were chosen. But you can't take that seriously! We'd do badly to displace our picked group of specialists with youths who have enthusiasm and nothing else." "That's not what I had in mind,

Lavon. Didn't I see a Noc in these chambers somewhere? Oh, there he is, asleep in the dome. Noc!" The creature stirred its tentacle lazily. "Noc, I've a message," Shar called. "The Protos are to tell all men that those who wish to go to the next world with the spaceship must come to the staging area right away. Say that we can't promise to take everyone, but that only those who help us to build the ship will be considered at all." The Noc curled its tentacle again, and appeared to go back to sleep. Lavon turned from the arrangement of speaking-tube mega- phones which was his control board and looked at Para. "One last try," he said. "Will you give us back the history plate?" "No, Lavon. We have never denied you anything before. But this we must." "You're going with us, though, Para. Unless you give. us back the knowledge we need, you'll lose your life if we lose ours."

' "What is one Para?" the creature said. "We are all alike. This cell will die; but the Protos need to know how you fare on this journey. We believe you should make it without the plate, for in no other way can we assess the real importance of the plate." "Then you admit you still have it. What if you can't com- municate with your fellows once we're out in space? How do you know that water isn't essential to your telepathy?" The Proto was silent. Lavon stared at it a moment, then turned deliberately back to the speaking tubes. "Everyone hang on," he said. He felt shaky. "We're about to start. Stra- vol, is the ship sealed?" "As far as I can tell, Lavon." Lavon shifted to another megaphone. He took a deep breath. Already the water seemed stifling, although the ship hadn't moved. "Ready with one-quarter power. . . . One, two, three, go." The whole ship jerked and settled back into place again. The raphe diatoms along the under hull settled into their niches, their jelly treads turning against broad endless belts of crude caddis-worm leather. Wooden gears creaked, step- ping up the slow power of the creatures, transmitting it to the sixteen axles of the ship's wheels. The ship rocked and began to roll slowly along the sand bar. Lavon looked tensely through the mica port. The world flowed painfully past him. The ship canted and began to climb the slope. Behind him, he could feel the electric silence of Shar, Para, and the two alternate pilots. Than and Stravol, as if their gaze were stabbing directly through his body and on out the port. The world looked different, now that he was leaving it. How had he missed all this beauty before? The slapping of the endless belts and the squeaking and groaning of the gears and axles grew louder as the slope steep- ened. The ship continued to climb, lurching. Around it, squad- rons of men and Protos dipped and wheeled, escorting it to- ward the sky. Gradually the sky lowered and pressed down toward the top of the ship. "A little more work from your diatoms, Tanol," Lavon said. "Boulder ahead." The ship swung ponderously. "All right, slow them up again. Give us a shove from your side, Tolno, that's too muchthere, that's it. Back to normal; you're still turning us I Tanol, give us one burst to line us up again. Good. All right, steady drive on all sides. It shouldn't be long now." "How can you think in webs like that?" the Para won- dered behind him. "I just do, that's all. It's the way men think. Overseers, a little more thrust now; the grade's getting steeper." The gears groaned. The ship nosed up. The sky brightened in Lavon's face. Despite himself, he began to be frightened. His lungs seemed to burn, and in his mind he felt his long fall through nothingness toward the chill slap of the water as if he were experiencing it for the first time. His skin itched and burned. Ctould he go up there again? Up there into the burning void, the great gasping agony where no life should go? The sand bar began to level out and the going became a little easier. Up here, the sky was so close that the lumbering motion of the huge ship disturbed it. Shadows of wavelets ran across the sand. Silently, the thick-barreled bands of blue-green algae drank in the light and converted it to oxy- gen, writhing in their slow mindless dance just under the long mica skylight which ran along the spine of the ship. In the hold, beneath the latticed corridor and cabin floors, whirring Vortae kept the ship's water in motion, fueling them- selves upon drifting organic particles. One by one, the figures wheeling outside about the ship waved arms or cilia and fell back,

coasting down the slope of th? sand bar toward the familiar world, dwindling and disappearing. There was at last only one single Euglena, half- plant cousin of the Protos, forging along beside the space- ship into the marshes of the shallows. It loved the light, but finally it, too, was driven away into deeper, cooler waters, its single whiplike tentacle undulating placidly as it went. It was not very bright, but Lavon felt deserted when it left. Where they were going, though, none could follow. Now the sky was nothing but a thin, resistant skin of water coating the top of the ship. The vessel slowed, and when Lavon called for more power, it began to dig itself in among the sandgrains and boulders. "That's not going to work," Shar said tensely. "I think we'd better step down the gear-ratio, Lavon, so you can apply stress more slowly." "All right," Lavon agreed. "Full stop, everybody. Shar, will you supervise gear-changing, please?" Insane brilliance of empty space looked Lavon full in the face just beyond his big mica bull'seye. It was maddening to be forced to stop here upon the threshold of infinity; and it was dangerous, too. Lavon could feel building in him the old fear of the outside. A few moments more of inaction, he knew with a gathering coldness in his belly, and he would 'be un- able to go through with it. Surely, he thought, there must be a better way to change gear-ratios than the traditional one, which involved disman- tling almost the entire gear-box. Why couldn't a number of gears of different sizes be carried on the same shaft, not nec- essarily all in action at once, but awaiting use simply by shov- ing the axle back and forth longitudinally in its sockets? It would still be clumsy, but it could be worked on orders from the bridge and would not involve shutting down the entire machineand throwing the new pilot into a blue-green funk. Shar came lunging up through the trap and swam himself to a stop. "All set," he said. "The big reduction gears aren't taking the strain too well, though." "Splintering?" "Yes. I'd go it slow at first." Lavon nodded mutely. Without allowing himself to stop, even for a moment, to consider the consequences of his words, he called: "Half power." , The ship hunched itself down again and began to move, very slowly indeed, but more smoothly than before. Over- head, the sky thinned to complete transparency. The great light came blasting in. Behind Lavon there was an uneasy stir. The whiteness grew at the front ports. Again the ship slowed, straining against the blinding bar- rier. Lavon swallowed and called for more power. The ship groaned like something about to die. It was now almost at a standstill. "More power," Lavon ground out. Once more, with infinite slowness, the ship began to move. Gently, it tilted upward. Then it lunged forward and every board and beam in it began to squall. "Lavoni Lavon!" Lavon started sharply at the shout. The voice was coming at him from one of the megaphones, the one marked for the port at the rear of the ship. "Lavoni" "What is it? Stop your damn yelling." "I can see the top of the skyl From the other side, from the top side! It's like a big flat sheet of metal. We're going away from. it. We're above the sky, Lavon, we're above the sky!" Another violent start swung Lavon around toward the for- ward port. On the outside of the mica, the water was evap- orating with shocking swiftness, taking with it strange distor- tions and patterns made of rainbows. Lavon saw space. It was at first like a deserted and cruelly dry version of the Bottom. There were enormous boulders, great cliffs, tumbled, split, riven, jagged rocks going up and away in all directions, as if scattered at random by some giant. But it had a sky of its owna deep blue dome so far away that he could not believe in, let alone estimate, what its dis- tance might be. And in this dome was a ball of reddish-white fire that seared his eyeballs. The wilderness of rock was still a long way away from the ship, which now seemed to be resting upon a level, glistening plain. Beneath the surface-shine, the plain seemed to be made of sand, nothing but familiar sand, the same substance which had heaped up to form a bar in Lavon's universe, the bar along which the ship had climbed. But the glassy, colorful skin over it Suddenly Lavon became conscious of another shout from the megaphone banks. He shook his head savagely and said, "What is it now?" "Lavon, this is Tol. What have you gotten us into? The belts are locked. The diatoms can't move

them. They aren't faking, either; we've rapped them hard enough to make them think we were trying to break their shells, but they still can't give us more power." "Leave them alone," Lavon snapped. "They can't fake; they haven't enough intelligence. If they say they can't give you more power, they can't." "Well, then, you get us out of it." Shar came forward to Lavon's elbow. "We're on a spac&- water interface, where the surface tension is very high," he said softly. "If you order the wheels pulled up now, I think we'll make better progress for a while on the belly tread." "Good enough," Lavon said with relief. "Hello below haul up the wheels." "For a long while," Shar said, "I couldn't understand the reference of thi history plate to 'retractable landing gear,' but it finally occurred to me that the tension along a space-mud interface would hold any large object pretty tightly. That's why I insisted on our building the ship so that we could lift the wheels." "Evidently the ancients knew their business after all, Shar." Quite a few minutes laterfor shifting power to the belly treads involved another setting of the gear boxthe ship was crawling along the shore toward the tumbled roc5. Anx- iously, Lavon scanned the jagged, threatening wall for a break. There was a sort of rivulet off toward the teft which might offer a route, though a dubious one, to the next world. After some thought, Lavon ordered his ship turned toward it. "Do you suppose that thing in the sky is a 'star'?" he asked. "But there were supposed to be lots of them. Only one is up .thereand one's plenty for my taste." "I don't know," Shar admitted. "But I'm beginning to get a picture of the way the universe is made, I think. Evidefttly our world is a sort of cup in the Bottom of this huge one. This one has a sky of its own; perhaps it, too, is only a cup in the Bottom of a still huger world, and so on and on with- out end. It's a hard concept to grasp, I'll admit. Maybe it would be more sensible to assume that all the worlds are cups in this one common surface, and that the great light shines on them all impartially." "Then what makes it go out every night, and dim even in the day during winter?" Lavon demanded. "Perhaps it travels in circles, over first one world, then an- other. How could I know yet?" "Well, if you're right, it means that all we have to do is crawl along here for a while, until we hit the top of the sky' of another world," Lavon said. "Then we dive in. Somehow it seems too simple, after all our preparations." Shar chuckled, but the sound did not suggest that he had discovered anything funny. "Simple? Have you noticed the temperature yet?" Lavon had noticed it, just beneath the surface of aware- ness, but at Shar's remark he realized that he was gradually being stifled. The oxygen content of the water, luckily, had not dropped, but the temperature suggested the shallows in the last and worst part of autumn. It was like trying to breathe soup. "Than, give us more action from the Vortae," Lavon said. "This is going to be unbearable unless we get more circula- tion." There was a reply from Than, but it came to Lavon's ears only as a mumble. It was all he could do now to keep his at- tention on the business of steering the ship. The cut or defile in the scattered razor-edged rocks was a little closer, but there still seemed to be many miles of rough desert to cross. After a while, the ship settled into a steady, painfully slow crawling, with less pitching and jerking than before, but also with less progress. Under it, there was now a sliding, grinding sound, rasping against the hull of the ship itself, as if it were treadmilling over some coarse lubricant the particles of which were each as big as a man's head. Finally Shar said, "Lavon, we'll have to stop again. The sand this far up is dry, and we're .wasting energy using the tread." "Are you sure we can take it?" Lavon asked, gasping for breath. "At least we are moving. If we stop to lower the wheels and change gears again, we'll boil." "We'll boil if we don't," Shar said calmly. "Some of our algae are dead already and the rest are withering. That's a pretty good sign that we can't take much more. I don't think we'll make it into the shadows, unless we do change over and put on some speed." There was a gulping sound from one of the mechanics. "We ought to turn back," he said raggedly. "We were never meant to be outhere in the first place. We were made for the water, not for this hell." "We'll stop," Lavon

said, "but we're not turning back. That's final." - The words made a brave sound, but the man had upset Lavon more than he dared to admit, even to himself. "Shar," he said, "make it fast, will you?" The scientist nodded and dived below. The minutes stretched out. The great red-gold globe in the sky blazed and blazed. It had moved down the sky, far down, so that the light was pouring into the ship directly in Lavon's face, illuminating every floating particle, its rays like long milky streamers. The currents of water passing Lavon's cheek were almost hot. How could they dare go directly forward into that inferno? The land directly under the "star" must be even hotter than it was here. "Lavon! Look at Paral" Lavon forced himself to turn and look at his Proto ally. The great slipper had settled to the deck, where it was lying with only a feeble pulsation of its cilia. Inside, its vacuoles were beginning to swell, to become bloated, pear-shaped bubbles, crowding the granulated cytoplasm, pressing upon the dark nuclei. "Is . . . is he dying?" "This cell is dying," Para said, as coldly as always. "But go ongo on. There is much to learn, and you may live, even though we do not. Go on." "You'refor us now?" Lavon whispered. "We have alway been for you. Push your folly to the utter- most. We will benefit in the end, and so will Man." The whisper died away. Lavon called the creature again, but it did not respond. There was a wooden clashing from below, and then Shar's voice came tinnily from one of the megaphones. "Lavon, go aheadi The diatoms are dying, too, and then we'll be without power. Make it as quickly and directly as you can." Grimly, Lavon leaned forward. "The 'star' is directly over the land we're approaching." "It is? It may go lower still and the shadows will get longer. That may be our only hope." Lavon had not thought of that. He rasped into the banked megaphones. Once more, the ship began to move, a little faster now, but seemingly still at a crawl. The thirty-two wheels rumbled. It got hotter. Steadily, with a perceptible motion, the "star" sank in Lavon's face. -Suddenly a new terror struck him. Suppose it should continue to go down until it Was gone entirely? Blast- ing though it was now, it was the only source of heat. Would not space become bitter cold on the instantand the ship an expanding, bursting block of ice? The shadows lengthened menacingly, stretching across the desert toward the forward-rolling vessel. There was no talking in the cabin, just the sound of ragged breathing and the creaking of the machinery. Then the jagged horizon seemed to rush upon them. Stony teeth cut into the lower rim of the ball of fire, devoured it swiftly. It was gone. They were in the lee of the cliffs. Lavon ordered the ship turned to parallel the rock-line; it responded heavily, slug- gishly. Far above, the sky deepened steadily, from blue to indigo. Shar came silently up through the trap and stood beside Lavon, studying that deepening color and the lengthening of the shadows down the beach toward their own world. He said nothing, but Lavon was sure that the same chilling thought was in his mind. "Lavon." Lavon jumped. Shar's voice had iron in it. "Yes?" "We'll have to keep moving. We must make the next world, wherever it is, very shortly." "How can we dare move when we can't see where we're going? Why not sleep it overif the cold will let us?" "It will let us," Shar said. "It can't get dangerously cold up here. If it did, the skyor what we used to think of as the skywould have frozen over every night, even in summer. But what I'm thinking about is the water. The plants will go to sleep now. In our world that wouldn't matter; the supply of oxygen there is enough to last through the night. But in this confined space, with so many creatures in it and no supply of fresh water, we will probably smother." Shar seemed hardly to be involved at all, but spoke rather with the voice of implacable physical laws. "Furthermore," he said, staring unseeingly out at the raw landscape, "the diatoms are plants, too. In other words, we must stay on the move for as long as we have oxygen and powerand pray that we make it." . "Shar, we had quite a few Protos on board this ship once. And Para there isn't quite dead yet. If he were, the cabin would be intolerable. "The ship is nearly sterile of bacteria, because all the protos have been eating them as a matter of course and there's no outside supply of them, either. But still and all there would have been some

decay." Shar bent and tested the pellicle of the motionless Para with a probing finger. "You're right, he's still alive. What does that prove?" "The Vortae are also alive; I can feel the water circulating. Which proves that it wasn't the heat that hurt Para. it was the light. Remember how badly my skin was affected after I climbed beyond the sky? Undiluted starlight is deadly. We should add that to the information from the plate." "I still don't get the point." "It's this: We've got three or four Noc down below. They were shielded from the light, and so must be still alive. If we concentrate them in the diatom galleys, the dumb diatoms will think it's still daylight and will go on working. Or we can con- centrate them up along the spine-of the ship, and keep the algae putting out oxygen. So the question is: Which do we need more, oxygen or power? Or can we split the difference?" Shar actually grinned. "A brilliant piece of thinking. We may make a Shar out of you some day, Lavon. No, I'd say that we can't split the difference. Noc's light isn't intense enough to keep the plants making oxygen; I tried it once, and the oxygen production was too tiny to matter. Evidently the plants use the light for energy. So we'll have to settle for the diatoms for motive power." "All right. Set it up that way, Shar." Lavon brought the vessel away from the rocky lee of the cliff, out onto the smoother sand. All trace of direct light was now gone, although there was still a soft, general glow on the sky.

, "Now then," Shar said thoughtfully, "I would guess that there's water over there in the canyon, if we can reach it. I'll go below again and arrange" Lavon gasped. "What's the matter?" Silently, Lavon pointed, his heart pounding. The entire dome of indigo above them was spangled with ' tiny, incredibly brilliant lights. There were hundreds of them, and more and more were becoming visible as the darkness deepened. And far away, over the ultimate edge of the rocks, was a dim red globe, crescented wigh ghostly silver. Near the zenith was another such body, much smaller, and silvered all over... Under the two moons of Hydrot, and under the eternal stars, the two-inch wooden spaceship and its microscopic cargo toiled down the slope toward the drying little rivulet. The ship rested on the Bottom of the canyon for the rest of the night. The great square doors were unsealed and thrown open to admit the raw, irradiated, life-giving water from out- sideand the wriggling bacteria which were fresh food. No other creatures approached them, either out of curi- osity or for hunting, while they slept, although Lavon had posted guards at the doors just in case. Evidently, even up here on the very floor of space, highly organized creatures were quiescent at night. But when the first flush of light filtered through the water, trouble threatened. First of all, there was the bug-eyed monster. The thing was green and had two snapping claws, either one of which could have broken the ship in two like a spirogyra strand. Its eyes were black and globular, on the ends of short columns, and its long feelers were thicker through than a plant bole. It passed in a kicking fury of motion, however, never noticing the ship at all. "Is thata sample of the kind of life they have here?" La- von whispered. "Does it all run as big as that?" Nobody an- swered, for the very good reason that nobody knew. After a while, Lavon risked moving the ship forward against the current, which was slow but heavy. Enormous writhing worms whipped past them. One struck the hull a heavy blow, then thrashed on obliviously. "They don't notice us," Shar said. "We're too small. Lavon, the ancients warned us of the immensity of space, but even when you see it, it's impossible to grasp. And all those stars can they mean what I think they mean? It's beyond thought, beyond belief!" "The Bottom's sloping," Lavon said, looking ahead intently. "The walls of the canyon are retreating, and the water's be- coming rather silty. Let the stars wait, Shar; we're coming toward the entrance of our new world." Shar subsided moodily. His vision of space apparently had disturbed him, perhaps seriously. He took little notice of the great thing that was happening, but instead huddled worriedly over his own expanding speculations. Lavon felt the old gap between their minds widening once more. Now the Bottom was tilting upward again. Lavon had no experience with delta-formation, for no rivulets left his

own world, and the phenomenon worried him. But his worries were swept away in wonder as the ship topped the rise and nosed over. Ahead, the Bottom sloped away again, indefinitely, into glimmering depths. A proper sky was over them once more, and Lavon could see small rafts of plankton floating placidly beneath it. Almost at once, too, he saw several of the smaller kinds of Protos, a few of which were already approaching the ship Then the girl came darting out of the depths, her features blurred and distorted with distance and terror. At first she did not seem to see the ship at all. She came twisting and turning lithely through the water, obviously hoping only to throw herself over the mound of the delta and into the sav- age streamlet beyond. Lavon was stunned. Not that there were men herehe had hoped for that, had even known somehow that men were everywhere in the universebut at the girl's single-minded flight toward suicide. "What" Then a dim buzzing began to grow in his ears, and he un- derstood. "Sharl Than! Stravoll" he bawled. "Break out crossbows and spears! Knock out all the windows!" He lifted a foot and kicked through the port in front of him. Someone thrust a crossbow into his hand. "What?" Shar blurted. "What's the matter? What's happen- ing?" "Eaters!" The cry went through the ship like .a galvanic shock. The rotifers back in Lavon's own world were virtually extinct, but everyone knew 'thoroughly the grim history of the long battle man and Proto had waged against them. The girl spotted the ship suddenly and paused, obviously stricken with despair at the sight of this new monster. She drifted with her own momentum, her eyes alternately fixed upon the ship and jerking back over her shoulder, toward where the buzzing snarled louder and louder in the dimness. "Don't stop!" Lavon shouted. "This way, this way! We're friends! We'll help!" Three great semi-transparent trumpets of smooth flesh bored over the rise, the many thick cilia of their coronas whirring greedily. Dicrans, arrogant in their flexible armor, quarrel- ing thickly among themselves as they moved, with the few blurred, pre-symbolic noises which made up their own lan- guage. ' Carefully, Lavon wound the crossbow, brought it to his shoulder, and fired. The bolt sang away through the water. It lost momentum rapidly, and was caught by a stray current which brought it closer to the girl than to the Eater at which Lavon had aimed. He bit his lip, lowered the weapon, wound it up again. It did not pay to underestimate the range; he would have to wait. Another bolt, cutting through the water from a side port, made him issue orders to cease firing "until," he added, "you can see their eyespots." The irruption of the rotifers decided the girl. The motion- less wooden monster was of course strange to her, but it had not yet menaced herand she must have known what it would be like to have three Dicrans over her, each trying to grab from the others the largest share. She threw herself to- wards the bull'seye port. The three Eaters screamed with fury and greed and bored in after her. She probably would not have made it, had not the dull vi- sion of the lead Dicran made out the wooden shape of the ship at the last instant. The Dicran backed off, buzzing, and the other two sheered away to avoid colliding with her. After that they had another argument, though they could hardly have formulated what it was that they were fighting .about; they were incapable of exchanging any thought much more complicated than the equivalent of "Yaah," "Drop dead," and "You're another." While they were still snarling at each other, Lavon pierced the nearest one aU the way through with an arablast bolt. The surviving two were at once involved in a lethal battle over the remains. "Than, take a party out and spear me those two Eaters while they're still fighting," Lavon ordered. "Don't forget to destroy their eggs, too. I can see that this world needs a little taming." The girl shot through the port and brought up against the far wall of the cabin, flailing in terror. Lavon tried to approach her, but from somewhere she produced a flake of stonewort chipped to a nasty point. Since she was naked, it was hard to tell where she had been hiding it, but she obviously knew how to use it, and meant to. Lavon retreated and sat down on the stool before his control board, waiting while she took in the cabin, Lavon, Shar, the other pilots, the senescent Para. At last she said:

"Areyouthe godsfrom beyond the sky?" "We're from beyond the sky, all right," Lavon said. "But we're not gods. We're human beings, just like you. Are there many humans here?" The girl seemed to assess the situation very rapidly, savage though she was. Lavon had the odd and impossible impression that he should recognize her: a tall, deceptively relaxed, tawny woman, not after all quite like this one . . . a woman from another world, to be sure, but still . . . She tucked the knife back into her bright, matted hairaha, Lavon thought confusedly, there's a trick I may need to re- memberand shook her head. "We are few. The Eaters are everywhere. Soon they will have the last of us." Her fatalism was so complete that she actually did not seem to care. "And you've never cooperated against them? Or asked the Protos to help?" "The Protos?" She shrugged. "They are as helpless as we are against the Eaters, most of them. We have no weapons that kill at a distance, like yours. And it's too late now for such weapons to do any good. We axe too few, the Eaters too many." Labon shook his head emphatically. "You've had one weapon that counts, all along. Against it, numbers mean noth- ing. We'll show you how we've used it. You may be able to use it even better than we did, once you've given it a try." The girl shrugged again. "We dreamed of such a weapon, but never found it Are you telling the truth? What is the weapon?" "Brains, of course," Lavon said. "Not just one brain, but a lot of them. Working together. Cooperation." "Lavon speaks the truth," a weak voice said from the deck. The Para stirred feebly. The girl watched it with wide eyes. The sound of the Para using human speech seemed to impress her more than the ship itself, or anything else that it con- tained. "The Eaters can be conquered," the thin, burring voice said. "The Protos will help, as they helped in the world from which we came. The Protos fought this flight through space, and deprived Man of his records; but Man made the trip with- out the records. The Protos will never oppose Man again. We have already spoken to the Protos of this world, and have told them that what Man can dream, Man can do. Whether the Protos will it or not. "Sharyour metal record is with you. It was hidden in the ship. My brothers will lead you to it. "This organism dies now. It dies in confidence of knowl- edge, as an intelligent creature dies. Man has taught us this. There is nothing. That knowledge. Cannot do. With it . . . men . . ."have crossed . . . have crossed space . . ." The voice whispered away. The shining slipper did not change, but something about it was gone. Lavon looked at the girl; their eyes met. He felt an unaccountable Warmth. "We have crossed space," Lavon repeated softly. Shar's voice came to him across a great distance. The young-old man was whispering: "Buthave we?" Lavon was looking at the girl. He had no answer for Shar's question. It did not seem to be important.

THE REAL THRILL by James Blish (author of "Phoenix Planet," "Callistan Cabal," etc.) ONE OF THE FEW abilities time had left Martin Burrowes was that of being bored, and he was taking advantage of it to the fullest extent. The incessant, mindless windjamming of the suspiciously blonde girl sounded on beside him and down the cold darkness of the empty street, but he was learning to say "Yes," "You're quite right, m'love,'' automatically and without interrupting his own stream of thought. Those thoughts were not particularly happy ones. At the age of 47 Burrowes was hardly a middle-aged man. In these days normal life expectancy exceeded a century, and the middle-age level had been moved up to the vicinity of fifty-five. No, Burrowes had certainly not passed his prime. But time and technology had betrayed him. Fifteen years ago Martin Burr owes had known all there was to know about rocket engines, and had served as technical adviser to the government, the IP, and a dozen private spaceship yards. Then--the gravity impellor, geotrons, atomic power--and rocket technicians were suddenly as useless in the scheme of things as blacksmiths. "Sorry, Mr. Burrowes." "I'm

afraid we have little use for rocket engineering these days, sir." "We realize that a man of your ability--" "We'll call you immediately if anything comes up--" And now the lunar colonies had revolted; there was war, and industries of all kinds were booming, and there was nothing for Martin Burrowes to do. Even the night clubs and similar places of nonconstructive amusement were folding rapidly in the serious intensity of the warfever. All the young men and the adaptable older ones were in the IP or the yards, and the ships were in space, fighting or patrolling. Left behind were the crocks which ran on rocket power, and the human crocks who serviced rockets. The blonde tugged insistently on his aim. "Martin," she said. "Look. Let's go in there, huh?" He followed her over-manicured finger to a large sign overlooking the dark street. STOP Here and see the former Interplanetary POLICE CRUISER C2-77 Now open to the public. Admission 50cents A Real Thrill "That's right," he said, half to himself. "The old IP drydock was down here once." "Let's go in," she said. "Won't it be fun?" There might be a melancholy pleasure in seeing the inside of one of the old boats again. Abandoned cruiser, abandoned technician-- a fitting juxtaposition. "Okay," he agreed, and she tugged him toward the sign. IF THE FENCED-OFF area had ever been a dry-dock, it showed little sign of it now. Most of the heavy machinery had been moved to other quarters and what had been left for useless had rusted into unrecognizable lumps of scrap, amorphous, contorted giants in the darkness. The ship itself lay on hydraulic risers, the kind they had used to repair and scrape the underjets and a rickety gangplank, lit yellowly by one dismal bare bulb, ran up to the airlock. The berylliumalloy hull was pitted and burned in a hundred places--sightseers would think them ray scars, but Burrowes recognized them as the ordinary marks of ten times a hundred passages through the atmosphere. He stamped on the boards and a flight lieutenant a little past his own age appeared from the dark interior, blinking sleepily. "You're the first all day,' he said, taking the money. "Come in." He fumbled in the blackness and found a switch, and the corridors lit abruptIy. Bare bulbs again--evidently the C2-77 antedated the general installation of gas-glow tubes. "This passage," the officer began in a bored voice, "is the core of the ship, running lengthwise from tubes to control-room. The gravity plates, which act similarly to the modern geotron-stasis, are on the hull, so that the down direction in flight is always away from the center--" "I know," Burrowes interrupted. "I used to service these things. Designed the engines for this type." "That so?" said the officer, not much interested. "Well, I suppose there's always a job for technies. Me, I have to hang around this tub and take people through, and everybody else gets on the geotronic ships and gets some excitement." "Why isn't this one fightin'?" the girl wanted to know. "Lord," said the officer indulgently. "This thing hasn't seen active service since the Nationalist Coup. Against the Lunies it'd be practically helpless. Those fellows have as good a navy as we have--they ought to--the lunar colonies had a branch of the terrestrial service right in their hands when the rebellion came." He slammed a bulkhead back viciously. "This is the control room." "Goodness," said the girl. It's upside down." "It wouldn't be in space-- remember, out is down in flight." Burrowes peered around interestedly, the older days coming back to him as he marked the condition of the apparatus, but the things that attracted him didn't appeal to the girl. "Goodness," she said again. "What a lot of clock-faces." "All necessary," the officer nodded, and mistaking the comment for a question, pointed to them one by one. "Speed in MPS, acceleration in G's, fuel, oxygen, tube heat, surface temperature, outside and inside atmospheric pressure, gravity altimeter, circuit load indicators, detectors of various kinds--" "Uh-huh," said the girl. "Main rocket valves, steering rockets, braking rockets," the officer went on relentlessly. "Search beam wheel and switch, starter, screen controls, lights, silencers, wings, wing brakes, generators, landing gear. Compartment release directly above you--" "Rocket, hold, deck, control," Martin recited without looking, and the bored lieutenant looked at him in surprise. "Yeah, that's right. Waste

weight, that release apparatus. Then there's the airlock, emergency lock, autopilot, air, gun controls--" "Uh-huh," said the girl. "Let's see somethin' else." The officer shrugged and opened another door. "Officer's quarters ?" asked Burrowes. "Yep. My little home." There was little to see but three bunks and a desk upon which lay some dusty books and scattered, yellowed papers. The girl grunted and made for the door, but Burrowes was attracted by the books. He picked them up one by one. "See this," he said, holding up one marked Jet Propulsion Engines: Types and Maintenance. "I wrote this one." "Yeah?" The officer was more interested. "The captain had a lot of books in here in the days before I took over. He had ambitions for being transferred to a grav-boat, and he studied like fury. See--" He picked up several of the books. "Mechanics of Achronic Fields. Geotron Operation and Repair. The Stasis Effect. No use for those on a rocket ship." "True enough," Martin agreed, while the girl squirmed impatienty. "The rest is ordinary enough, though." "Oh, the usual math tables, Barclay's Journal, Government orbits, takeoSs, landings, the IP Yearbook of Hazards to Navigation and a million of the monthly supplements to it--every ship carries those, gravboats included." "Mar-tin," whined the girl. "Let's see somethin' else." HE SIGHED and followed the offcer out. He shouldn't have come in here. It made him too conscious of the days which should properly be forgotten. The great metal shell seemed empty and dead. So far he had seen no one else on board except the three of them. "No crew?" "Skeleton," the officer said over his shoulder. "Don't need many to fly this boat, and it isn't going to be flown, anyhow. A few of the boys are down in the engine compartment playing cards; my engineer is out on one of his periodic binges. I don't blame him," he added bitterly. They went down the central core to the end of the passage, where another metal door admitted them to a balcony overlooking the engineroom. Below, four burly toughs sat around a circle on the floor, each with a pile of matches before him. Burrowes chuckled slightly to himself as he watched the girl pat her hair and turn on her archest smile. He was more than conscious of his own rather flabby construction, the poor condition into which he had allowed himself to slip with the onset of despair and boredom. The tube-men barely glanced at them, however, before going on with their game. Evidently they were used to sight-seers, and had little respect for them. Burrowes ran his eyes over the banks of tubes. They had seen heavy use at one time; they were blue with heat-stain. He pointed. "If you don't get number two cleaned out pretty soon you'll have a back-blast." The officer shrugged. "What's the difference? This boat won't see space again. Let the stuff rot. The government's just using it to collect a little petty cash before they melt it up for new ships." A red light began to wink on and off by the door. "Excuse me a minute," he said. "Call coming in. Be right back." He turned and ran back down the corridor. The girl hung on Burrowes' arm. "Martin," she said, "let's look around for ourselves, huh? Just a little look around. I'll bet there's a lot of places he hasn't shown us." Burrowes shook his head. "I don't think we'd better. We might get into trouble. This is still a government ship, you know, and they won't be easy on snoopers." "Please. Aw, come on, baby--" "No," he snapped, irritated by the "baby." She let go of his arm. "Well, I don't care, if you're goin' to be an old spoil-sport--" and she started down a side corridor by herself. "Hey," he growled, stepping after her. She giggled and ran. "Come back here, you little witch!" he yelled, but by this time she had vanished around a corner. He stopped, suddenly realizing how quickly he got out of breath these days. Oh, well, let her go. If she got into trouble he'd let her worry her own way out of it. Returning, he nearly bumped into the officer, who was running back down the core. "Oh," said the latter excitedly. "Oh, it's you. Listen, you and your friend'll have to get off. GHQ called--attack on the north side of the city--we're called in." "What! You're going to take this tub into the air again?" "Yeah, yeah--most of the fleet's in a fight over Tycho City--they're hard up for ships, say this may be a decisive battle--where's my rummy engineer?" and he started for the airlock. A light burst in Burrowes' brain,

and he grabbed the man's arm. "Listen. It'll take you valuable time to find your engineer--he might be in any one of fifty dives around this part of town. How about letting me take his place?" "You're battier'n an asteroid orbit." "No, listen, I know a lot about rockets--I was an expert, remember. And I can still manage the technical end." The older man scratched his head. "Well, we've got a pick-up crew as it is--okay. Come on. It may be sholt but it'll still be action." In the tube room the men had apparently gotten the news by communicator from the bridge, for there was a ferocious racket of old jets being tuned. Somebody was pounding madly on a breech-valve with a hammer. Martin winced and pounded down the stairs. "Hey, you," he hollered over the din, grabbing the man. "Don't you know any better'n that ?" He snatched a U-wrench and the offending valve opened with a scream of protest. SHow far? 63? All right. If you snap those carbopoints inside we'll blow higher than a kite." "Who the hell are you?" the tubemarl growled. "New engineer," the flight lieutenant's voice cut in. "Get 'em started, boys. We're going to see some fighting." He ran back up the stairs. Martill had an idea he had forgotten something, but in the excitement and sudden din he could not remember what it was. He moved rapidly down the banks, correcting mistakes in adjustment, checking, helping when a recalcitrant old tube refused to yield to persuasion. This was his first experience with actual field-work; before he had been a mere paperand-drydock man. It was a real thrill. THE WARNING BELL rang, and he went back on the platform to watch the dials, which duplicated those in the control room. There was even a telescreen whose eyes opened on the forward viewplate, so that the engineer could follow the maneuvering. These old boats had been pretty good in their time, at that. A tube began to sputter and he plunged back down to adjust the mixture. "Hey, bud, take it easy," the tubeman in charge of that section protested. "I can watch it. You don't have to be the whole damn black gang." Martin returned to his platform "Watch your mixtures!" he howled. Then he clung to the railing as the commander flung the ship eagerly upward. The shock of take-off knocked all the breath from him. He had not known what to expect, for despite many years of lab training, he had never flown in a rocket-powered ship any farther than thirty miles For a moment he sat stupidly on the platform. Then from somewhere an insistent, wicked pounding came to his ears, and he shook himself back to consciousness. The banks were glowing dull red now with the over rapid firing after so many years of inaction, but he couldn't see anything radically wrong. The pounding was coming from that half-clogged number two tube. Well, if the lieutenant took it easy there'd be little trouble there. He ran his eye over the dials. The lieutenant was taking little account of safety; but then, they would probably come to grief against the first Lunar ship they met, anyhow. Maybe they would be too late as it was. In the screen he could see the partly darkened city and a red flaring on the horizon. The clock grinned at him and he was astonished to see how long they had been traveling. Four minutes. It hadn't seemed like that many seconds. Things moved fast these days, even time. He tried to calm his breathing, but about his rapid heart he could do nothing. Why had he let himself get into such poor physical condition? There was another jerk of acceleration and the pounding in number two became a continuous rattle, like a machine gun. The engine-room was almost insufferably hot, and the tube-men were stripped to the waist. The communicator buzzed and Burrowes put on the phones. "We're coming up on it from behind," said the lieutenant's voice. "There's a big Ligget-type battleplane above it that seems to be directing the Lunies, and I don't think they've seen us. Can we stand more speed ?" Burrowes narrowed his eyes. "A little," he said into- the mike. "Feed it slow, or they']l be picking scraps of us up in Florida." The C2-77 bounced upward like a nudged frog and the number two began to howl. The tube-men looked nervously at it and then up at Burrowes. They were ok enough hands to recognize the signs and the need of expert advice. And Burrowes knew suddenly that a paper-man couldn't give such advice properly. If that tube backblasted now-- As if to spur him, the

howling rose to a scream. He made a quick decision. "Clear out," he ordered at the top of his voice. "I'll get it." If it did blow, that way it would take only one man instead of five. He rattled down the stairs, and the black gang, frightened now, headed for the bulkhead as fast as possible. The screaming of the overloaded, defective tube was a terrifying thing. It seemed to fill the whole universe. He took the U-wrench in a shaking hand, and in a moment the note died away to a low, ominous mutter. He tried to get that out, but an adjustment just a fraction further in the other direction brought the howl in again. He hastily returned the valves to the final position. There were several painful burns on his hands where he had inadvertently touched the white-hot breech, and his heart was making more noise than the jet. Another farther down the bank began to whisper, and when he ran to correct it the number two lifted its voice a little higher. THEN, SUDDENLY, the girl was behind him, screaming. "Get me out of here," she yelled, her face hard. "Get me out, do you hear?" He grinned mercilessly. "Too late, little explorer. We're in the air." "I don't give a damn where we are. You got me into this and you can get me out." The number two, its first polite request ignored, demanded attention more loudly. The earphones buzzed. "We're above them," the lieutenant said. "All okay?" "All wrong," Burrowes told him grimly, pushing away the furious girl. "Listen. That number two jet is going to either burst or backblast any minute. Fall free past your Luny and drop the engine compartment on him and parachute the rest of the way." "The hell ! How about you guys--?" "The gang's out. There's only me, and I'm satisfied. Make it quick. When the tube goes, the gang and you will go too, besides me." There was a brief silence, just a second, but age-long. Burrow es' reasoning was inexorable and according to the IP code--one life for many--and he knew it. "All right," said the lieutenant's voice, strangely altered. "I'll remember you if I get out." "Thanks, and good luck," Burrowes said, and broke connection. "Now, you," he snapped, and, grabbing the girl, he propelled her toward the bulkhead, clenching his teeth doggedly as she kicked him repeatedly. "Fresh!" she screamed at him, and the double doors of the engine room slammed in her face. The floor shifted under him, and he recognized the feel of a slanting fall. He knew what would happen--the C2-77 would drive for the nose of the Luny, clearing it as it was relieved of the weight of the engine compartment, and then drop on a 'chute. Behind him number two began to scream again, and he ran to it, swearing. "If you'll shut your trap for three seconds," he told it, plying the U-wrench frantically. There was a lurch and a snapping sound, and again the floor shifted. The compartment had been cut loose-- That last second, Martin Burrowes felt the burden of uselessness at last lifted completely from his shoulders. At the count of three, he smashed in the back of the valve-- THE GIRL pressed her nose to a tiny port and watched the fused masses of metal tumble past her together, flaring. She did not understand what had happened, but she knew that this had been more of a real thrill than the battered sign had promised. She stood by the engine room door with her hands on her hips. She was going to give Martin Burrowes a piece of her mind when -he came out. On the other side of the door the air shrieked dismally.

BOOK TWO THE THING IN THE ATTIC . . . And it is written that after the Giants came to Tellura from the far stars, they abode a while, and looked upon the surface of the land, and found it -wanting, arid of evil omen. Therefore did they make man to live always in the air and in the sunlight, and in the light of the stars, that he would be reminded of them. And the Giants abode yet a -while, and taught men to speak, and to write, and to -weave, and to do many things which are needful to do, of -which the writings speak. And thereafter they departed to the far stars, saying. Take this world as your own, and though we shall return, fear not, for it is yours. THE BOOK OF

LAWS Honath the Purse-Maker was haled from the nets an hour before the rest of the prisoners, as befitted his role as the arch- doubter of them all. It was not yet dawn, but his captors led him in great bounds through the endless, musky-perfumed orchid gardens, small dark shapes with crooked legs, hunched shoulders, slim hairless tails, carried, like his, in concentric spirals wound clockwise. Behind than sprang Honath on the end of a long tether, timing his leaps by theirs, since any slip would hang him summarily. He would of course be on his way to the surface/some 250 feet below the orchid gardens, shortly after dawn in any event. But not even the arch-doubter of them all wanted to begin the tripnot even at the merciful snap-spine end of a tether a moment before the law said. Go. The looping, interwoven network of vines beneath them, each cable as thick through as a man's body, bellied out and down sharply as the leapers reached the edge of the fern-tree forest which surrounded the copse of horsetails. The whole party stopped before beginning the descent and looked east- ward, across the dim bowl. The stars were paling more and more rapidly; only the bright constellation of the Parrot could still be picked out without doubt. "A fine day," one of the guards said, convefgationally. "Better to go below on a sunny day than in the rain, Purse- Maker." Honath shuddered and said nothing. Of course, it was al- ways raining down below in Hell, that much could be seen by a child. Even on sunny days, the endless pinpoint rain of transpiration, from the hundred million leaves of the eternal trees, hazed the forest air and soaked the black bog forever. He looked around in the brightening, misty morning. The eastern horizon was black against the limb of the great red sun, which had already risen about a third of its diameter; it was almost time for the small, blue-white, furiously hot con- sort to follow. All the way to that brink, as to every other horizon, the woven ocean of the tree tops flowed gently in long, unbreaking waves, featureless as some smooth oil. Only nearby could the eye break that ocean into its details, into the world as it was: a great, many-tiered network, thickly over- grown with small ferns, with air-drinking orchids, with a thousand varieties of fungi sprouting wherever vine crossed vine and collected a little humus for them, with the vivid par- asites sucking sap from the vines, the trees, and even each other. In the ponds of rainwater collected by the closely fitting leaves of the bromelaids, tree-toads and peepers stopped down their hoarse songs dubiously as the light grew. and fell silent one by one. In the trees below the world, the tentative morning screeches of the lizard-birdsthe souls of the damned, or the devils who hunted them, no one was quite sure whichtook up the concert. A small gust of wind whipped out of the hollow above the glade of horsetails, making the network under the party shift slightly, as if in a loom. Honath gave with it easily, automat- ically, but one of the smaller vines toward which he had moved one furless hand hissed at him and went pouring away into the darkness beneatha chlorophyll-green snake, come up out of the dripping aerial pathways in which it hunted in ancestral gloom, to greet the suns and dry its scales in the quiet morning. Farther below, an astonished monkey, routed out of its bed by the disgusted serpent, sprang into another tree, reeling off ten mortal insults, one after the other, while still in mid-leap. The snake, of course, paid no attention, since it did not speak the language of men; but the party on the edge of the glade of horsetails snickered appreciatively. "Bad language they favor, below," another of the guards said. "A fit place for you and your blasphemers, Purs&- Maker. Come now." The tether at Honath's neck twitched, and then his captors were soaring in zig-zag bounds down into the hollow toward the Judgment Seat. He followed, since he had no choice, the tether threatening constantly to foul his arms, legs, or tail, andworse, far worsemaking his every movement mor- tally ungraceful. Above, the Parrot's starry plumes flickered and faded into the general blue. Toward the center of the saucer above the grove, the stitched leaf-and-leather houses clustered thickly, bound to the vines themselves, or hanging from an occasional branch too high or too slender to bear the vines. Many of these purses Honath kn6w well, not only as visitor but as artisan. The

finest of them, the inverted flowers which opened auto- matically as the morning dew bathed them, yet which could be closed tightly and safely around their occupants at dusk by a single draw-string, were his own design as well as his own handiwork. They had been widely admired and imitated. The reputation that they had given him, too, had helped to bring him to the end of the snap-spine tether. They had given weight to his words among othersweight enough to make him, at last, the arch-doubter, the man who leads the young into blasphemy, the man who questions the Book of Laws. And they had probably helped to win him his passage on the Elevator to Hell. The purses were already opening as the party swung among them. Here and there, sleepy faces biinked out from amid the exfoliating sections, criss-crossed by relaxing lengths of dew- soaked rawhide. Some of the awakening householders rec- ognized Honath, of that he was sure, but none came out to follow the partythough the villagers should be beginning to drop from the hearts of their stitched flowers like ripe seed- pods by this hour of any normal day. A Judgment was at hand, and they knew itand even those who had slept the night in one of Honath's finest houses would not speak for him now. Everyone knew, after all, that Honath did not believe in the Giants. Honath could see the Judgment Seat itself now, a slung chair of woven cane crowned along the back with a row of gigantic mottled orchids. These had supposedly been trans- planted there when the chair was made, but no one could remember how old they were; since there were no seasons, there was no particular reason why they should not have been there forever. The Seat itself was at the back of the arena and high above it, but in the gathering light Honath could make out the white-furred face of the Tribal Spokes- man, like a lone silver-and-black pansy among the huge vivid blooms. At the center of the arena proper was the Elevator itself. Honath had seen it often enough, and had himself witnessed Judgments where it was called into use, but he could still hardly believe that he was almost surely to be its next pas- senger. It consisted of nothing more than a large basket, deep enough so that one would have to leap out of it, and rimmed with thorns to prevent one from leaping back in. Three hempen ropes were tied to its rim, and were then cunningly interwound on a single-drum windlass of wood, which could be turned by two men even when the basket was loaded. The procedure was equally simple. The condemned man was forced into the basket, and the basket lowered out of sight, until the slackening of the ropes indicated that it had touched the surface. The victim climbed outand if he did not, the basket remained below until he starved or until Hell otherwise took care of its ownand the windlass was re- wound. The sentences were for varying periods of time according to the severity of the crime, but in practical terms this formality was empty. Although the basket was dutifully lowered when the sentence had expired, no one had ever been known to get back into it. Of course, in a world without seasons or moons, and hence without any but an arbitrary year, long periods of time are not easy to count accurately. The basket may often have arrived thirty or forty days to one side or the other of the proper date. This was only a technicality, however, for if keeping time was difficult in the attic world, it was probably impossible in Hell. Hoifcth's guards tied the free end of his tether to a branch and settled down around him. One abstractedly passed a pine cone to him, and he tried to occupy his mind with the business of picking the]uicy seeds from it, but somehow they had no flavor. More captives were being brought in now, while the Spokes- man watched with glittering black eyes from his high perch. There was Mathild the Forager, shivering as if with ague, the fur down her left side glistening and spiky, as though she had inadvertently overturned a tank plant on herself. After her was .brought Alaskon the Navigator, a middle-aged man only a few years younger than Honath himself; he was tied up next to Honath, where he settled down at once, chewing at a joint of cane with apparent indifference. Thus far, the gathering had proceeded without more than a few words being spoken, but that ended when the guards tried to bring Seth the Needlesmith from the nets. He could be heard at onoe, over the entire distance to the glade, al- ternately chattering and

shrieking in a mixture of tones that might mean fear or fury. Everyone in the glade but Alaskon turned to look, and heads emerged from purses like new but- terflies from cocoons. A moment later, Seth's guards .came over the lip of the glade in a tangled group, now shouting themselves. Some- where in the middle of the knot Seth's voice became still louder; obviously he was clinging with all five members to any vine or frond he could grasp, 'and was no sooner pried loose from one than he would leap by main force, backwards if possible, to another. Nevertheless, he was being brought inexorably down into the arena, two feet forward, one foot back, three feet forward . . . Honath's guards resumed picking their pine cones. During the disturbance, Honath realized, Charl the Reader had been brought in quietly from the same side of the glade. He now sat opposite Alaskon, looking apathetically down at the vine- web, his shoulders hunched forward. He exuded despair; even to look at him made Honath feel a renewed shudder. From the high Seat, the Spokesman said: "Honath the Purse-maker, Alaskon the Navigator, Charl the Reader, Seth the Needlesmith, Mathild the Forager, you are called to an- swer to justice." "Justicel" Seth shouted, springing free of his captors with ,a tremendous bound, and bringing up with a jerk on the end of his tether. "This is no justicel I have nothing to do with" The guards caTight up with him and clamped brown hands firmly over his mouth. The Spokesman watched with amused malice. "The accusations are three," the Spokesman said. "The first, the telling of lies to children. Second, the casting into doubt of the divine order among men. Third, the denial of the Book of Laws. Each of you. may speak in order of age. Honath the Purse-Maker, your plea may be heard." Honath stood up, trembling a little, but feeling a surpris- ingly renewed surge of his old independence. "Your charges," he said, "all rest upon the denial of the Book of Laws. I have taught nothing else that is contrary to what we all believe, and called nothing else into doubt. And I deny the charge." The Spokesman looked down at him with disbelief. "Many men and women have said that you do not believe in the Giants, Purse-Maker," he said. "You will not win mercy by piling up more lies." "I deny the charge," Honath insisted. "I believe in the Book of Laws as a whole, and I believe in the Giants. I have taught only that the Giants were not real in the sense that we are real. I have taught that they were intended as symbols of - some higher reality, and were not meant to be taken as literal Persons." "What higher reality is this?" the Spokesman demanded. "Describe it." "You ask me to do something the writers of the Book of Laws themselves couldn't do," Honath said hotly. "If they had to embody the reality in symbols rather than writing it down directly, how could a mere pursemaker do better?" "This doctrine is wind," the Spokesman said. "And it is plainly intended to undercut authority and the order es- tablished, by the Book. Tell me, Purse-Maker, if man need not fear the Giants, why should they fear the law?" "Because they are men, and it is to their interest to fear the law. They aren't children, who need some physical Giant sitting over them with a whip to make them behave. Further- more, Spokesman, this archaic belief itself undermines us. As long as we believe that there are real Giants, and that some day they'll return and resume teaching us, so long will we fail to seek answers to our questions for ourselves. Half of what we know was given to us in the Book, and the other half is supposed to drop to us from the skies if we wait long enough. In the meantime, we vegetate." "If a part of the Book be untrue, there can be nothing to prevent that it is all untrue," the Spokesman said heavily. "And we will lose even what you call the half of our knowl- edgewhich is actually the whole of it, to those who see with clear eyes." Suddenly, Honath lost his temper. "Lose it, then!" he shouted. "Let us unlearn everything we know only by rote, go back to the beginning, learn all over again, and continue to learn, from our own experience. Spokesman, you are an old man, but there are still some of us who haven't forgotten what curiosity means!" "Quiet!" the Spokesman said. "We have heard enough. We call on Alaskon the Navigator." "Much of the Book is clearly untrue," Alaskon said flatly, rising. "As a handbook of small trades it has served us well. As a guide to how the

universe is made, it is nonsense, in my opinion; Honath is too kind to it. I've made no secret of what I think, and I still think it." "And will pay for it," the Spokesman said, blinking slowly down at Alaskon. "Chart the Reader." "Nothing," Charl said, without standing, or even looking up. "You do not deny the charges?" "I've nothing to say," Charl said, but then, abruptly, his head jerked up, and he glared with desperate eyes at the Spokesman. "I can read. Spokesman. I have seen words of the Book of Laws that contradict each other. I've pointed them out. They're facts, they exist on the pages. I've taught noth- ing, told no lies, preached no unbelief. I've pointed to the facts. That's all." "Seth the Needlesmith, you may speak now." The guards took their hands gratefully off Seth's mouth; they had been bitten several times in the process of keeping him quiet up to now. Seth resumed shouting at once. "I'm no part of this groupl I'm the victim of gossip, envious neighbors, smiths jealous of my skill and my custom! No man can say worse of me than that I sold needles to this pursemakersold them in good faith! The charges against me are lies. all of them!" Honath jumped to his feet in fury, and then sat down again, choking back the answering shoUt almost without tasting its bitterness. What did it matter? Why should he bear witness against the young man? It would not help the others, and if Seth wanted to lie his way out of Hell, he might as well be given the chance. The Spokesman was looking down at Seth with the identi- cal expression of outraged disbelief which he had first bent upon Honath. "Who was it cut the blasphemies into the hard- wood trees, by the house of Hosi the Lawgiver?" he demand- ed. "Sharp needles were at work there, and there are witnesses to say that your hands held them." "More lies!" "Needles found in your house fit the furrows, Seth." "They were not mineor they were stolen! I demand to be freed!" "You will be freed," the Spokesman said coldly. .There was no possible doubt as to what he meant. Seth began to weep and to shout at the same time. Hands closed over his mouth again. "Mathild the Forager, your plea may be heard." The young woman stood up hesitantly. Her fur Was nearly dry now, but she was still shivering. "Spokesman," she said, "I saw the things which Charl the Reader showed me. I doubted, but what Honath said restored my belief. I see no harm in his teachings. They remove doubt, instead of fostering it, as you say they do. I see no evil in them, and I don't understand why this is a crime." Honath looked over to her with new admiration. The Spokesman sighed heavily. "I am sorry for you," he said, "but as Spokesman we can- not allow ignorance of the Law as a plea. We will be merci- ful to you all, however. Renounce your heresy, affirm your belief in the Book as it is written from bark to bark, and you shall be no more than cast out of the tribe." "I renounce it!" Seth said. "I never shared it! It's all blas- phemy and every word is a lie! I believe in the Book, all of it!" "You, Needlesmith," the Spokesman said, "have lied before this Judgment, and are probably lying now. You are not in- cluded in the dispensation." "Snake-spotted caterpillar! May yoururnmulph." "Purse-Maker, what is your answer?" "It is. No," Honath said stonily. "I've spoken the truth. The truth can't be unsaid." The Spokesman looked down at the rest of them. "As for you three, consider your answers carefully. To share the heresy means sharing the sentence. The penalty will not be lightened only because you did not invent the heresy." There was a long silence. Honath swallowed hard. The courage and 'the faith in that silence made him feel smaller and more helpless than ever. He realized suddenly that the other three would have kept that silence, even without Seth's defection to stiffen their spines. He wondered if he could have done so. "Then we pronounce the sentence," the Spokesman said. "You are one and all condemned to one thousand days in Hell.'" There was a concerted gasp from around the edges of the arena, where, without Honath's having noticed it before, a silent crowd had gathered. He did not wonder at the sound. The sentence was the longest in the history of the tribe. Not that it really meant anything. No one had ever come 64 back from as little as one hundred days in Hell. No one had ever come back from Hell at all. "Unlash the Elevator. All shall go togetherand theil heresy with them." 5 The basket swayed. The last of the attic world

that Honath saw was a circle of faces, not too close to the gap in the vine web, peering down after them. Then the basket fell another few yards to the next turn of the windlass and the faces van- ished. Seth was weeping in the bottom of the Elevator, curled up into a tight ball, the end of his tail wrapped around his nose and eyes. No one else could make a sound, least of all Hon- ath. The gloom closed around them. It seemed extraordinarily still. The occasional harsh scream of a lizard-bird somehow emphasized the silence without breaking it. The light that filtered down into the long aisles between the trees seemed to be absorbed in a blue-green haze, through which the lianas wove their long curved lines. The columns of tree-trunks, the pillars of the world, stood all around them, too distant in the dim light to allow them to gauge their speed of descent; only - the irregular plunges of the basket proved that it was even in motion any longer, though it swayed laterally in a com- plex, overlapping series of figure-eights traced on the air in response to the rotation of the planeta Foucault pendulum ballasted with five lives. Then the basket lurched downward once more, brought up short, and tipped sidewise, tumbling them all against the hard cane. Mathild cried out in a thin voice, and Seth uncurled al- most instantly, clawing for a handhold. Another lurch, arid the Elevator lay down on its side and was still. They were in Hell. Cautiously, Honath began to climb out, picking his way over the long thorns on the basket's rim. After a moment, Chart the Reader followed, and then Alaskon took Mathild firmly by the hand and led her out onto the surface. The foot- ing was wet and spongy, yet not at all resilient, and it felt cold; Honath's toes curled involuntarily. "Come on, Seth," Charl said in a hushed voice. "They won't haul it back up until we're all out. You know that." Alaskon looked around into the chilly mists. "Yes," he said. "And we'll need a needlesmith down here. With good tools, there's just a chance" Seth's eyes had been darting back and forth from one to the other. With a sudden chattering scream, he bounded out of the bottom of the basket, soaring over their heads in a long, flat leap, and struck the high knee at the base of the nearest tree, an immense fan palm. As he hit, his legs doubled under him, and almost in the same motion he seemed to rocket straight up into the murky air. Gaping, Honath looked up after him. The young needle- smith had timed his course to the split second. He was already darting up the rope from which the Elevator was suspended. He did not even bother to look back. After a moment, the basket tipped upright. The impact of Seth's weight hitting the rope evidently had been taken by the windlass team to mean that the condemned people were all out on the surface; a twitch on the rope was the usual signal. The basket began to rise, bobbing and dancing. Its speed of ascent, added to Seth's, took his racing dwindling figure out of sight quickly. After a while, the basket was gone, too. "He'll never get to the top," Mathild whispered. "It's too far, and he's going too fast. He'll lose strength and fall." "I don't think so," Alaskon said heavily. "He's agile and strong. If anyone could make it, he could." "They'll km him if he does." "Of course they will," Alaskon said, shrugging. "I won't miss him," Honath said. "No more will 1. But we could use some sharp needles down here, Honath. Now, we'll have to plan to make our ownif we can identify the different woods, down here where there aren't any leaves to help us tell them apart." Honath looked at the Navigator curiously. Seth's bolt for the sky had distracted him from the realization that the bas- ket, too, was gone, but now that desolate fact hit home. "You actually plan to stay alive in Hell, don't you, Alaskon?" "Certainly," Alaskon said calmly. "This is no more Hell than up thereis Heaven. It's the surface of the planet, no more, no less. We can stay alive if we don't panic. Were you just going to sit here until the furies came for you, Honath?" "I hadn't thought much about it," Honath confessed. "But if there is any chance that Seth will lose his grip on that rope before he reaches the top and they knife himshouldn't we wait and see if we can catch him? He can't weigh more than 35 pounds. Maybe we could contrive some sort of a net" "He'd just break our bones along with his," Chart said. "I'm for getting out of here as fast as possible." "What for? Do you know a better

place?" "No, but whether this is Hell or not, there are demons down here. We've all seen them from up above, the snake-headed giants. They must know that the Elevator always lands here and empties out free food. This must be a feeding-ground for them" He had not quite finished speaking when the branches began to sigh and toss, far above. A gust of stinging droplets poured along the blue air, and thunder rumbled. Mathild whimpered. "It's only a squall coming up," Honath said. But the words came out in a series of short croaks. As the wind had moved through the trees, Honath had automatically flexed his knees and put his arms out for handholds, awaiting the long wave of response to pass through the ground beneath him. But nothing happened. The surface under his feet remained stol- idly where it was, flexing not a fraction of an inch in any di- rection. And there was nothing nearby for his hands to grasp. He staggered, trying to compensate for the failure of the ground to move, but at the same moment another gust of wind blew through the aisles, a little stronger than the first, and calling insistently for a new adjustment of his body to the waves which passed along the treetops. Again the squashy -surface beneath him refused to respond; the familiar give- and-take of the vine-web to the winds, a part of his world as accustomed as the winds themselves, was gone. Honath was forced to sit down, feeling distinctly ill. "The damp, cool earth under his furless buttocks was unpleasant, but he could not have remained standing any longer without losing his meager prisoner's breakfast. One grappling hand caught hold of the ridged, gritty stems of a clump of horse- tail, but the contact failed to allay the uneasiness. The others seemed to be bearing it no better than Honath. Mathild in particular was rocking dizzily, her lips compressed, her hands clapped to her delicate ears. Dizziness. It was unheard of up above, except among those who had suffered grave head injuries or were otherwise very ill. But on the motionless ground of Hell, it was evidently go- ing to be with them constantly. Charl squatted, swallowing convulsively. "I1 can't stand," he moaned. "It's magic, Alaskonthe snake-headed de- mons" "Nonsense," Alaskon said, though he had remained stand- ing only by clinging to the huge, mud-colored bulb of a cy- cadella. "It's just a disturbance of our sense of balance. It's amotionlessness-sickness. We'll get used to it." "We'd better," Honath said, relinquishing his grip on the horsetails by a sheer act of will. "I think Charl's right about this being a feeding-ground, Alaskon. I hear something mov- ing around in the ferns. And if this rain lasts long, the water will rise here, too. I've seen silver flashes from down here many a time after heavy rains." "That's right," Mathild said, her voice subdued. "The base of the ferntree grove always floods; that's why the treetops are so much lower there." The wind seemed to have let up a little, though the rain was still falling. Alaskon stood up tentatively. "Then let's move on," he said. "If we try to keep under cover until we get to higher ground" A faint crackling sound, high above his head, interrupted him. It got louder. Feeling a sudden spasm of pure fear, Honath looked up. Nothing could be seen for an instant but the far-away cur- tain of branches and fern-fronds. Then, with shocking sud- denness, something small and black irrupted through the blue-green roof and came tumbling toward them. It was a man, twisting and tumbling through the air with grotesque slowness, like a child turning in its sleep. They scattered. The body hit the ground with a sodden thump, but there were sharp overtones to the sound, like the bursting of a gourd. For a moment nobody moved. Then Honath crept for- ward. It had been Seth, as Honath had realized the moment the black figurine had burst through the branches far above. But it had not been the fall that had killed him. He had been run through by at least a dozen needlessome of them, beyond doubt, tools from his own shop, their points edged hair-fine by his own precious strops of leatherwood-bark, soaked until they were soft, pliant, and nearly transparent in the mud at the bottom of sun-warmed bromelaid tanks. There would be no reprieve from above. The sentence was one thousand days. This burst and broken huddle of fur was the only alternative. And the first day had barely begun. They toiled all the rest of the day to reach higher ground, clinging to

the earth for the most part because the trees, ex- cept for a few scattered gingkoes, flowering dogwoods and live oaks, did not begin to branch until their tunks had soared more than eighteen feet above the ground. As they stole cau- tiously closer to the foothills of the Great Range and the ground became firmer, they were able to take to the air for short stretches, but they were no sooner aloft among the wil- lows than the lizard-birds came squalling down on them by the dozens, fighting among each other for the privilege of nipping these plump and incredibly slow-moving monkeys. No man, no matter how confirmed a free-thinker, could have stood up under such an onslaught by the creatures he had been taught as a child to think of as his ancestors.
The first time it happened, every member of the party dropped like a pine-cone to the sandy ground and lay paralyzed under the nearest cover, until the brindle-feathered, fan-tailed scream- ers tired of flying in such tight circles and headed for clearer air. Even after the lizard-birds had given up, they crouched quietly for a long time, waiting to see what greater demons might have been attracted by the commotion. Thus far, none of the snake-headed Powers had shown themselvesthough several times Honath had heard sugges- tively heavy movements in the jungle around them. Luckily, on the higher ground there was much more cover available, from low-growing shrubs and treespalmetto, sas- safras, several kinds of laurel, magnolia, and a great many sedges. Up here, too, the endless jungle began to break to "pour around the bases of the great pink cliffs, leaving welcome vistas of open sky, only sketchily crossed by woven bridges leading from the vine-world to the cliffs themselves. In the intervening columns of blue air a whole hierarchy of flying creatures ranked themselves, layer by layer: First the low- flying beetles, bees and two-winged insects; then the dra- gon-flies which hunted them, some with wingspreads as wide as two feet; then the lizard-birds, hunting the dragon-flies and anything else that could be nipped without fighting back; and at last, far above, the great gliding reptiles coasting along the brows of the cliffs, riding the rising currents of air, their long-jawed hunger stalking anything that flewas they sometimes stalked the birds of the attic world, and the flying fish along the breast of the distant sea. The party halted in an especially thick clump of sedges. Though the rain continued to fall, harder than ever, they were all desperately thirsty. They had yet to find a single brome- laid; evidently the tank-plants did not grow in Hell. Cupping their hands to the weeping sky accumulated surprisingly little water; and no puddles large enough to drink from accumu- lated on the sand. But at least, here under the open sky, there was too much fierce struggle in the air to allow the liz- ard-birds to congregate and squall above their hiding place. The white sun had already set, and the red sun's vast arc still bulged above the horizon only because the light from its limb had been wrenched higher into Tellura's sky by its pass- age through the white sun's intense gravitational field. In the lurid glow the rain looked like blood, and the seamed faces of the pink cliffs had all but vanished. Honath peered dubi- ously out from under the sedges at the still-distant .escarp- ments. "I don't see how we can hope to climb those," he said, in a low voice. "That kind of limestone crumbles as soon as you touch it, otherwise we'd have had better luck with our war against the cliff tribe." "We could go around the cliffs," Chart said. "The foothills of the Great Range aren't very steep. If we could last until we get to them, we could go on up into the Range itself." "To the volcanoes?" Mathild protested. "But nothing can live up there, nothing but the white fire-things. And there are the lava-flows, too, and the choking smoke" "Well, we can't climb these cliffs, Honath's quite right," Alaskon said. "And we can't climb the Basalt Steppes, either there's nothing to eat along them, let alone any water or cover. I don't see what else we can do but try to get up into the foothills." "Can't we stay here?" Mathild said plaintively. "No," Honath said, even more gently than he had intended. Mathild's four words were, he knew, the most dangerous words in Hellhe knew it quite surely, because of the im- prisoned creature inside him that cried out to say "Yes" in- stead. "We have to get out of the country

of the demons. And maybejust maybeif we can cross the great Range, we can Join a tribe that hasn't heard about our- being condemned to Hell. There are supposed to be tribes on the other side of the Range, but the cliff people would never let our folk get through to them. That's on our side now." "That's true," Alaskon said, brightening a little. "And from the top of the Range, we could come down into another tribe instead of trying to climb up into their village out of Hell. Honath, I think it might work." "Then we'd better try to sleep right here and now," Chart said. "It seems safe enough. If we're going to skirt the cliffs and climb those foothills, we'll need all the strength "we've got left." Honath was about to protest, but he was suddenly too tired to care. Why not sleep it over? And if in the night they were found and takenwell, that would at least put an end tc the struggle. It was a cheerless and bone-damp bed to sleep in, but there was no better alternative. They curled up as best they could. Just before he was about to drop off at last, Honath heard Mathild whimpering to herself, and, on impulse, crawled ovei to her and began to smooth down her fur with his tongue. To his astonishment, each separate, silky hair was loaded with dew. Long before the girl had curled herself more tightly and her complaints had dwindled into sleepy murmurs, Honath's thirst was assauged. He reminded himself to mention the method in the morning. But when the white sun finally came up, there was no time to think of thirst. Charl the Reader was gone. Something had plucked him from their huddled midst as neatly as a fallen breadfruitand had dropped his cleaned ivory skull just as negligently, some two hundred feet farther on up the slope which led toward the pink cliffs. *3 Late that afternoon, the three found the blue, turbulent stream flowing out of the foothills of the Great Range. Not even Alaskon knew quite what to make of it. It looked like water, but it flowed like the rivers of lava that crept downward fSpm the volcanoes. Whatever else it could be, obviously it wasn't water; water stood, it never flowed. It was possible to imagine a still body of water as big as this, but only as a mo- ment of fancy, an exaggeration derived from the known bodies of water in the tank-plants. But this much water in motion? It suggested pythons; it was probably poisonous. It did not occur to any of them to drink from it. They were afraid even to touch it, let alone cross it, for it was almost surely as hot as the other kinds of lava-rivers. They followed its course cautiously into the foothills, their throats as dry and gritty as the hollow stems of horsetails. Except for the thirstwhich was in an inverted sense their friend, insofar as it overrode the hungerthe climbing was not difficult. It was only circuitous, because of the need to stay under cover, to reconnoiter every few yards, to choose the most sheltered course rather than the most direct. By an unspoken consent, none of the three mentioned Charl, but 11 their eyes were constantly darting from side to side/searching for a glimpse of the thing that had taken him. That was perhaps the worst, the most terrifying part of the tragedy: that not once since they had been in Hell bad they actually seen a demon, or even any animal as large as a man. The enormous, three-taloned footprint they had found in the sand beside their previous night's bedthe spot where the thing had stood, looking down at the four sleeping men from above, coldly deciding which of them to seizewas the only evidence they had that they were now really in the same world with the demonsthe same demons they had some- times looked down upon from the remote vine-webs. The footprintand the skull. By nightfall, they had ascended perhaps a hundred and fifty feet. It was difficult to judge distances in the twilight, and the token vine bridges from the attic world to the pink cliffs were now cut off from sight by the intervening masses of the cliffs themselves. But there was no possibility that they could climb higher today. Although Mathild had borne the climb sur- prisingly well, and Honath himself still felt almost fresh, Alaskon was completely winded. He had taken a bad cut on one hip from a serrated spike of volcanic glass against which he had stumbled, and the wound, bound with leaves to pre- vent its leaving a spoor which might be followed, evidently was becoming steadily more painful. Honath finally called a halt as soon as they reached the little ridge

with the cave in back of it. Helping Alaskon over the last boulders, he was astonished to discover how hot the Navigator's hands were. He took him back into the cave and then came out onto the ledge again. "He's really sick," he told Mathild in a low voice. "He needs water, and another dressing for that cut. And we've got to get both for him somehow. If we ever get to the jungle on the other side of the Range, we'll need a navigator even worse than we need a needlesmith." "But how? I could dress the cut if I had the materials, Hon- ath. But there's no water up here. It's a desert; we'll never get aCTOSS it.)t "We've got to try. I can get him water, I think. There was a big cycladella on the slope we came up, just before we passed that obsidian spur that hurt Alaskon. Gourds that size usually have a fair amount of water inside themand I can use a piece of the spur to rip it open" A small hand came out of the darkness and took him tightly by the elbow. "Honath, you can't go back down there. Suppose the demon thatthat took Chart is still following us? They hunt at nightand this country is all so strange . . ." "I can find my way. I'll follow the sound of the stream of glass or whatever it is. You pull some fresh leaves for Alas- kon and try to make him comfortable. Better loosen those vines around the dressing a little. I'll be back." He touched her hand and pried it loose gently. Then, with- out stopping to think about it any further, he slipped off the ledge and edged toward' the sound of the stream, travelling crabwise on all fours. But he was swiftly lost. The night was thick and com- pletely impenetrable, and he found that the noise of the stream seemed to come from all sides, providing him no guide at all. Furthermore, his memory of the ridge which led up to the cave appeared to be faulty, for he could feel it turning sharply to the right beneath him, though he remembered dis- tinctly that it had been straight past the first side-branch, and then had gone to the left. Or had he passed the first side- branch in the dark without seeing it? He probed the dark- ness cautiously with one hand. At the same instant, a brisk, staccato gust of wind came whirling up out of the night across the ridge. Instinctively, Honath shifted his weight to take up the flexing of the ground beneath him He realized his error instantly and tried to arrest the com- plex set of motions, but a habit-pattern so deeply ingrained could not be frustrated completely. Overwhelmed with ver- tigo, Honath grappled at the empty air with hands, feet, and tail and went toppling. An instant later, with a familiar noise and an equally fa- miliar cold shock that seemed to reach throughout his body, he was sitting in the midst of Water. Icy water, and water that rushed by him impro- bably with a menacing, monkeylike chattering, but water all the same. It was all he could do to repress a hoot of hysteria. He hun- kered into the stream and soaked himself. Things nibbled delicately at his calves as he bathed, but he had no reason to fear fish, small species of which often showed up in the tanks of the bromelaids. After lowering his muzzle to the rushing, invisible surface and drinking his fill, he ducked himself completely and then clambered out onto the banks, carefully neglecting to shake himself. Getting back to the ledge was much less difficult. "Mathild," he called in a hoarse whisper. "Mathild, we've got water." "Come in here quick then. Alaskon's worse. I'm afraid, Honath." Dripping, Honath felt his way into the cave. "I dofa't have any container. I just got myself wetyou'll have to sit him up and let him lick my fur." "I'm not sure he can." But Alaskon could, feebly, but sufficiently. Even the cold- ness of the watera totally new experience for a man who had never drunk anything but the soup-warm contents of the bromelaidsseemed to help him. He lay back at last, and said in a weak but otherwise normal voice: "So the stream was water after all." "Yes," Honath said. "And there are fish in it, too." "Don't talk," Mathild said. "Rest, Alaskon." "I'm resting. Honath, if we stick to the course of the stream .... Where was I? Oh. We can follow the stream through the Range, now that we know it's water. How did you find that out?" "I lost my balance and fell into it." Alaskon chuckled. "Hell's not so bad, is it?" he said. Then he sighed, and rushes creaked under him. "Mathild! What's the matter? Is hedid he die?" "No . . . no. He's breathing. He's still sicker than he real- izes,

that's all . . . Honathif they'd known, up above, how much courage you have" "I was scared white," Honath said grimly. "I'm still scared." But her hand touched his again in the soi'd blackness, and after he had taken it, he felt irrationally cheerful. With Alas- kon breathing so raggedly behind them, there was little chance that either of them would be able to sleep that night; but they sat silently together on the hard stone in a kind of temporary peace, and when the mouth of the cave began to outline itself, as dimly at first as the floating patches of color seen behind the closed eye, with the first glow of the red sun, they looked at each other in a conspiracy of light all their own. Hell, Honath reflected, wasn't so bad, after all. With the first light of the white sun, a half-grown oxyaena cub rose slowly from its crouch at the mouth of the cave, and stretched luxuriously, showing a full set of saber-like teeth. It looked at them steadily for a moment, its ears alert, then turned and loped away down the slope. How long it had been crouched there listening to them, it was impossible to know. They had been lucky that they had stumbled into the lair of a youngster. A full-grown animal would have killed them all, within a few seconds after its cat's eyes had collected enough dawn to identify them positively, The cub, since it had no family of its own as yet, evidently had only been puzzled to find its den occupied, and unin- clined to quarrel about it. The departure of the big cat left Honath frozen, not so much frightened as simply stunned by so unexpected- an end to the vigil. At the first moan from Alaskon, however, Mathild was up 'and walking softly to the Navigator, speaking in a low voice, sentences which made no particular sense and perhaps were not intended to. Honath stirred and followed her. Halfway back into the cave, his foot struck something and he looked down. It was the thigh bone of some medium-large animal, imperfectly cleaned, but not very recentpossibly the keepsake the oxyaena had hoped to rescue from the usurp- ers of its lair. Along a curved inner surface there was a patch' of thick gray mold. Honath squatted and peeled it off care- fully.

- "Mathild, we can put this over the wound," he said. "Some molds help prevent wounds from festering . . . How is he?" "Better, I think," Mathild murmured. "But he's still feverish. I don't think we'll be able to move on today." Honath was unsure whether to be pleased or disturbed. Certainly, he was far from anxious to leave the cave, where they seemed at least to be reasonably comfortable. Possibly they would also be reasonably safe, for the low-roofed hole ,a~lmostt surely still smelt of oxyaena, and possible intruders wOtrid recognize the smell-as the men from the attic world could notand keep their distance. They would have no way of knowing that the cat had only been a cub to begin with, and that it had vacated the premises, though of course the odor would fade before long. Yet it was important to move on, to cross the Great Range if possible, and in the end to win their way back to the world where they belonged; even to win vindication, no matter how long it took. Even should it prove relatively easy to survive in Helland there were few signs of that, thus farthe only proper course was to fight until the attic world was totally reconquered. After all, it would have been the easy and the comfortable thing, back there at the very beginning, to have kept one's incipient heresies to oneself and remained on com- fortable terms with one's neighbors. But Honath had spoken up and so had the rest of them, in their fashions. It was the ancient internal battle between what Honath wanted to do, and what he knew he ought to do. He had never heard of Kant and the Categorical Imperative, but he knew well enough which side of his nature would win in the long run. But it had been a cruel joke of heredity which had fas- 75 tened a sense of duty onto a lazy nature. It made even small decisions aggressively painful. But for the moment at least, the decision was out of his hands. Alaskon was too sick to be moved. In addition, the strong beams of sunlight which had been glaring in across the floor of the cave were dimming by the instant, and there was a distant, premonitory growl of thunder. "Then we'll stay here," he said. "It's going to rain again, and hard this time. Once it's falling in earnest, I can go out and pick up some fruitit'll screen me even if anything is prowling around in it.

And I won't have to go as far as the stream for water, as long as the rain keeps up." The rain, as it turned out, kept up all day, in a growing downpour which completely curtained the mouth of the cave by early afternoon. The chattering of the nearby stream grew quickly to a roar. By evening, Alaskon's fever seemed to have dropped almost to normal, and his strength nearly returned as well. The wound, thanks more to the encrusted matte of mold than to any complications within the flesh itself, was still ugly-look- ing, but it was now painful only when the Navigator moved carelessly, and Mathild was convinced that it was mending. Alaskon himself, having been deprived of activity all day, was unusually talkative. "Has it occurred to either of you," he said in the gathering gloom, "that since that stream is water, it can't possibly be coming from the Great Range? All the peaks over there are just cones of ashes and lava. We've seen young volcanoes in the process of building themselves, so we're sure of that. What's more, they're usually hot. I don't see how there could possibly be any source of water in the Rangenot even run- off from the rains." "It can't just come up out of the ground," Honath said. "It must be fed by rain. By the way it sounds now, it could even be the first part of a flood." "As you say, it's probably rain water," Alaskon said cheer- fully. "But not off the Great Range, that's out of the ques- tion. Most likely it collects on the cliffs." "I hope you're wrong," Honath said. "The cliffs may be a little easier to climb from this side, but there's still the cliff tribe to think about." "Maybe, maybe. But the cliffs are big. The tribes on this side may never have heard of the war with our treetop folk. No, Honath, I think that's our only course from here." "If it is," Honath said grimly, "we're going to wish more than ever that we had some stout, sharp needles among us." Alaskon's judgment was quickly borne out. The three left the cave at dawn the next morning, Alaskon moving some- what stiffly but not otherwise noticeably incommoded, and re- sumed following the stream bed upwardsa stream now swol- len by the rains to a roaring rapids. After winding its way up- wards for about a mile in the general direction of the Great Range, the stream turned on itself and climbed rapidly back to- ward the basalt cliffs, falling toward the three over success- ively steeper shelves of jutting rock. Then it turned again, at right angles, and the three found themselves at the exit of a dark gorge, little more than thirty feet high, but both narrow and long. Here the stream was al- most perfectly smooth, and the thin strip of land on each side of it was covered with low shrubs. They paused and looked dubiously into the canyon. It was singularly gloomy. "There's plenty of cover, at least," Honath said in a low voice. "But almost anything could live in a place like .that." "Nothing very big could hide in it," Alaskon pointed out. "It should be safe. Anyhow it's the only way to go." "All right. Let's go ahead, then. But keep your head down, and be ready to jump!" Honath lost the other two by sight as soon as they crept into the dark shrubbery, but he could hear their cautious movements nearby. Nothing else in the gorge seemed to move at-~ not even the water, which flowed without a ripple over r,n invisible bed. There was not even any wind, for which Honath was grateful, although he had begun to develop an immunity to the motionlessness sickness. After a few moments, Honath heard a low whistle. Creep- ing sidewise toward the source of the sound, he nearly bumped into Alaskon, who was crouched beneath a thickly spreading magnolia. An instant later, Mathild's face peered out of the dim greenery. "Look," Alaskon whispered. "What do you make of this?" "This" was a hollow in the sandy soil, about four feet across and rimmed with a low parapet of earthevidently the same earth that had been scooped out of its center. Occupying most of it were three gray, ellipsoidal objects, smooth and feature- less. "Eggs," Mathild said wonderingly. "Obviously. But look at the size of them! Whatever laid them must be gigantic. I think we're trespassing in some- thing's private valley." Mathild drew in her breath. Honath thought fast, as much to prevent panic in himself as in the girl. A sharp-edged stone lying nearby provided the answer. He seized it and struck. The outer surface of the egg was leathery rather than brit- tle; it tore raggedly. Deliberately, Honath bent and put

his mouth to the oozing surface. It was excellent. The flavor was decidedly stronger than that of birds' eggs, but he was far too hungry to be squeamish. After a moment's amazement, Alaskon and Mathild attacked the other two ovoids with a will. It was the first really satis- fying meal they had had in Hell. When they finally moved away from the devastated nest, Honath felt better than he had since the day he was arrested, As they moved on down the gorge, they began again to hear the roar .of water, though the stream looked as placid as ever. Here, too, they saw the first sign of active life in the valley: a flight of giant dragonflies skimming over the water. The insects took flight as soon as Honath showed himself, but quickly came back, their nearly non-existent brains already convinced that there had always been men in the valley. The roar got louder very rapidly. When the three rounded the long, gentle turn which had cut off their view from the exit, the source of the roar came into view. It was a sheet of falling water as tall as the depth of the gorge itself, which came arcing out from between two pillars of basalt and fell to a roiling, frothing pool. "This is as far as we go!" Alaskon said, shouting to make himself heard at all over the tumult. "We'll never be able to get up those walls I" Stunned, Honath looked from side to side. What Alaskon had said was all too obviously true. The gorge evidently had begun life as a layer of soft, partly soluble stone in the cliffs, tilted upright by some volcanic upheaval, and then worn com- pletely away by the rushing stream. Both cliff faces were of the harder rock, and were sheer and as smooth aa if they had been polished by hand. Here and there a network of tough vines had begun to climb them, but nowhere did such a network even come close to reaching the top. Honath turned and looked once more at the great arc of water and spray. If there were only some way to prevent their being forced to retrace their steps Abruptly, over the riot of the falls, there was a piercing, hissing shriek. Echoes picked it up and sounded it again and again, all the way up the battlements of the cliffs. Honath sprang straight up in the air and came down trembling, fac- ing away from the pool. At first he could see nothing. "Then, down at the open end of the turn, there was a huge flurry of motion. A second later, a two-legged, blue-green reptile half as tall as the gorge itself came around the turn in a single huge bound and lunged violently into the far wall of the valley. It stopped as if momentarily stunned, and the great head turned toward them a face of sinister and furious idiocy. The shriek set the air to boiling again. Balancing itself with its heavy tail, the beast lowered its head and looked redly toward the falls. The owner of the robbed nest had come homeand they had met a demon of Hell at last. Honath's mind at that instant went as white and blank as the underbark of a poplar. He acted without thinking, without even knowing what he did. When thought began to creep back into his head again, the three of them were standing shiv- ering in semi-darkness, watching the blurred shadow of the demon lurching back and forth upon the screen of shining water. It had been nothing but luck, not foreplanning, to find that there was a considerable space between the back of the falls proper and the blind wall of the canyon. It had been luck, too, which had forced Honath to skirt the pool in order to reach, the falls at all, and thus had taken them all bebind the silver curtain at the point where the weight of the falling water was too low to hammer them down for good. And it had been the blindest stroke of all that the demon had charged after them directly into the pool, where the deep, boiling water had slowed the threshing hind legs enough to halt it be- fore it went under the falls, as it had earlier blundered into the hard wall of the gorge. Not an iota of all this had been in Honath's mind before he had discovered it to be true. At the moment that the huge reptile had screamed for the second time, he had simply grasped Mathild's hand and broken for the falls, leaping from low tree to shrub to fern faster than he had ever leapt before. He did not stop to see how well Mathild was keeping up with him, or whether or not Alaskon was following. He only ran. He might have screamed, too; he could not remember. They stood now, all three of them, wet through, behind the curtain until the shadow of the demon faded and van- ished. Finally

Honath felt a hand thumping his shoulder, and turned slowly. Speech was impossible here, but Alaskon's pointing finger was eloquent enough. Along the back wall of the falls, cen- tunes of erosion had failed to wear away completely-the orig- inal soft limestone; there was still a sort of serrated chimney there, open toward the gorge, which looked as though it could be climbed. At the top of the falls, the water shot out from between the basalt pillars in a smooth, almost solid-looking tube, arching at least six feet before beginning to break into the fan of spray and rainbows which poured down into the gorge. Once the chimney had been climbed, it should be pos- sible to climb out from under the falls without passing through the water again. And after that? Abruptly, Honath grinned. He felt weak all through with reaction, and the face of the demon would probably be leer- ing in his dreams for a long time to comebut at the same time he could not repress a surge of irrational confidence. He gestured upward jauntily, shook himself, and loped forward into the throat of the chimney. Hardly more than an hour later they were all standing on a ledge overlooking the gorge, with the waterfall creaming over the brink next to them, only a few yards away. From here, it was evident that the gorge itself was only the bottom of a far larger cleft, a split in the pink-and-gray cliffs as sharp as though it had been driven in the rock by a bolt of sheet light- ning. Beyond the basalt pillars from which the fall issued. however, the stream foamed over a long ladder of rock shelves which seemed to lead straight up into the sky. On this side of the pillars the ledge broadened into a sort of truncated mesa, as if the waters had been running at this level for cen- turies before striking some softer rock-stratum which had per- mitted them to cut down further to create the gorge. The stone platform was littered with huge rocks, rounded by long water erosion, obviously the remains of a washed-out stratum of conglomerite or a similar sedimentary layer. Honath looked at the huge pebblesmany of them bigger than he wasand then back down into the gorge again. The figure of the demon, foreshortened into a pigmy by distance and perspective, was still roving back and forth in front of the waterfall. Having gotten the notion that prey was hiding behind the sheet of water, the creature might well stay sta- tioned there until it starved, for all Honath knewit cer- tainly did not seem to be very brightbut Honath thought he had a better idea. "Alaskon, can we hit the demon with one of these rocks?" The navigator peered cautiously into the gorge. "It wouldn't surprise me," he said at last. "It's just pacing back and forth in that .same small arc. And all things fall at the same speed; if we can make the rock arrive just as it walks under ithmm. Yes, I think so. Let's pick a big one to make certain." But Alaskon's ambitions overreached his strength; the rock he selected would not move, largely because he himself was still too weak to help much with it. "Never mind," he said. "Even a small one will be falling fast by the time it gets down there. Pick one you and Mathild can roll easily your- selves; I'll just have to figure it a little closer, that's all." After a few tests, Honath selected a rock about three times the size of his own head. It was heavy, but between them he a~d Mathild got it to the edge of the ledge. "Hold on," Alaskon said in a pre-occupied voice. "Tip it over the edge, so it's ready to drop as soon as you let go of it. Good. Now wait. He's on his backtrack now. As soon as he crossesAll right. Four, three, two, one, drop it!" The rock fell away. All three of them crouched in a row at the edge of the gorge. The rock dwindled, became as small as a fruit, as small as a fingernail, as small as a grain of sand. The dwarfed figure of the demon reached the end of its mad stalking arc, swung furiously to go back again And stopped. For an instant it just stood there. Then, with infinite slowness, it toppled sidewise into the pool. It thrashed convulsively two or three times, and then was gone; the spreading waves created by the waterfall masked any rip- ples it might have made in sinking. "Like spearing fish in a bromelaid," Alaskon said proudly. But)US voice was shaky. Honath knew exactly why. After all, they had just killed a demon. "jffe could do that again," Honath whispered. Often," Alaskon agreed, still peering greedily down at the pool. "They don't appear to have much intelligence, these demons. Given enough

height, we could lure them into blind alleys like this, and bounce rocks off them almost at will. I wish I'd thought of it." "Where do we go now?" Mathild said, looking toward the ladder beyond-the basalt pillars. "That way?" "Yes, and as fast as possible," Alaskon said, getting to his feet and looking upward, one hand shading his eyes. "It must be late. I don't think the light will last much longer." "We'll have to go single file," Honath said. "And we'd bet- ter keep hold of each other's hands. One slip on those wet steps andit's a long way down again." Mathild shuddered and took Honath's hand convulsively. To his astonishment, the next instant she was tugging him toward the basalt pillars. The irregular patch of deepening violet sky grew slowly as they climbed. They paused often, clinging -to the tagged es- carpments until their breath came back, and snatching icy water in cupped palms from the stream that fell down the lad- der beside them. There was no way to tell how far up into the dusk the way had taken them, but Honath suspected that they were already somewhat above the level of their own vine- webbed world. The air smelled colder and sharper than it ever had above the jungle. The final cut in the cliffs through which the stream fell was another chimney, steeper and more smooth-walled than the one which had taken them out of the gorge under the water- fall, but also narrow enough to be climbed by bracing one's back against one side, and one's hands and feet against the other. The column of air inside the chimney was filled with spray, but in Hell that was too minor a discomfort to bother about. At long last Honath heaved himself over the edge of the chimney onto flat rock, drenched and exhausted, but filled with an elation he could not suppress and did not want to. They were above the attic .jungle; they had beaten Hell it- self. He looked around to make sure that Mathild was safe, and then reached a hand down to Alaskon; the navigator's bad leg had been giving him trouble. Honath heaved mightily, and Alaskon came heavily over the edge and lit sprawling on the high moss. The stars were out. For a while they simply sat and gasped for breath. Then they turned, one by one, to see where they were. There was not a great deal to see. There was the mesa, domed with stars on all sides; a shining, finned spindle, like a gigantic minnow, pointing skyward in the center of the rocky plateau; and around the spindle, indistinct in the starlight . . . . . Around the shining minnow, tending it, were the Giants. 4 This, then, was the end of the battle to do what was right, whatever the odds. All the show of courage against supersti- tion, all the black battles against Hell itself, came down to this: The Giants were real! They were inarguably real. Though they were twice as tall as men, stood straighter, had broader shoulders, were heavier acros'S the seat and had no visible tails, their fellowship with men was clear. Even their voices, as they shouted to each other around their towering metal minnow, were the voices of men made into gods, voices as remote from those of men as the voices of men were remote from those of monkeys, yet just as clearly of the same family. These were the Giants of the Book of Laws. They were not only real, but they had come back to Tellura as they had promised to do. And they would know what to do with unbelievers, and with fugitives from Hell. It had all been for nothingnot only the physical struggle, but the fight to be allowed to think for oneself as well. The gods existed, literally, actually. This belief was the real hell from which Honath had been try- ing to fight free all his lifebut now it was no longer just a belief. It was a fact, a fact that he was seeing with his own eyes.

* The Giants had returned to judge their handiwork. And the first of the people they would meet would be three outcasts, three condemned and degraded criminals, three jailbreakers the worst possible detritus of the attic world. All this went searing through Honath's mind in less than a second, but nevertheless Alaskon's mind evidently had worked still taster. Always the most outspoken unbeliever of the en- tire little group of rebels, the one among them whose whole world was founded upon the existence of rational explana- tions for everything, his was the point of view most com- pletely ~allengedd by the sight before them now. With a deep, sharply indrawn breath, he turned abruptly and walked away from

them. Mathild' uttered a cry of protest, which she choked off in the middle; but it was already too late. A round eye on the great silver minnow came alight, bathing them all in an oval patch of brilliance. Honath darted after the navigator. Without looking back, Alaskon suddenly was running. For an instant longer Honath saw his figure, poised delicately against the black sky. Then he dropped silently out of sight, as suddenly and completely as if he had never been. Alaskon had borne every hardship and every terror of the ascent from Hell with courage and even with cheerfulness but he had been unable to face being told that it had all been meaningless. Sick at heart, Honath turned back, shielding his eyes from the miraculous light. There was a clear call in some unknown language from near the spindle. Then there were footsteps, several pairs of them, coming closer. It was time for the Second Judgment. After a long moment, a big voice from the darkness said: "Don't be afraid. We mean you no harm. We're men, just as you are." The language had the archaic flavor of the Book of Laws, but it was otherwise perfectly understandable. A second voice said: "What are you called?" Honath's tongue seemed to be stuck to the roof of his mouth. While he was struggling with it, Mathild's voice came clearly from beside him: "He is Honath the Purse-Maker, and I am Mathild the For- ager." "You are a long distance from the place we left your peo- ple," the first Giant said. "Don't you still live in the vine-webs above the jungles?" "Lord" "My name is Jarl Eleven. This is Gerhardt Adier." This seemed to stop Mathild completely. Honath could understand why: the very notion of addressing Giants by name was nearly paralyzing. But since they were already as good as cast down into Hell again, nothing could be lost by it. "Jarl Eleven," he said, "the people still live among the vines. The floor of the jungle is forbidden. Only criminals are sent there. We are criminals." "Oh?" Jarl Eleven said. "And you've come all the way from the surface to this mesa? Gerhardt, this is prodigious. You have no idea what the surface of this planet is likeit's a place where evolution has never managed to leave the tooth- and-nail stage. Dinosaurs from every period of the Meso- zoic, primitive mammals all the way up the scale to the an- cient catsthe works. That's why the original seeding team put these people in the treetops instead." "Honath, what was your crime?" Gerhardt Adier said. Honath was almost relieved to have the questioning come so quickly to this point; Jarl Eleven's aside, with its many terms he could not understand, had been frightening in its very meaninglessness. "There were five of us," Honath said in a low voice. "We said 'wethat we did not believe in the Giants." There was a brief silence. Then, shockingly, both Jarl Eleven and Gerhardt Adier burst into enormous laughter. Mathild cowered, her hands over her ears. Even Honath flinched and took a step backward. Instantly, the laughter stopped, and the Giant called Jarl Eleven stepped into the oval of light and sat down beside them. In the light, it could be seen that his face and hands were hairless, although there was hair on his crown; the rest of his body was covered by a kind of cloth. Seated, he was no taller than Honath, and did not seem quite so fearsome. "I beg your pardon," he said. "It was unkind of us to laugh, but what you said was highly unexpected. Oerhardt, come over here and squat down, so that you don't look so much like a statue of some general. Tell me, Honath, in what way did you not believe in the Giants?" Honath could hardly believe his ears. A Giant had begged his pardon! Was this some still crueler joke? But whatever the reason, Jarl Eleven had asked him a question. "Each of the five of us differed," he said. "I held that you were notnot real except as symbols of some abstract truth. One of us, the wisest, believed that you did not exist in any sense at all. But we all agreed that you were not gods." "And, of course, we aren't," Jarl Eleven said. "We're men. We come from the same stock as you. We're not your rulers, but your brothers. Do you understand what I say?" '"No," Honath admitted. "Then let me tell you about it. There are men on many worlds, Honath. They differ from one another, because the worlds differ, and different kinds of men are needed to people each one. Gerhardt and I are the kind of men who live on a world called Earth, and many other worlds like it. We are two very minor members of a huge

project called a 'seeding pro- gram,' which has been going on for thousands of years now. It's the job of the seeding program to survey newly discovered worlds, and then to make men suitable to live on each new world." "To make men? But only gods" "No, no. Be patient and listen," said Jarl Eleven. "We don't make men. We make them suitable. There's a great deal of difference between the two. We take the living germ plasm, the sperm and the egg, and we modify it; then the modified man emerges, and we help him to settle down in his new world. That's what we did on Tellurait happened long ago, before Gerhardt and I were even born. Now, we've come back to see how you people are getting along, and to lend a hand if necessary." He looked from Honath to Mathild, and back again. "Do you follow me?" he said. "I'm trying," Honath said. "But you should go down to the jungle-top, then. We're not like the others; they are the people you want to see." "We shall, in the morning. We just landed here. But, just because you're not like the others, we're more interested in you now. Tell me: has any condemned man ever escaped from the jungle floor before?" "No, never. That's not surprising. There are monsters down there." Jarl Eleven looked sidewise at the other Giant; he seemed to be smiling. "When you see the films," he remarked, "you'll call that the understatement of the century. Honath, how did you three manage to escape, then?" Haltingly, at first, and then with more confidence as the memories came crowding vividly back, Honath told him. When he mentioned the feast at the demon's nest, Jarl Eleven again looked significantly at Adier, but he did not interrupt. "And, finally, we got to the top of the chimney and came out on this flat space," Honath said. "Alaskon was still with us then, but when he saw you and the shining thing he threw himself back down the pleft. He was a criminal like us, but he should not have died. He was a brave man, and a wise one." "Not wise enough to wait until all the evidence wai in," Adier said enigmatically. "All in all, Jarl, I'd say 'prodigious' is the word for it. This is really the most successful seeding job any team has ever done, at least in this limb of the galaxy. And what a stroke of luck, to be on the spot just as it came to term, and with a couple at that!" "What does it mean?" Honath said. "Just this, Honath. When the seeding team set your people up in business on Tellura, they didn't mean for you to live forever in the treetops. They knew that, sooner or later, you'd have to come down to the ground and learn to fight this planet on its own terms. Otherwise, you'd go stale and die out." "Live on the ground all the time?" Mathild said in a faint voice. "Yes, Mathild. The life in the treetops was to have been only an interim period,, while you gathered knowledge you needed about Tellura, and put it to use. But to be the real masters of the world, you will have to conquer the surface, too. "The device your people worked out, of sending only crim- inals to the surface, was the best way of conquering the planet that they could have picked. It takes a strong will and excep- tional courage to go against custom; and both those qualities are needed to lick Tellura. Your people exiled just such fight- ing spirits to the surface, year after year after year. "Sooner or later, some of those exiles were going to discover how to live successfully on the ground, and make it possible for the rest of your people to leave the trees. You and Honath have done just that." "Observe please, Jari," Adier said. "The crime in this first successful case was ideological. That was the crucial turn in the criminal policy of these people. A spirit of revolt is not quite enough; but couple it with brains, andecce homo!" Honath's head was swimming. "But what does all this mean?" he said. "Are wenot condemned to Hell any more?" "No, you're still condemned, if you still want to call it that," Jari Eleven said soberly. "You've learned how to live down there, and you've found out something even more val- uable: How to stay alive while cutting down your enemies. Do you know that you killed three demons with your bare hands, you and Mathild and Alaskon?" "Killed" "Certainly," Jari Eleven said. "You ate three eggs. That is the classical way, and indeed the only way, to wipe out monsters like the dinosaurs. You can't kill the adults with ~iitpthing short of an anti-tank gun, but they're helpless in embryoand the adults haven't the sense to guard their nests. '"~' Honath heard, but only distantly.

Even his awareness of Mathild's warmth next to him did not seem to help much. "Then we have to go back down there," he said dully. "And this time forever." "Yes," Jari Eleven said, his voice gentle. "But you won't be alone, Honath. Beginning tomorrow, you'll have all your people with you." "All our people? Butyou're going to drive them out?" "All of them. Oh, we won't prohibit the use of the vine- webs, too, but from now on your race will have to fight it out on the surface as well. You and Mathild have proven that it can be done. It's high time the rest of you learned, too." "Jari, you think too little of these young people themselves," Adier said. "Tell them what is in store for them. They are frightened." "Of course, of course. It's obvious. Honath, you and Mathild are the only living individuals of your race who know how to survive down there on the surface. And we're not going to tell your people how to do that. We aren't even going to drop them so much as a hint. That part of it is up to you." Honath's jaw dropped. "It's up to you," Jarl Eleven repeated firmly. "We'll return you to your tribe tomorrow, and we'll tell your people that you two know the rules for successful life on the ground and that everyone else has to go down and live there, too. We'll tell them nothing else but that. What do you think they'll do then?" "I don't know," Honath said dazedly. "Anything could happen. They might even make us Spokesman and Spokes- womanexcept that we're just common criminals." "Uncommon pioneers, Honath. The man and woman to lead the humanity of Tellura out of the attic, into the wide world." Jarl Eleven got to his feet, the great light playing over him. Looking up after him, Honath saw that there were at least a dozen other Giants standing just outside the oval of light, listening intently to every word. "But there's a little time to be passed before we begin," Jarl Eleven said. "Perhaps you two would like to look over our ship." Numbly, but with a soundless emotion much like music inside him, Honath took Mathild's hand. Together they walked away from the chimney to Hell, following the foot- steps of the Giants.

To Pay the Piper THE MAN in the white jacket stopped at the door marked Re-Education ProjectCol. H. H. Mudgett, Commanding Officer and waited while the scanner looked him over. He had been through that door a thousand times, but the scanner made as elaborate a job of it as if it had never seen him before. It always did, for there was always in fact a chance that it had never seen him before, whatever the fallible human beings to whom it reported might think. It went over him from gray, crew-cut poll to reagent-proof shoes, checking his small wiry body and lean profile against its stored silhouettes, tasting and smelling him as dubiously as if he were an orange held in storage two days too long. "Name?" it said at last. "Carson, Samuel, 32-454-0698." "Business?" "Medical director, Re-Ed One." While Carson waited, a distant, heavy concussion came rolling down upon him through the mile of solid granite above his head. At the same moment, the letters on the doorand everything else inside his cone of visionblurred distressingly, and a stab of pure pain went lancing through his head. It was the supersonic component of the explosion, and it was harm- lessexcept that it always both hurt and scared him. The light on the door-scanner, which had been glowing yellow up to now, flicked back to red again and the machine began the whole routine all over; the sound bomb had reset it. Carson patiently endured its inspection, gave his name, serial number, and mission once more, and this time got the green. He went in, unfolding as he walked the flimsy square of cheap paper he had been carrying all along. Mudgett looked up from his desk and said at once: "What now?" The physician tossed the square of paper down under Mudgett's eyes. "Summary of the press reaction to Hamelin's speech last night," he said. "The total effect is going against us, Colonel. Unless we can change Hamelin's mind, this outcry to re-educate civilians ahead of soldiers is going to lose the war for us. The urge to live on the surface again has

been mounting for ten years; now it's got a target to focus on. Us." Mudgett chewed on a pencil while he read the summary; a blocky, bulky man, as short as Carson and with hair as gray and close-cropped. A year ago, Carson would have told him that nobody in Re-Ed could afford to put stray objects in his mouth even once, let alone as a habit; now Carson just waited. There wasn't a manor a woman or a childof America's surviving thirty-five million "sane" people who didn't have some such tic. Not now, not after twenty-five years of underground life. "He knows it's impossible, doesn't he?" Mudgett demanded abruptly. "Of course he doesn't," Carson said impatiently. "He doesnt know any more about the real nature of the project than the people do. He thinks the 'educating' we do is in some sort of survival technique. . . . That's what the papers think, too, as you can plainly see by the way they loaded that editorial." "Urn. If we'd taken direct control of the papers in the first place . . ." Carson said nothing. Military control of every facet of civilian life was a fact, and Mudgett knew it. He also knew that an appearance of freedom to think is a necessity for the human mindand that the appearance could not be main- tained without a few shreds of the actuality. "Suppose we do this," Mudgett said at last. "Hamelin's position in the State Department makes it impossible for us to muzzle him. But it ought to be possible to explain to him that no unprotected human being can live on the surface, no matter how many Merit Badges he had for woodcraft and first aid. Maybe we could even take him on a little trip top- side; I'll wager he's never seen it." "And what if he dies up there?" Carson said stonily. "We lose three-fifths of every topside party as it isand Hamelin's an inexperienced" "Might be the best thing, mightn't it?" "No," Carson said. "It would look like we'd planned it that way. The papers would have the populace boiling by the next morning." Mudgett groaned and nibbled another double row of inden- tations around the barrel of the pencil. "There must be some- thing," he said. "There is." "Well?" "Bring the man here and show him just what we are doing. Re-educate him, if necessary. Once we told the newspapers that he'd taken the course. . . well, who knows, they just might resent it. Abusing his clearance privileges and so on." "We'd be violating our basic policy," Mudgett said slowly. " 'Give the Earth back to the men who fight for it.' Still, the idea has some merits. . . ." "Hamelin is out in the antechamber right now," Carson said. "Shall I bring him in?" The radioactivity never did rise much beyond a mildly hazardous level, and that was only transient, during the second week of the warthe week called the Death of Cities. The small shards of sanity retained by the high commands on both sides dictated avoiding weapons with a built-in backfire; no cobalt bombs were dropped, no territories permanently poisoned. Generals still remembered that unoccupied territory, no matter how devastated, is still unconquered territory. But no such considerations stood in the way of biological warfare. It was controllable: you never released against the enemy any disease you didn't yourself know how to control. There would be some slips, of course, but the margin for error ... There were some slips. But for the most part, biological warfare worked fine. The great fevers washed like tides around and around the globe, one after another. In such cities as had escaped the bombings, the rumble of truck convoys carrying the puffed heaped corpses to the mass graves became the only sound except for sporadic small-arms fire; and then that too ceased, and the trucks stood rusting in rows. Nor were human beings the sole victims. Cattle fevers were sent out. Wheat rusts, rice molds, corn blights, hog choleras, poultry enteritises, fountained into the indifferent air from the hidden laboratories, or were loosed far aloft, in the jet- stream, by rocketing fleets. Gelatin capsules pullulating with gill-rots fell like hail into the great fishing grounds of New- foundland, Oregon, Japan, Sweden, Portugal. Hundreds of species of animals were drafted as secondary hosts for human diseases, were injected and released to carry the blessings of the laboratories to their mates and litters. It was discovered that minute amounts of the tetracycline series of antibiotics, which had long been used as feed supplements to bring

farm animals to full market weight early, could also be used to raise the most whopping Anopheles and Aedes mosquitoes anybody ever saw, capable of flying long distances against the wind and of carrying a peculiarly interesting new strain of the malarial parasite and the yellow fever virus. . . . By the time it had ended, everyone who remained alive was a mile under ground. For good. "I still fail to understand why," Hamelin said, "if, as you claim, you have methods of re-educating soldiers for surface life, you can't do so for civilians as well. Or instead." The Under Secretary, a tall, spare man, bald on top, and with a heavily creased forehead, spoke with the odd neutral accentuntinged by regionalismof the trained diplomat, despite the fact that there had been no such thing as a foreign service for nearly half a century. "We're going to try to explain that to you," Carson said. "But we thought that, first of all, we'd try to explain once more why we think it would be bad policyas well as physically out of the question. "Sure, everybody wants to go topside as soon as it's possible. Even people who are reconciled to these endless caverns and corridors hope for something better for their childrena glimpse of sunlight, a little rain, the fall of a leaf. That's more important now to all of us than the war, which we don't believe in any longer. That doesn't even make any military sense, since we haven't the numerical strength to occupy the enemy's territory any more, and they haven't the strength to occupy ours. We understand all that. But we also know that the enemy is intent on prosecuting the war to the end. Extermination is what they say they want, on their propaganda broadcasts, and your own Department reports that they seem to mean what they say. So we can't give up fighting them; that would be simple suicide. Are you still with me?" "Yes, but I don't see" "Give me a moment more. If we have to continue to fight, we know this much: that the first of the two sides to get men on the surface againso as to be able to attack important targets, not just keep them isolated in seas of plagueswill be the side that will bring this war to an end. They know that, too. We have good reason to believe that they have a re- education project, and that it's about as far advanced as ours is." "Look at it this way," Colonel Mudgett burst in un- expectedly. "What we have now is a stalemate. A saboteur occasionally locates one of the underground cities and lets the pestilences into it. Sometimes on our side, sometimes on theirs. But that only happens sporadically, and it's just more of this mutual extermination businessto which we're com- mitted, willy-nilly, for as long as they are. If we can get troops onto the surface first, we'll be able to scout out their im- portant installations in short order, and issue them a surrender ultimatum with teeth in it. They'll take it. The only other course is the sort of slow, mutual suicide we've got now." Hamelin put the tips of his fingers together. "You gentlemen lecture me about policy as if I had never heard the word before. I'm familiar with your arguments for sending soldiers first. You assume that you're familiar with all of mine for starting with civilians, but you're wrong, because some of them haven't been brought up at all outside the Department. I'm going to tell you some of them, and I think they'll merit your close attention." Carson shrugged. "I'd like nothing better than to be con- vinced, Mr. Secretary. Go ahead." "You of all people should know, Dr. Carson, how close our underground society is to a psychotic break. To take a single instance, the number of juvenile gangs roaming these corridors of ours has increased 400 per cent since the rumors about the Re-Education Project began to spread. Or another: the number of individual crimes without motivecrimes committed just to distract the committer from the grinding monotony of the life we all leadhas now passed the total of all other crimes put together. "And as for actual insanityof our thirty-five million people still unhospitalized, there are four million cases of which -we know, each one of which should be committed right now for early paranoid schizophreniaexcept that were we to commit them, our essential industries would suffer a manpower loss more devastating than anything the enemy has inflicted upon us. Every one of those four million persons is a major hazard to his neighbors and to his job, but how can we do without them?

And what can we do about the un- recognized, subclinical cases, which probably total twice as many? How long can we continue operating without a collapse under such conditions?" Carson mopped his brow. "I didn't suspect that it had gone that far." "It has gone that far," Hamelin said icily, "and it is accelerating. Your own project has helped to accelerate it. Colonel Mudgett here mentioned the opening of isolated cities to the pestilences. Shall I tell you how Louisville fell?" "A spy again, I suppose," Mudgett said. "No, Colonel. Not a spy. A band ofof vigilantes, of mutineers. I'm familiar with your slogan. The Earth to those who fight for it.' Do you know the counterslogan that's circulating among the people?" They waited. Hamelin smiled and said: " 'Let's die on the surface.' " "They overwhelmed the military detachment there, put the city administration to death, and blew open the shaft to the surface. About a thousand people actually made it to the top. Within twenty-four hours the city was deadas the ring- leaders had been warned would be the outcome. The warning didn't deter them. Nor did it protect the prudent citizens who had no part in the affair." Hamelin leaned forward suddenly. "People won't wait to be told when it's their turn to be re-educated. They'll be tired of waiting, tired to the point of insanity of living at the bottom of a hole. They'll just go. "And that, gentlemen, will leave the world to the enemy . . . or, more likely, the rats. They alone are immune to every- thing by now." There was a long silence. At last Carson said mildly: "Why aren't we immune to everything by now?" "Eh? Whythe new generations. They've never been exposed." "We still have a reservoir of older people who lived through the war: people who had one or several of the new diseases that swept the world, some as many as five, and yet recovered. They still have their immunities. We know; we've tested them. We know from sampling that no new disease has been introduced by either side in over ten years now. Against all the known ones, we have immunization techniques, anti-sera, antibiotics, and so on. I suppose you get your shots every six months like all the rest of us; we should all be very hard to infect now, and such infections as do take should run mild courses." Carson held the Under Secretary's eyes grimly. "Now, answer me this question: why is it that, despite all these protections, every single person in an opened city dies?" "I don't know," Hamelin said, staring at each of them in turn. "By your showing some of them should recover." "They should," Carson said. "But nobody does. Why? Because the very nature of disease has changed since we all went underground. There are now abroad in the world a number of mutated bacterial strains which can by-pass the immunity mechanisms of the human body altogether. What this means in simple terms is that, should such a germ get into your body, your body wouldn't recognize it as an invader. It would manufacture no antibodies against the germ. Conse- quently, the germ could multiply without any check, andyou would die. So would we all." "I see," Hamelin said. He seemed to have recovered his composure extraordinarily rapidly. "I am no scientist, gentle- men, but what you tell me makes our position sound perfectly hopeless. Yet obviously you have some answer." Carson nodded. "We do. But it's important for you to understand the situation, otherwise the answer will mean nothing to you. So: is it perfectly clear to you now, from what we've said so far, that no amount of re-educating a man's brain, be he soldier or civilian, will allow him to survive on the surface?" "Quite clear," Hamelin said, apparently ungrudgingly. Carson's hopes rose by a fraction of a millimeter. "But if you don't re-educate his brain, what can you re-educate? His reflexes, perhaps?" "No," Carson said. "His lymph nodes, and his spleen." A scornful grin began to appear on Hamelin's thin lips. "You need better public relations counsel than you've been getting," he said. "If what you say is trueas of course I assume it isthen the term 're-educate' is not only inap- propriate, it's downright misleading. If you had chosen a less suggestive and more accurate label in the beginning, I wouldn't have been able to cause you half the trouble I have." "I agree that we were badly advised there," Carson said. "But not entirely for those reasons. Of course the name is misleading; that's both a characteristic

and a function of the names of top secret projects. But in this instance the name 'Re-Education,' bad as it now appears, subjected the men who chose it to a fatal temptation. You see, though it is misleading, it is also entirely accurate." "Word games," Hamelin said. "Not at all," Mudgett interposed. "We were going to spare you the theoretical reasoning behind our project, Mr. Sec- retary, but now you'll just have to sit still for it. The fact is that the body's ability to distinguish between its own cells and those of some foreign tissuea skin graft, say, or a bacterial invasion of the bloodisn't an inherited ability. It's a learned reaction. Furthermore, if you'll think about it a moment, you'll see that it has to be. Body cells die, too, and have to be disposed of; what would happen if removing those dead cells provoked an antibody reaction, as the destruction of foreign cells does? We'd die of anaphylactic shock while we were still infants. "For that reason, the body has to learn how to scavenge selectively. In human beings, that lesson isn't learned com- pletely until about a month after birth. During the intervening time, the newborn infant is protected by antibodies that it gets from the colestrum, the 'first milk' it gets from the breast during the three or four days immediately after birth. It can't generate its own; it isn't allowed to, so to speak, until it's learned the trick of cleaning up body residues without triggering the antibody mechanisms. Any dead cells marked 'personal' have to be dealt with some other way." "That seems clear enough," Hamelin said. "But I don't see its relevance." "Well, we're in a position now where that differentiation between the self and everything outside the body doesn't do us any good any more. These mutated bacteria have been 'selfed' by the mutation. In other words, some of their protein molecules, probably desoxyribonucleic acid molecules, carry configurations or 'recognition units' identical with those of our body cells, so that the body can't tell one from another." "But what has all this to do with re-education?" "Just this," Carson said. "What we do here is to impose upon the cells of the bodyall of thema new set of recognition units for the guidance of the lymph nodes and the spleen, which are the organs that produce antibodies. The new units are highly complex, and the chances of their being duplicated by bacterial evolution, even under forced draft, are too small to worry about. That's what Re-Education is. In a few moments, if you like, we'll show you just how it's done." Hamelin ground out his fifth cigarette in Mudgett's ash tray and placed the tips of his fingers together thoughtfully. Carson wondered just how much of the concept of recognition- marking the Under Secretary had absorbed. It had to be admitted that he was astonishingly quick to take hold of abstract ideas, but the self-marker theory of immunity was like everything else in immunologyalmost impossible to explain to laymen, no matter how intelligent. "This process," Hamelin said besitantly, "it takes a long time?" "About six hours per subject, and we can handle only one man at a time. That means that we can count on putting no more than seven thousand troops into the field by the turn of the century. Every one will have to be a highly trained specialist, if we're to bring the war to a quick conclusion." "Which means no civilians," Hamelin said. "I see. I'm not entirely convinced, butby all means let's see how it's done." Once inside, the Under Secretary tried his best to look everywhere at once. The room cut into the rock was roughly two hundred feet high. Most of it was occupied by the bulk of the Re-Education Monitor, a mechanism as tall as a fifteen- story building, aad about a city block square. Guards watched it on all sides, and the face of the machine swarmed with technicians. "Incredible," Hamelin murmured. "That enormous object can process only one man at a time?" 'That's right," Mudgett said. "Luckily it doesn't have to treat all the body cells directly. It works through the blood, re-selfing the cells by means of small changes in the serum chemistry." "What kind of changes?" "Well," Carson said, choosing each word carefully, "that's more or less a graveyard secret, Mr. Secretary. We can tell you this much: the machine uses a vast array of crystalline, complex sugars which behave rather like the blood-group- and-type proteins. They're

fed into the serum in minute amounts, under feedback control of second-by-second analysis of the blood. The computations involved in deciding upon the amount and the precise nature of each introduced chemical are highly complex. Hence the size of the machine. It is, in its major effect, an artificial kidney." "I've seen artificial kidneys in the hospitals," Hamelin said, frowning. "They're rather compact affairs." "Because all they do is remove waste products from the patient's blood, and restore the fluid and electrolyte balance. Those are very minor renal functions in the higher mammals. The organ's main duty is chemical control of immunity. If Bumet and Fenner had known that back in 1949, when the selfing theory was being formulated, we'd have had Re- Education long before now." "Most of the machine's size is due to the computation sec- tion," Mudgett emphasized. "In the body, the brain stem does those computations, as part of maintaining homeostasis. But we can't reach the brain stem from outside; it's not under conscious control. Once the body is re-selfed, it will retram the thalamus where we can't." Suddenly, two swinging doors at the base of the machine were pushed apart and a mobile operating table came through, guided by two attendants. There was a form on it, covered to the chin with a sheet. The face above this sheet was immobile and almost as white. Hamelin watched the table go out of the huge cavern with visibly mixed emotions. He said: "This processit's painful?" "No, not exactly," Carson said. The motive behind the question interested him hugely, but he didn't dare show it. "But any fooling around with the immunity mechanisms can give rise to symptomsfever, general malaise, and so on. We try to protect our subjects by giving them a light shock anesthesia first." "Shock?" Hamelin repeated. "You mean electroshock? I don't see how" "Call it stress anesthesia instead. We give the man a steroid drug that counterfeits the anesthesia the body itself produces in moments of great stresson the battlefield, say, or just after a serious injury. It's fast, and free of aftereffects. There's no secret about that, by the way; the drug involved is 21-hydroxypregnane-3,20-dione sodium succinate, and it dates all the way back to 1955." "Oh," the Under Secretary said. The ringing sound of the chemical name had had, as Carson had hoped, a ritually soothing effect. "Gentlemen," Hamelin said hesitantly. "Gentlemen, I have aa rather unusual request. And, I am afraid, a rather sel- fish one." A brief, nervous laugh. "Selfish in both senses, if you will pardon me the pun. You need feel no hesitation in refusing me, but" Abruptly he appeared to find it impossible to go on. Carson mentally crossed his fingers and plunged in. "You would like to undergo the process yourself?" he said. "Well, yes. Yes, that's exactly it. Does that seem in- consistent? I should know, should I not, what it is that I'm advocating for my following? Know it intimately, from personal experience, not just theory? Of course I realize that it would conflict with your policy, but I assure you I wouldn't turn it to any political advantagenone whatsoever. And perhaps it wouldn't be too great a lapse of policy to process just one civilian among your seven thousand soldiers." Subverted, by God! Carson looked at Mudgett with a firmly straight face. It wouldn't do accept too quickly. But Hamelin was rushing on, almost chattering now. "I can understand your hesitation. You must feel that I'm trying to gain some advantage, or even to get to the surface ahead of my fellow men. If it will set your minds at rest, I would be glad to enlist in your advance army.'Before five years are up, I could surely learn some technical skill which would make me useful to the expedition. If you would prepare papers to that effect, I'd be happy to sign them." "That's hardly necessary," Mudgett said. "After you're Re- Educated, we can simply announce the fact, and say that you've agreed to join the advance party when the time comes." "Ah," Hamelin said. "I see the difficulty. No, that would make my position quite impossible. If there is no other way . . ." "Excuse us a moment," Carson said. Hamelin bowed, and the doctor pulled Mudgett off out of earshot. "Don't overplay it," he murmured. "You're tipping our hand with that talk about a press release. Colonel. He's offering us a bribebut he's plenty smart enough to see that the price you're suggesting is that of his whole

political career; he won't pay that much." "What then?" Mudgett whispered hoarsely. "Get somebody to prepare the kind of informal contract he suggested. Offer to put it under security seal so we won't be able to show it to the press at all. He'll know well enough that such a seal can be broken if our policy ever comes before a presidential reviewand that will restrain him from forcing such a review. Let's not demand too much. Once he's been Re-Educated, he'll have to live the rest of the five years with the knowledge that he can live topside any time he wants to try itand he hasn't had the discipline our men have had. It's my bet that he'll goof off before the five years are upand good riddance." They went back to Hamelin, who was watching the machine and humming in a painfully abstracted manner. "I've convinced the Colonel," Carson said, "that your serv- ices in the army might well be very valuable when the time comes, Mr. Secretary. If you'll sign up, we'll put the papers under security seal for your own protection, and then I think we can fit you into our treatment program today." "I'm grateful to you. Dr. Carson," Hamelin said. "Very grateful indeed." Five minutes after his injection, Hamelin was as peaceful as a flounder and was rolled through the swinging doors. An <JV hour? discussion of the probable outcome, carried on in the privacy of Mudgett's office, bore very little additional fruit, however. "It's our only course," Carson said. "It's what we hoped to gain from his visit, duly modified by circumstances. It all comes down to this: Hamelin's compromised himself, and he knows it." "But," Mudgett said, "suppose he was right? What about all that talk of his about mass insanity?" "I'm sure it's true," Carson said, his voice trembling slightly despite his best efforts at control. "It's going to be rougher than ever down here for the next five years, Colonel. Our only consolation is that the enemy must have exactly the same problem; and if we can beat them to the surface" "Hsst!" Mudgett said. Carson had already broken off his sentence. He wondered why the scanner gave a man such a hard time outside that door, and then admitted him without any warning to the people on the other side. Couldn't the damned thing be trained to knock? The newcomer was a page from the haemotology section. "Here's the preliminary rundown on your 'student X,' Dr. Carson," he said. The page saluted Mudgett and went out. Carson began to read. After a moment, he also began to sweat. "Colonel, look at this. I was wrong after all. Disastrously wrong. I haven't seen a blood-type distribution pattern like Hamelin's since I was a medical student, and even back then it was only a demonstration, not a real live patient. Look at it from the genetic point of viewthe migration factors." He passed the protocol across the desk. Mudgett was not by background a scientist, but he was an enormously able administrator, of the breed that makes it its business to know the technicalities on which any project ultimately rests. He was not much more than halfway through the tally before his eyebrows were gaining altitude like shock waves. "Carson, we can't let that man into the machine! He's" "He's already in it, Colonel, you know that. And if we interrupt the process before it runs to term, we'll kill him." "Let's kill him, then," Mudgett said harshly. "Say he died while being processed. Do the country a favor." "That would produce a bell of a stink. Besides, we have no proof." Mudgett flourished the protocol excitedly. "That's not proof to anyone but a haemotologist." "But Carson, the man's a saboteur!" Mudgett shouted. "Nobody but an Asiatic could have a typing pattern like- this I And he's no melting-pot product, eitherhe's a classical mixture, very probably a Georgian. And every move he's made since we first heard of him has been aimed directly at usaimed directly at tricking us into getting him into the machine!" "I think so too," Carson said grimly. "I just hope the enemy hasn't many more agents as brilliant." "One's enough," Mudgett said. "He's sure to be loaded to the last cc of his blood with catalyst poisons. Once the machine starts processing his serum, we're done forit'll take us years to reprogram the computer, if it can be done at all. It's got to be stopped!" "Stopped?" Carson said, astonished. "But it's already stopped. That's not what worries me. The machine stopped it fifty minutes ago." "It can't have! How

could it? It has no relevant data!" "Sure it has." Carson leaned forward, took the cruelly chewed pencil away from Mudgett, and made a neat check beside one of the entries on the protocol. Mudgett stared at the checked item. "Platelets Rh VI?" he mumbled. "But what's that got to do with . . . Oh. Oh, I see. That platelet type doesn't exist at all in our population now, does it? Never seen it before myself, at least." "No," Carson said, grinning wolfishly. "It never was com- mon in the West, and the pogrom of 1981 wiped it out. That's something the enemy couldn't know. But the machine knows it. As soon as it gives him the standard anti-IV desen- sitization shot, his platelets will begin to dissolveand he'll be rejected for incipient thrombocytopenia." He laughed. "For his own protection! But" "But he's getting nitrous oxide in the machine, and he'll be held six hours under anesthesia anyhowalso for his own protection," Mudgett broke in. He was grinning back at Carson like an idiot. "When he comes out from under, he'll assume that he's been re-educated, and he'll beat it back to the enemy to report that he's poisoned our machine, so that they can be sure they'll beat us to the surface. And he'll go the fastest way: overland." "He will," Carson agreed. "Of course he'll go overland, and of course he'll die. But where does that leave us? We won't be able to conceal that he was treated here, if there's any sort of inquiry at all. And his death will make everything we do here look like a fraud. Instead of paying our Pied Piperand great jumping Jehoshaphat, look at his name! They were rubbing our noses in it all the time! Nevertheless, we didn't pay the piper; we killed him. And 'platelets Rh VI' won't be an adequate excuse for the press, or for Hamelin's following." "It doesn't worry me," Mudgett rumbled. "Who'll know? He won't die in our labs. He'll leave here hale and hearty. He won't die until he makes a break for the surface. After that we can compose a fine obituary for the press. Heroic government official, on the highest policy levelcouldn't wait to lead his followers to the surfacedied of being too much in a hurryRe-Ed Project sorrowfully reminds everyone that no technique is foolproof . . ." Mudgett paused long enough to light a cigarette, which was a most singular action for a man who never smoked. "As a matter of fact, Carson," he said, "it's a natural." Carson considered it. It seemed to hold up. And "Hamelin" would have a death certificate as complex as he deserved not officially, of course, but in the minds of everyone who knew the facts. His death, when it came, would be due directly to the thrombocytopenia which had caused the Re-Ed machine to reject himand thrombocytopenia is a disease of infants. Unless ye become as little children . . . That was a fitting reason for rejection from the new kingdom of Earth: anemia of the newborn. His pent breath went out of him in a long sigh. He hadn't been aware that he'd been holding it. "It's true," he said softly. "That's the time to pay the piper." "When?" Mudget said. "When?" Carson said, surprised. "Why, before he takes the children away."

Tomb Tapper THE DISTANT glare of the atomic explosion had already faded from the sky as McDonough's car whirred away from the blacked-out town of Port Jervis and turned north. He was making fifty m.p.h. on U.S. Route 209 using no lights but his parkers, and if a deer should bolt across the road ahead of him he would never see it until the impact. 'It was hard enough to see the road. But he was thinking, not for the first time, of the old joke about the man who tapped train wheels. He had been doing it, so the story ran, for thirty years. On every working day be would go up and down both sides of every locomotive that pulled into the yards and hit the wheels with a hammer; first the drivers, then the trucks. Each time, he would cock his head, as though listening for some- thing in the sound. On the day of his retirement, he was given a magnificent dinner, as befitted a man with long senior- ity in the Brotherhood of Railway Trainmenand somebody stopped to ask him what he had been tapping for all those years. He had cocked his head as though listening

for something, but evidently nothing came. "I don't know," he said. That's me, McDonough thought. I tap tombs, not trains. But what am I listening for? The speedometer said he was close to the turnoff for the airport, and he pulled the dimmers on. There it was. There was at first nothing to be seen, as the headlights swept along the dirt road, but a wall of darkness deep as all night, faintly edged at the east by the low domed hills of the Neversink valley. Then another pair of lights snapped on behind him, on the main highway, and came jolting after McDonough's car, clear and sharp in the dust clouds he had raised. He swung the car to a stop beside the airport fence and killed the lights; the other car followed. In the renewed black- ness the faint traces of dawn on the hills were wiped out, as though the whole universe had been set back an hour. Then the yellow eye of a flashlight opened in the window of the other car and stared into his face. He opened the door. "Martinson?" he said tentatively. "Right here," the adjutant's voice said. The flashlight's oval spoor swung to the ground. "Anybody else with you?" "No. You?" "No. Go ahead and get your equipment out. Ill open up the shack." The oval spot of light bobbed across the parking area and came to uneasy rest on the combination padlock which held the door of the operations shack secure. McDonough flipped the dome light of his car on long enough to locate the canvas sling which held the components of his electro- encephalograph, and eased the sling out onto the sand. He had just slammed the car door and taken up the burden when little chinks of light sprang into being in the blind windows of the shack. At the same time, cars came droning out onto the field from the opposite side, four of them, each with its wide-spaced unblinking slits of paired parking lights, and ranked themselves on either side of the landing strip. It would be dawn before long, but if the planes were ready to go before dawn, the cars could light the strip with their brights. We're fast, McDonough thought, with brief pride. Even the Air Force thinks the Civil Air Patrol is just a bunch of amateurs, but we can put a mission in the air ahead of any other CAP squadron in this county. We can scramble. He was getting his night vision back now, and a quick glance showed him that the windsock was flowing straight out above the black, silent hangar against the pearly false dawn. Aloft, the stars were paling without any cloud-dimming, or even much twinkling. The wind was steady north up the valley; ideal flying weather. Small lumpy figures were running across the field from the parked cars toward the shack. The squadron was scrambling. "Mac!" Martinson shouted from inside the shack. "Where are you? Get your junk in here and get started!" McDonough slipped inside the door, and swung his BEG components onto the chart table. Light was pouring into the briefing room from the tiny office, dazzling after the long darkness. In the briefing room the radio biinked a tiny red eye, but the squadron's communications officer hadn't yet arrived to answer it. In the office, Martinson's voice rumbled softly, urgently, and the phone gave him back thin un- intelligible noises, like an unteachable parakeet. Then, suddenly, the adjutant appeared at the office door and peered at McDonough. "What are you waiting for?" he said. "Get that mind reader of yours into the Cub on the double." "What's wrong with the Aeronca? It's faster." "Water in the gas; she ices up. We'll have to drain the tank. This is a hell of a time to argue." Martinson jerked open the squealing door which opened into the hangar, his hand groping for the light switch. McDonough followed him, supporting his sling with both hands, his elbows together. Nothing is quite so concentratedly heavy as an electronics chassis with a transformer mounted on it, and four of them make a back-wrenching load. The adjutant was already hauling the servicing platform across the concrete floor to the cowling of the Piper Cub. "Get your stuff set," he said. "I'll fuel her up and check the oil." "All right. Doesn't look like she needs much gas." "Don't you ever stop talkin'? Let's move." McDonough lowered his load to the cold floor beside the plane's cabin, feeling a brief flash of resentment. In daily life Martinson was a job printer who couldn't, and didn't, give orders to anybody, not even his wife. Well, those were usually the boys who let rank go to their heads, even in

a volunteer outfit. He got to work. Voices sounded from the shack, and then Andy Persons, the commanding officer, came bounding over the sill, followed by two sleepy-eyed cadets. "What's up?" he shouted. "That you, Martinson?" "It's me. One of you cadets, pass me up that can. Andy, get the doors open, hey? "There's a Russki bomber down north of us, somewhere near Howells. Part of a flight that was making a run on Schenectady." "Did they get it?" "No, they overshot, way overtook out Kingston instead. Stewart Field hit them just as they turned to regroup, and knocked this baby down on the first pass. We're supposed The rest of the adjutant's reply was lost in a growing, echoing roar, as though they were all standing underneath a vast trestle over which all the railroad trains in the world were crossing at once. The sixty-four-foot organ reeds of jets were being blown in the night zenith above the fieldanother hunting pack, come from Stewart Field to avenge the hydro- gen agony that had been Kingston. His head still inside the plane's greenhouse, McDonough listened transfixed. Like most CAP officers, he was too old to be a jet pilot, his reflexes too slow, his eyesight too far over the line, his belly muscles too soft to take the five-gravity turns; but now and then he thought about what it might be like to ride one of those flying blowtorches, cruising at six hundred miles an hour before a thin black wake of kerosene fumes, or being followed along the ground at top speed by the double wave-front of the "supersonic bang." It was a noble notion, almost as fine as that of piloting the one-man Niagara of power that was a rocket fighter. The noise grew until it seemed certain that the invisible Jets were going to bullet directly through the hangar, and then dimmed gradually. "The usual orders?" Persons shouted up from under the declining roar. "Find the plane, pump the live survivors, pick the corpses' brains? Who else is up?" "Nobody," Martinson said, coming down from the ladder and hauling it clear of the plane. "Middletown squadron's deactivated; Montgomery hasn't got a plane; Newburgh hasn't got a field." "Warwick has Group's L-16" "They snapped the undercarriage off it last week," Martin- son said with gloomy satisfaction. "It's our baby, as usual. Mac, you got your ghoul-tools all set in there?" "In a minute," McDonough said. He was already wearing the Walter goggles, pushed back up on his helmet, and the detector, amplifier, and power pack of the EEG were secure in their frames on the platform behind the Cub's rear seat. The "hair net"the flexible network of electrodes which he would jam on the head of any dead man whose head had survived the bomber crashwas connected to them and hung in its clips under the seat, the leads strung to avoid fouling the plane's exposed control cables. Nothing remained to do now but to secure the frequency analyzer, which was the heaviest of the units and had to be bolted down just forward of the rear joystick so that its weight would not shift in flight. If the apparatus didn't have to be collimated after every flight, it could be left in the planebut it did, and that was that. "O.K.," he said, pulling his head out of the greenhouse. He was trembling slightly. These tomb-tapping expeditions were hard on the nerves. No matter how much training in the art of reading a dead mind you may have had, the actual experience is different, and cannot be duplicated from the long-stored corpses of the laboratory. The newly dead brain is an inferno, almost by definition. "Good," Persons said. "Martinson, you'll pilot. Mac, keep on the air; we're going to refuel the Airoknocker and get it up by ten o'clock if we can. In any case we'll feed you any spottings we get from the Air Force as fast as they come in. Martinson, refuel at Montgomery if you have to; don't waste time coming back here. Got it?" "Roger," Martinson said, scrambling into the front seat and buckling his safety belt. McDonough put his foot hastily into the stirrup and swung into the back seat. "Cadets!" Persons said. "Pull chocks! Roll 'eri" Characteristically, Persons himself did the heavy work of lifting and swinging the tail. The Cub bumped off the apron and out on the grass into the brightening morning. "Switch off!" the cadet at the nose called. "Gasi Brakes!" "Switch off, brakes," Martinson called back. "Mac, where to? Got any ideas?" While McDonough thought about it, the cadet pulled the prop backwards through four turns. "Brakes! Contact!" "Let's try up around the Otisville

tunnel. If they were knocked down over Howells, they stood a good chance to wind up on the side of that mountain." Martinson nodded and reached a gloved hand over his head. "Contact!" he shouted, and turned the switch. The cadet swung the prop, and the engine barked and roared; at McDonough's left, the duplicate throttle slid forward slightly as the pilot "caught" the engine. McDonough buttoned up the cabin, and then the plane began to roll toward the far, dim edge of the grassy field. The sky got brighter. They were off again, to tap on another man's tomb, and ask of the dim voice inside it what memories it had left unspoken when it had died. The Civil Air Patrol is, and has been since 1941, an auxiliary of the United States Air Force, active in coastal patrol and in air-sea rescue work. By 1954when its ranks totaled more than eighty thousand men and women, about fifteen thousand of them licensed pilotsthe Air Force had nerved itself up to designating CAP as its Air Intelligence arm, with the job of locating downed enemy planes and radioing back infor- mation of military importance. Aerial search is primarily the task of planes which can fly low and slow. Air Intelligence requires speed, since the kind of tactical information an enemy wreck may offer can grow cold .within a few hours. The CAP'S planes, most of them single-engine, private-flying models, had already been proven ideal aerial search instruments; the CAP'S radio net, with its more than seventy-five hundred fixed, mobile and airborne stations, was more than fast enough to get information to wherever it was needed while it was still hot. But the expected enemy, after all, was Russia; and how many civilians, even those who know how to fly, navigate, or operate a radio transmitter, could ask anyone an intelligent question in Russian, let alone understand the answer? It was the astonishingly rapid development of electrical methods for probing the brain which provided the answer in particular the development, in the late fifties, of flicker- stimulus aimed at the visual memory. Abruptly, EEG tech- nicians no longer needed to use language at all to probe the brain for visual images, and read them; they did not even need to know how their apparatus worked, let alone the brain. A few moments of flicker into the subject's eyes, on a fre- quency chosen from a table, and the images would come swarming into the operator's toposcope gogglesthe fre- quency chosen without the slightest basic knowledge of electro- physiology, as a woman choosing an ingredient from a cookbook is ignorant ofand indifferent tothe chemistry involved in the choice. It was that engineering discovery which put tomb-tappers into the back seats of the CAP'S putt-putts when the war finally beganfor the images in the toposcope goggles did not stop when the brain died. The world at dawn, as McDonough saw it from three thousand feet, was a world of long sculptured shadows, almost as motionless and three-dimensional as a lunar landscape near the daylight terminator. The air was very quiet, and the Cub droned as gently through the blue haze as any bee, gaining altitude above the field in a series of wide climbing turns. At the last turn the plane wheeled south over a farm owned by someone Martinson knew, a man already turning his acres from the seat of his tractor, and Martinson waggled the plane's wings at him and got back a wave like the quivering of an insect's antenna. It was all deceptively normal. Then the horizon dipped below the Cub's nose again and Martinson was climbing out of the valley. A lake passed below them, spotted with islands, and with the brown barracks of Camp Cejwin, once a children's summer camp but now full of sleeping soldiers. Martinson continued south, skirting Port Jervis, until McDonough was able to pick up the main line of the Erie Railroad, going northeast toward OtisviUe and Howells. The mountain through which the Otisville tunnel ran was already visible as a smoky hulk to the far left of the dawn. McDonough turned on the radio, which responded with a rhythmical sputtering; the Cub's engine was not adequately shielded. In the background, the C.O.'s voice was calling them: "Huguenot to L-4. Huguenot to L-4." "L-4 here. We read you, Andy. We're heading toward Otisville. Smooth as glass up here. Nothing to report yet." "We read you weak but clear. We're dumping the gas in the Airoknocker crackle ground. We'll follow as fast as pos- sible. No new AF spottings yet. If crackle, call us right

away. Over." "L-4 to Huguenot. Lost the last sentence, Andy. Cylinder static. Lost the last sentence. Please read it back." "All right, Mac. If you see the bomber, crackle right away. Got it? If you see crackle, call us right away. Got it? Over." "Got it, Andy. L-4 to Huguenot, over and out." "Over and out." The railroad embankment below them went around a wide arc and separated deceptively into two. One of the lines had been pulled up years back, but the marks of the long-ago stacked and burned ties still striped the gravel bed, and it would have been impossible for a stranger to tell from the air whether or not there were any rails running over those marks; terrain from the air can be deceptive unless you know what it is supposed to look like, rather than what it does look like. Martinson, however, knew as well as McDonough which of the two rail spurs was the discontinued one, and banked the Cub in a gentle climbing turn toward the mountain. The rectangular acres wheeled slowly and solemnly below them, brindled with tiny cows as motionless as toys. After a while the deceptive spur line turned sharply east into a woolly green woods and never came out again. The mountain got larger, the morning ground haze rising up its nearer side, as though the whole forest were smoldering sullenly there. Martinson turned his head and leaned it back to look out of the corner of one eye at the back seat, but McDonough shook his head. There was no chance at all that the crashed bomber could be on this side of that heavy-shouldered mass of rock. Martinson shrugged and eased the stick back. The plane bored up into the sky, past four thousand feet, past four thousand, five hundred. Lake Hawthorne passed under the Cub's fat little tires, an irregular sapphire set in the pommel of the mountain. The altimeter crept slowly past five thousand feet; Martinson was taking no chances on being caught in the downdraft on the other side of the hill. At six thousand, he edged the throttle back and leveled out, peering back through the plexiglas. But there was no sign of any wreck on that side of the mountain, either. Puzzled, McDonough forced up the top cabin flap on the right side, buttoned it into place against the buffering slip- stream, and thrust his head out into the tearing gale. There was nothing to see on the ground. Straight down, the knife- edge brow of the cliff from which the railroad tracks emerged again drifted slowly away from the Cub's tail; just an inch farther on was the matchbox which was the Otisville siding shack. A sort of shaking of pepper around the matchbox meant people, a small crowd of themthough there was no train due until the Erie's No. 6, which didn't stop at Otisville anyhow. He thumped Martinson on the shoulder. The adjutant tilted his head back and shouted, "What?" "Bank right. Something going on around the Otisville station. Go down a bit." The adjutant jerked out the carburetor-heat toggle and pulled back the throttle. The plane, idling, went into a long, whistling glide along the railroad right of way. "Can't go too low here," he said. "If we get caught in the downdraft, we'll get slammed right into the mountain." "I know that. Go on about four miles and make an airline approach back. Then you can climb into the draft. I want to see what's going on down there." Martinsen shrugged and opened the throttle again. The Cub clawed for altitude, then made a half-turn over Howells for the bogus landing run. The plane went into normal glide and McDonough craned his neck. In a few moments he was able to see what had happened down below. The mountain from this side was steep and sharp; a wounded bomber couldn't possibly have hoped to clear it. At night, on the other hand, the mouth of the railroad tunnel was marked on all three sides, by the lights of the station on the left, the neon sign of the tavern which stood on the brow of the cliff in OtisviUe (POP. 3,000HIGH AND HEALTHY) and on the right by the Erie's own signal standard. Radar would have shown the rest: the long regular path of the embankment leading directly into that cul-de-sac of lights, the beetling mass of contours which was the moun- tain. All these signs would mean "tunnel" in any language. And the bomber pilot had taken the longest of all possible chances: to come down gliding along the right of way, in the hope of shooting his fuselage cleanly into that tunnel, leaving behind his wings with their dangerous engines and fuel tanks. It was absolutely insane, but that was what he had done. And, miracle of miracles, he had made

it. McDonough could see the wings now, buttered into two-dimensional profiles over the two pilasters of the tunnel. They had hit with such force that the fuel in them must have been vaporized instantly; at least, there was no sign of a fire. And no sign of a fuselage, either. The bomber's body was inside the mountain, probably half- way or more down the tunnel's one-mile length. It was in- conceivable that there could be anything intelligible left of it; but where one miracle has happened, two are possible. No wonder the little Otisville station was peppered over with the specks of wondering people. "L-4 to Huguenot. L-4 to Huguenot. Andy, are you there?" "We read you, Mac. Go ahead." "We've found your bomber. It's in the Otisville tunnel. Over." "Crackle to L-4. You've lost your mind." "That's where it is, all the same. We're going to try to make a landing. Send us a team as soon as you can. Out." "Huguenot to L-4. Don't be a crackle idiot, Mac, you can't land there." "Out," McDonough said. He pounded Martinson's shoulder and gestured urgently downward. "You want to land?" Martinson said. "Why didn't you say so? We'll never get down on a shallow glide like this." He cleared the engine with a brief burp on the throttle, pulled the Cub up into a sharp stall, and slid off on one wing. The whole world began to spin giddily. Martinson was losing altitude. McDonough closed his eyes and hung onto his back teeth. Martinson's drastic piloting got them down to a rough landing, on the wheels, on the road leading to the Otisville station, slightly under a mile away from the mountain. They taxied the rest of the way. The crowd left the mouth of the tunnel to cluster around the airplane the moment it had come to a stop, but a few moments' questioning convinced Mc- Donough that the Otisvilleans knew very little. Some of them had heard "a turrible noise" in the early morning, and with the first light had discovered the bright metal coating the sides of the tunnel. No, there hadn't been any smoke. No, nobody heard any sounds in the tunnel. You couldn't see the other end of it, though; something was blocking it. "The signal's red on this side," McDonough said thought- fully while he helped the adjutant tie the plane down. "You used to run the PBX board for the Erie in Port, didn't you, Marty? If you were to phone the station master there, maybe we could get him to throw a block on the other end of the tunnel." "If there's wreckage in there, the block will be on automat- ically." "Sure. But we've got to go in there. I don't want the Number Six piling in after us." Martinson nodded, and went inside the railroad station. McDonough looked around. There was, as usual, a motorized hand truck parked off the tracks on the other side of the embankment. Many willing hands helped him set it on the right of way, and several huskies got the one-lung engine started for him. Getting his own apparatus out of the plane and onto the truck, however, was a job for which he refused all aid. The stuff was just too delicate, for all its weight, to be allowed in the hands of laymenand never mind that McDonough himself was almost as much of a layman in neurophysiology as they were; he at least knew the coUimat- ing tables and the cookbook. "O.K.," Martinson said, rejoining them. "Tunnel's blocked at both ends. I talked to Ralph at the dispatcher's; he was steamingsays he's lost four trains already, and another due in from Buffalo in forty-four minutes. We cried a little about it. Do we go now?" "Right now." Martinson drew his automatic and squatted down on the front of the truck. The little car growled and crawled toward the -tunnel. The spectators murmured and shook their heads knowingly. Inside the tunnel it was as dark as always, and cold, with a damp chill which struck through McDonough's flight jacket and dungarees. The air was still, and in addition to its musty smell it had a peculiar metallic stench. Thus far, however, there was none of the smell of fuel or of combustion products which McDonough had expected. He found sud- denly that he was trembling again, although he did not really believe that the EEG would be needed. "Did you notice those wings?" Martinson said suddenly, just loud enough to be heard above the popping of the motor. The echoes distorted his voice almost beyond rec- ognition. "Notice them? What about them?" "Too short to be bomber wings. Also, no engines." McDonough swore silently. To have failed to notice a detail as gross as that was a sure sign

that he was even more frightened than he had thought. "Anything else?" "Well, I don't think they were aluminum; too tough. Titanium, maybe, or stainless steel. What have we got in here, anyhow? You know the Russkies couldn't get a fighter this far." There was no arguing that. There was no answering the question, eithernot yet. McDonough unhooked the torch from his belt. Behind them, the white aperture of the tunnel's mouth looked no bigger than a nickel, and the twin bright lines of the rails looked forty miles long. Ahead, the flashlight revealed nothing but the slimy walls of the tunnel, coated with soot. And then there was a fugitive bluish gleam. McDonough set the motor back down as far as it would go. The truck crawled painfully through the stifling blackness. The thudding of the engine was painful, as though his own heart were trying to move the heavy platform. The gleam came closer. Nothing moved around it. It was metal, reflecting the light from his torch. Martinson lit his own and brought it into play. The truck stopped, and there was absolute silence except for the ticking of water on the floor of the tunnel. "It's a rocket," Martinson whispered. His torch roved over the ridiculously inadequate tail empennage facing them. It was badly crumpled. "In fair shape, considering. At the clip he was going, be must have slammed back and forth like an alarm clapper." Cautiously they got off the truck and prowled around the gloaming, badly dented spindle. There were clean shears where the wings had been, but the stubs still remained, as though the metal itself had given to the impact before the joints could. That meant welded construction throughout, MeDonough remembered vaguely. The vessel rested now roughly in the center of the tunnel, and the railroad tracks had spraddled under its weight. The fuselage bore no iden- tifying marks, except for a red star at the nose; or rather, a red asterisk. Martinson's torch lingered over the star for a moment, but the adjutant offered no comment. He went around the nose, MeDonough trailing. On the other side of the ship was the death wound; a small, ragged tear in the metal, not far forward of the tail. Some of the raw curls of metal were partially melted. Martinson touched one. "Flak," he muttered. "Cut his fuel lines. Lucky he didn't blow up." "How do we get in?" MeDonough said nervously. "The cabin didn't even crack. And we can't crawl through that hole." Martinson thought about it. Then he bent to the lesion in the ship's skin, took a deep breath, and bellowed at the top of his voice: "Hey in there! Open up!" It took a long time for the echoes to die away. MeDonough was paralyzed with pure fright. Anyone of those distorted, ominous rebounding voices could have been an answer. Fi- nally, however, the silence came back. "So he's dead," Martinson said practically. "I'll bet even his footbones are broken, every one of 'em. Mac, stick your hair net in there and see if you can pick up anything." "N-not a chance. I can't get anything unless the electrodes are actually t-touching the skull." "Try it anyhow, and then we can get out of here and let the experts take over. I've about made up my mind it's a missile, anyhow. With this little damage, it could still go off." MeDonough had been repressing that notion since his first sight of the spindle. The attempt to save the fuselage intact, the piloting skill involved, and the obvious cabin windshield all argued against it; but even the bare possibility was somehow twice as terrifying, here under a mountain, as it would have been in the open. With so enormous a mass of rock pressing down on him, and the ravening energies of a sun perhaps waiting to break loose by his side No, no; it was a fighter, and the pilot might somehow still be alive. He almost ran to get the electrode net off the truck. He dangled it on its cable inside the flak tear, pulled the goggles over his eyes, and flicked the switch with his thumb. The Walter goggles made the world inside the tunnel no darker than it actually was, but knowing that he would now be unable to see any gleam of light in the tunnel, should one appear from somewheresay, in the ultimate glare of hydrogen fusionincreased the pressure of blackness on his brain. Back on the truck the frequency-analyzer began its regular, meaningless peeping, scanning the possible cortical output bands in order of likelihood: First the 0.5 to 3.5 cycles/second band, the delta wave, the last activity of the brain

detectable before death; then the four to seven c.p.s. theta channel, the pleasure-scanning waves which went on even during sleep; the alpha rhythm, the visual scanner, at eight to thirteen c.p.s.; the beta rhythms at fourteen to thirty c.p.s. which mirror the tensions of conscious computation, not far below the level of real thought; the gamma band, where The goggles lit. . . . And still the dazzling sky-blue sheep are grazing in the red field under the rainbow-billed and pea-green birds. . . . McDonough snatched the goggles up with a gasp, and stared frantically into the blackness, now swimming with resi- dual images in contrasting colors, melting gradually as the rods and cones in his retina gave up the energy they had ab- sorbed from the scene in the goggles. Curiously, he knew at once where the voice had come from: it had been his mo- ther's reading to him, on Christmas Eve, a story called "A Child's Christmas in Wales." He had not thought of it in well over two decades, but the scene in the toposcope goggles had called it forth irresistibly. "What's the matter?" Martinson's voice said. "Get any- thing? Are you sick?" "No," McDonough muttered. "Nothing." 'Then let's beat it. Do you make a noise like that over nothing every day? My Uncle Crosby did, but then, he had asthma." Tentatively, McDonough lowered the goggles again. The scene came back, still in the same impossible colors, and almost completely without motion. Now that he was able to look at it again, however, he saw that the blue animals were not sheep; they were too large, and they had faces rather like those of kittens. Nor were the enormously slow-moving birds actually birds at all, except that they did seem to be flying in unlikely straight lines, with slow, mathematically even flappings of unwinglike wings; there was something vegetable about them. The red field was only a dazzling blur, hazing the feet of the blue animals with the huge, innocent kitten's faces. As for the sky, it hardly seemed to be there at all; it was as white as paper. "Come on," Martinson muttered, his voice edged with irritation. "What's the sense of staying in this hole any more? You bucking for pneumonia?" "There's . . . something alive in there." "Not a chance," Martinson said. His voice was noticeably more ragged. "You're dreaming. You said yourself you couldn't pick up" "I know what I'm doing," MeDonough insisted, watching the scene in the goggles. "There's a live brain in there. Some- thing nobody's ever hit before. It's powerfulno mind in the books ever put out a broadcast like this. It isn't human." "All the more reason to call in the AF and quit. We can't get in there anyhow. What do you mean, it isn't human? It's a Red, that's all." "No, it isn't," MeDonough said evenly. Now that he thought he knew what they had found, he had stopped trembling. He was still terrified, but it was a different kind of terror: the fright of a man who has at last gotten a clear idea of what it is he is up against. "Human beings just don't broadcast like this. Especially not when they're near dying. And they don't remember huge blue sheep with cat's heads on them, or red grass, or a white sky. Not even if they come from the USSR. Whoever it is in there comes from some place else." "You read too much. What about the star on the nose?" MeDonough drew a deep breath. "What about it?" he said steadily. "It isn't the insignia of the Red Air Force. I saw that it stopped you, too. No air force I ever heard of flies a red asterisk. It isn't a cocarde at all. It's just what it is." "An asterisk?" Martinson said angrily. "No, Marty, I think it's a star. A symbol for a real star. The AF's gone and knocked us down a spaceship." He pushed the goggles up and carefully withdrew the electrode net from the hole in the battered fuselage. "And," he said carefully, "the pilot, whatever he is, is still aliveand thinking about home, wherever that is." Though the Air Force had been duly notified by the radio net of McDonough's preposterous discovery, it took its own time about getting a technical crew over to Otisville. It had to, regardless of how much stock it took in the theory. The nearest source of advanced Air Force EEG equipment yas just outside Newburgh, at Stewart Field, and it would have to be driven to Otisville by truck; no AF plane slow enough to duplicate Martinson's landing on the road could have handled the necessary payload. For several hours, therefore, McDonough could do pretty much as he liked with his prize.

After only a little urging, Martinson got the Erie dispatcher to send an oxyacetylene torch to the Port Jervis side of the tunnel, on board a Diesel camelback. Persons, who had subsequently arrived in the Aeronca, was all for trying it immediately in the tunnel, but McDonough was restrained by some dim memory of high school experiments with magnesium, a metal which looked very much like this. He persuaded the C.O. to try the torch on the smeared wings first. The wings didn't burn. They carried the torch into the tunnel, and Persons got to work with it, enlarging the flak hole. "Is that what-is-it still alive?" Persons asked, cutting steadily. "I think so," McDonough said, his eyes averted from the tiny sun of the torch. "I've been sticking the electrodes in there about once every five minutes. I get essentially the same picture. But it's getting steadily weaker." "D'you think we'll reach it before it dies?" "I don't know. I'm not even sure I want to." Persons thought that over, lifting the torch from the metal. Then he said, "You've got something there. Maybe I better try that gadget and see what I think." "No," McDonough said. "It isn't tuned to you." "Orders, Mac. Let me give it a try. Hand it over." "It isn't that, Andy. I wouldn't buck you, you know that; you made this squadron. But it's dangerous. Do you want to have an epileptic fit? The chances are nine to five that you would." "Oh," Persons said. "All right. It's your show." He re- sumed cutting. After a while McDonough said, in a remote, emotiemless voice: "That's enough. I think I can get through there now, as soon as it cools." "Suppose there's no passage between the tail and the nose?" Martinson said. "More likely there's a firewall, and we'd never be able to cut through that." "Probably," McDonough agreed. "We couldn't run the torch near the fuel tanks, anyhow, that's for sure." "Then what good" "If these people think anything like we do, there's bound to be some kind of escape mechanismsomething that blows the pilot's capsule free of the ship. I ought to be able to reach it." "And fire it in here?" Persons said. "You'll smash the cabin against the tunnel roof. That'll kill the pilot for sure." "Not if I disarm it. If I can get the charge out of it, all firing it will do is open the locking devices; then we can take the windshield off and get in. I'll pass the charge out back to you; handle it gently. Let me have your flashlight, Marty, mine's almost dead." Silently, Martinson handed him the light. He hesitated a moment, listening to the water dripping in the background. Then, with a deep breath, he said, "Well. Here goes nothin'." He clambered into the narrow opening. The jungle of pipes, wires and pumps before him was utterly unfamiliar in detail, but familiar in principle. Human beings, given the job of setting up a rocket motor, set it up in this general way. McDonough probed with the light beam, looking for a passage large enough for him to wiggle through. There didn't seem to be any such passage, but he squirmed his way forward regardless, forcing himself into any opening that presented itself, no matter how small and contorted it seemed. The feeling of entrapment was terrible. If he were to wind up in a cul-de-sac, he would never be able to worm himself backwards out of this jungle of piping . . . He hit his head a sharp crack on a metal roof, and the metal resounded hollowly. A tank of some kind, empty, or nearly empty. Oxygen? No, unless the stuff had evaporated long ago; the skin of the tank was no colder than any of the other surfaces he had encountered. Propellant, perhaps, or compressed nitrogensomething like that. Between the tank and what he took to be the inside of the hull, there was a low freeway, just high enough for him to squeeze through if he turned his head sideways. There were occasional supports and ganglions of wiring to be writhed around, but the going was a little better than it had been, back in the engine compartment. Then his head lifted into a slightly larger space, made of walls that curved gently against each other: the front of the tank, he guessed, opposed to the floor of the pilot's capsule and the belly of the hull. Between the capsule and the hull, up rather high, was the outside curve of a tube, large in diameter but very short; it was encrusted with motors, small pumps, and wiring. An air lock? It certainly looked like one. If so, the trick with the escape mechanism might not have to be worked at allif indeed the escape device

existed. Finding that he could raise his shoulders enough to rest on his elbows, he studied the wiring. The thickest of the cables emerged from the pilot's capsule; that should be the power line, ready to activate the whole business when the pilot hit the switch. If so, it could be shorted out provided that there was still any juice in the batteries. He managed to get the big nippers free of his belt, and dragged forward into a position where he could use them, with considerable straining. He closed their needlelike teeth around the cable and squeezed with all his might. The jaws closed slowly, and the cusps bit in. There was a deep, surging hum, and all the pumps and motors began to whirr and throb. From back the way he had come, he heard a very muffled distant shout of aston- ishment. He hooked the nippers back into his belt and inched forward, raising his back until he was almost curled into a ball. By careful, small movements, as though he were being born, he managed to somersault painfully in the cramped, curved space, and get his head and shoulders back under the tank again, face up this time. He had to trail the flash- light, so that his progress backwards through the utter dark- ness was as blind as a mole's; but he made it, at long last. The tunnel, once he had tumbled out into it again, seemed miraculously spaciousalmost like flying. "The damn door opened right up, all by itself," Martinson was chattering. "Scared me green. What'd you dosay 'Open sesame' or something?" "Yeah," McDonough said. He rescued his electrode net from the hand truck and went forward to the gaping air lock. The door had blocked most of the rest of the tunnel, but it was open wide enough. It wasn't much of an air lock. As he had seen from inside, it was too short to hold a man; probably it had only been intended to moderate the pressure drop between inside and outside, not prevent such a drop absolutely. Only the outer door had the proper bank-vault heaviness of a true air lock. The inner one, open, was now nothing but a narrow ring of serrated blades, machined to a Johannson-block finish so fine that they were airtight by virtue of molecular cohesion alonea highly perfected iris diaphragm. Mc- Donough wondered vaguely how the pinpoint hole in the center of the diaphragm was plugged when the iris was fully closed, but his layman's knowledge of engineering failed him entirely there; he could come up with nothing better than a vision of the pilot plugging that hole with a wad of well- chewed bubble gum. He sniffed the damp, cold, still air. Nothing. If the pilot had breathed anything alien to Earth-normal air, it had already dissipated without trace in the organ pipe of the tunnel. He flashed bis light inside the cabin. The instruments were smashed beyond hope, except for a few at the sides of the capsule. "The pilot had smashed them or rather, his environment had. Before him in the light of the torch was a heavy, transpar- ent tank of iridescent greenish-brown fluid, with a small figure floating inside it. It had been the tank, which had broken free of its moorings, which had smashed up the rest of the compartment. The pilot was completely enclosed in what looked like an ordinary G-suit, inside the oil; flexible hoses connected to bottles on the ceiling fed him his atmosphere, whatever it was. The hoses hadn't broken, but something inside the G-suit had; a line of tiny bubbles was rising from somewhere near the pilot's neck. He pressed the EEG electrode net against the tank and looked into the Walter goggles. The sheep with the kitten's faces were still there, somewhat changed in position; but almost all of the color had washed out of the scene. McDonough grunted involuntarily. There was now an at- mosphere about the picture which hit him like a blow, a feeling of intense oppression, of intense distress . . . "Marty," he said hoarsely. "Let's see if we can't cut into that tank from the bottom somehow." He backed down into the tunnel. "Why? If he's got internal injuries" "The suit's been breached. It's filling with that oil from the bottom. If we don't drain the tank, he'll drown first." "All right. Still think he's a man-from-Mars, Mac?" "I don't know. It's too small to be a man, you can see that. And the memories aren't like human memories. That's all I know. Can we drill the tank some place?" "Don't need to," Persons' echo-distorted voice said from inside the air lock. The reflections of his flashlight shifted in the opening like ghosts. "I just

found a drain pet cock. Roll up your trouser cuffs, gents." But the oil didn't drain out of the ship. Evidently it went into storage somewhere inside the hull, to be pumped back into the pilot's cocoon when it was needed again. It took a long time. The silence came flooding back into the tunnel. "That oil-suspension trick is neat," Martinson whispered edgily. "Cushions him like a fish. He's got inertia still, but no masslike a man in free fall." McDonough fidgeted, but said nothing. He was trying to imagine what the multicolored vision of the pilot could mean. Something about it was nagging at him. It was wrong. Why would a still-conscious and gravely injured pilot be solely preoccupied with remembering the fields of home? Why wasn't he trying to save himself insteadas ingeniously as he had tried to save the ship? He still had electrical power, and in that litter of smashed apparatus which he alone could recognize, there must surely be expedients which still awaited his trial. But he had already given up, though he knew he was dying. Or did he? The emotional aura suggested a knowledge of things desperately wrong, yet there was no real despera- tion, no frenzy, hardly any fearalmost as though the pilot did not know what death was, or, knowing it, was confident that it could not happen to him. The immensely powerful, dying mind inside the G-suit seemed curiously uncaring and passive, as though it awaited rescue with supreme confidence so supreme that it could afford to drift, in an oil-suspended floating dream of home, nostalgic and unhappy, but not really afraid. And yet it was dying! "Almost empty," Andy Persons' quiet, garbled voice said into the tunnel. Clenching his teeth, McDonough hitched himself into the air lock again and tried to tap the fading thoughts on a higher frequency. But there was simply nothing to hear or see, though with a brain so strong, there should have been, at as short a range as this. And it was peculiar, too, that the visual dream never changed. The flow of thoughts in a powerful human mind is bewilderingly rapid; it takes weeks of analysis by specialists before its essential pattern emerges. This mind, on the other hand, had been holding tenaciously to this one thoughtcomplicated though it wasfor a minimum of two hours. A truly subidiot performancebeing broadcast with all the drive of a super genius. Nothing in the cookbook provided McDonough with any precedent for it. The suited figure was now slumped against the side of the empty tank, and the shades inside the toposcope goggles suddenly began to be distorted with regular, wrenching blurs: pain waves. A test at the level of the theta waves confirmed it; the unknown brain was responding to the pain with ter- rible. knots of rage, real blasts of it, so strong and un- controlled that McDonough could not endure them for more than a second. His hand was shaking so hard that he could hardly tune back to the gamma level again. "We should have left the oil there," he whispered. "We've moved him too much. The internal injuries are going to kill him in a few minutes." "We couldn't let him drown, you said so yourself," Persons said practically. "Look, there's a seam on this tank that looks like a torsion seal. If we break it, it ought to open up like a tired clam. Then we can get him out of here." As he spoke, the empty tank parted into two shell-like halves. The pilot lay slumped and twisted at the bottom, like a doll, his suit glistening in the light of the C.O.'s torch. "Help me. By the shoulders, real easy. That's it; lift. Easy, now." Numbly, McDonough helped. It was true that the oil would have drowned the fragile, pitiful figure, but this was no help, either. The thing came up out of the cabin like a marionette with all its strings cut. Martinson cut the last of them: the flexible tubes which kept it connected to the ship. The three of them put it down, sprawling bonelessly. . . . AND STILL THE DAZZLING SKY-BLUE SHEEP ARE GRAZING IN THE RED FIELD . . . Just like that, McDonough saw it. A coloring book! That was what the scene was. That was why the colors were wrong, and the size referents. Of course the sheeplike animals did not look much like sheep, which the pilot could never have seen except in pictures. Of course the sheep's heads looked like the heads of kittens; everyone has seen kittens. Of course the brain was powerful out of all propor- tion to its survival drive and its knowledge of death; it was the

brain of a genius, but a genius without experience. And of course, this way, the USSR could get a rocket fighter to the United States on a one-way trip. The helmet fell off the body, and rolled off into the gutter which carried away the water condensing on the wall of the tunnel. Martinson gasped, and then began to swear in a low, grinding monotone. Andy Persons said nothing, but his light, as he played it on the pilot's head, shook with fury. McDonough, his fantasy of space ships exploded, went back to the hand truck and kicked his tomb-tapping ap- paratus into small shards and bent pieces. His whole heart was a fuming caldron of pity and grief. He would never knock upon another tomb again. The blond head on the floor of the tunnel, dreaming its waning dream of a colored paper field, was that of a little girl, barely eight years old.

BOOK FOUR WATERSHED The murmurs of discontent Capt. Gorbel, being a military man, thought of it as "disaffection"among the crew of the R.S.S. Indefeasible had reached the point where they could no longer be ignored, well before the ship had come within fifty light years of its objective. Sooner or later, Gorbel thought, sooner or later this idi- otic seal-creature is going to notice them. Capt. Gorbel wasn't sure whether he would be sorry or glad when the Adapted Man caught on. In a way, it would make things easier. But it would be an uncomfortable moment, not only for Hoqqueah and the rest of the pantrope team, but for Gorbel himself. Maybe it would be better to keep sitting on the safety valve until Hoqqueah and the other Altarians were put off onwhat was its name again? Oh yes. Earth. But the crew plainly wasn't going to let Gorbel put it off that long. As for Hoqqueah, he didn't appear to have a noticing cen- ter anywhere in his brain. He was as little discommoded by the emotional undertow as he was by the thin and frigid air the Rigellian crew maintained inside the battlecraft. Se- cure in his coat of warm blubber, his eyes brown, liquid and merry, he sat in the forward greenhouse for most of each ship's day, watching the growth of the star Sol in the black skies ahead. And he talked. Gods of all stars, how he talked! Capt. Gor- bel already knew more about the ancientthe very ancient history of the seeding program than he had had any. desire to know, but there was still more coming. Nor was the seed- ing program Hoqqueah's sole subject. The Colonization Coun- cil delegate had had a vertical education, one which cut in a narrow shaft through many different fields of specialization in contrast to Corbel's own training, which had been spread horizontally over the whole subject of spaceflight without more than touching anything else. Hoqqueah seemed to be making a project of enlarging the Captain's horizons, whether he wanted them enlarged or not. "Take agriculture," he was saying at the moment. "This planet we're to seed provides an excellent argument for taking the long view of farm policy. There used to be jungles there; it was very fertile. But the people began their lives as farmers with the use of fire, and they killed themselves off in the same way." "How?" Gorbel said automatically. Had he remained silent, Hoqqueah would have gone on .anyhow; and it didn't pay to be impolite to the Colonization Council, even by proxy. "In their own prehistory, fifteen thousand years .before their official zero date, they cleared farmland by burning it off. Then they would plant a crop, harvest it, and let the jungle return. Then they burned the jungle off and went through the cycle again. At the beginning, they wiped out the greatest abundance of game animals Earth was ever to see, just by farming that way. Furthermore the method was totally de- structive to the topsoil. "But did they learn? No. Even after they achieved space- flight, that method of farming was standard in most of the re- maining jungle areaseven though the bare rock was show- ing through everywhere by that time." Hoqqueah sighed. "Now, of course, there are no jungles. There are no seas, either. There's nothing but desert, naked rock, bitter cold, and thin, oxygen-poor airor so the people would view it, if there

were any of them left. Tapa farming wasn't solely responsible, but it helped." Gorbel shot a quick glance at the hunched back of Lt. Aver- dor, his adjutant and navigator. Averdor had managed to avoid saying so much as one word to Hoqqueah or any of the other pantropists from the beginning of the trip. Of course he wasn't required to assume the diplomatic burdens involved those were Corbel's crossesbut the strain of dodging even normal intercourse with the seal-men was beginning to tell on him. Sooner or later, Averdor was going to explode. He would have nobody to blame for it but himself, but that wouldn't prevent everybody on board from suffering from it. Including Corbel, who would lose a first-class navigator and adjutant. Yet it was certainly beyond Corbel's authority to order Averdor to speak to an Adapted Man. He could only suggest that Averdor run through a few mechanical courtesies, for the good of the ship. The only response had been one of the stoniest stares Corbel had ever seen, even from Averdor, with whom the Captain had been shipping for over thirty Galactic years. And the worst of it was that Corbel was, as a human being, wholly on Averdor's side. "After a certain number of years, conditions change on any planet," Hoqqueah babbled solemnly, waving a flipper-like arm to include all the points of light outside the greenhouse. He was working back to his primary obsession: the seeding program. "It's only logical to insist that man be able to change with themor, if he can't do that, he must establish himself somewhere else. Suppose he had colonized only the Earthlike planets? Not even those planets remain Earthlike forever, not in the biological sense." "Why would we have limited ourselves to Earthlike pla-nets in the first place?" Corbel said. "Not that I know much about the place, but the specs don't make it sound like an optimum world." "To be sure," Hoqqueah said, though as usual Corbel didn't know which part of his own comment Hoqqueah was agreeing to. "There's no survival value in pinning one's race forever to one set of specs. It's only sensible to go on evolving with the universe, so as to stay independent of such things as the aging of worlds, or the explosions of their stars. And look at the results! Man exists now in so many forms that there's always a refuge somewhere for any threatened people. That's a great achievementcompared to it, what price the old arguments about sovereignty of form?" "What, indeed?" Corbel said, but inside his skull his other . self was saying: Ah-ha, he smells the hostility after all. Once an Adapted Man, always an Adapted Manand always fighting for equality with the basic human form. But it's no good, you seal-snouted bureaucrat. You can argue for the isi rest of your life, but your whiskers will always wiggle when you talk. And obviously you'll never stop talking. "And as a military man yourself, you'd be the first to ap- preciate the military advantages, Captain,". Hoqqueah added earnestly. "Using pantropy, man has seized thousands of worlds that would have been inacccessible to him otherwise. It's enormously increased our chances to become masters of the galaxy, to take most of it under occupation without steal- ing anyone else's planet in the process. An occupation without dispossessionlet alone without bloodshed. Yet if some race other than man should develop imperial ambitions, and try to annex our planets, it will find itself enormously out- numbered." "That's true," Capt. Gorbel said, interested in spite of him- self. "It's probably just as well that we worked fast, way back there in the beginning. Before somebody else thought up the method, I mean. But, how come it was us? Seems to me that the first race to invent it should've been a race that already had itif you follow me." "Not quite. Captain. If you will give me an example1" "Well, we scouted a system once where there was a race that occupied two different planets, not both at the same time, but back and forth," Gorbel said. "They had a lifecycie that had three different forms. In the first form they'd winter over on the outermost of .the two worlds. Then they'd change to another form that could cross space, mother-naked, without ships, and spend the rest of the year on the inner planet in the third form. Then they'd change back into the second form and cross back to the colder planet. "It's a hard thing to describe. But the point is, this wasn't anything they'd worked out; it was natural to them.

They'd evolved that way." He looked at Averdor again. "The navi- gation was tricky around there during the swarming season." Avedor failed to rise to the bait. "I see; the point is well taken," Hoqqueah said, nodding with grotesque thoughtfulness. "But let me point out to you, Captain, that being already able to do a thing doesn't aid you in thinking of it as something that needs to be perfected. Oh, I've seen races like the one you describe, tooraces with polymorphism, sexual alteration of generation, metamorphosis of the insect life-history type, and so on. There's a planet named Lithia, about forty light years from here, where the dominant race undergoes complete evolutionary recapitulation after birthnot before it, as men do. But why should any of them think of form-changing as something extraordinary, and to be striven for? It's one of the commonplaces of their lives, after all." A small bell chimed in the greenhouse. Hoqqueah got up at once, his movements precise and almost graceful despite his tubbiness. "Thus endeth the day," he said cheerfully. "Thank you for your courtesy, Captain." He waddled out. He would, of course, be back tomorrow. And the day after that. And the next dayunless the crewmen hadn't tarred and feathered the whole bunch by then. If only, Gorbel thought distractedly, if only the damned Adapts weren't so quick to abuse their privileges! As a dele- gate of the Colonization Council, Hoqqueah was a person of some importance, and could not be barred from entering the greenhouse except in an emergency. But didn't the man know that he shouldn't use the privilege each and every day, on a ship manned by basic-form human beings most of whom could not enter the greenhouse at all without a direct order? And the rest of the pantropists were just as bad. As pas- sengers with the technical status of human beings, they could go almost anywhere in the ship that the crew could goand they did, persistantly and unapologetically, as though moving among equals. Legally, that was what 'they werebut didn't they know by this time that there was such a thing as preju- dice? And that among common spacemen the prejudice against their kindand against any Adapted Manalways hovered near the borderline of bigotry? There was a slight hum as Averdor's power chair swung around to face the Captain. Like most Rigellian men, the lieu- tenant's face was lean and harsh, almost like that of an an- cient religious fanatic, and the starlight in the greenhouse hid nothing to soften it; but to Capt. Gorbel, to whom it was fa- miliar down to its last line, it looked especially forbidding now. "Well?" he said. "I'd think you'd be fed to the teeth with that freak by this time," Averdor said without preamble. "Something's got to be done. Captain, before the crew gets so surly that we have to start handing out brig sentences." "I don't like know-it-alls any better than you do," Gorbel said grimly. "Especially when they talk nonsenseand half of what this one says about space flight is nonsense, that much I'm sure of. But the man's a delegate of the Council. He's got a right to be up here if he wants to." "You can bar anybody from the greenhouse in an emer- gencyeven the ship's officers." "I fail to see any emergency," Gorbel said stiffly. "This is a hazardous part of the galazypotentially, any- how. It hasn't been visited for millennia. That star up ahead has nine planets besides the one we're supposed to land on, and I don't know how many satellites of planetary size. Sup- pose somebody on one of them lost his head and took a crack at us as we went by?" Gorbel frowned. "That's reaching for trouble. Besides, the area's been surveyed recently at least onceotherwise we wouldn't be here." "A sketch job. It's still sensible to take precautions. If there should be any trouble, there's many a Board of Review that would call it risky to have unreliable, second-class human types in the greenhouse when it breaks out." "You're talking nonsense." "Dammit, Captain, read between the lines a minute," Aver- dor said harshly. "I know as well as you do that there's going to be no trouble that we can't handle. And that no reviewing board would pull a complaint like that on you it there were. I'm just trying to give you an excuse to use on the seals." "I'm listening." "Good. The indefeasible is the tightest ship in the Rigellian navy, her record's clean, and the crew's morale is almost a legend. We can't afford to start gigging the men for their

per- sonal prejudiceswhich is what it will amount to, if those seals drive them to breaking discipline. Besides, they've got a right to do their work without a lot of seal snouts poking con- tinually over their shoulders." "I can hear myself explaining that to Hoqqueah." "You don't need to," Averdor said doggedly. "You can tell him, instead, that you're going to have to declare the ship on emergency status until we land. That means that the pan- trope team, as passengers, will have to stick to their quar- ters. It's simple enough." It was simple enough, all right. And decidedly tempting. "I don't like it," Gorbel said. "Besides, Hoqqueah may be a know-it-all, but he's not entirely a fool. He'll see through it easily enough." Averdor shrugged. "It's your command," he said. "But I don't see what he could do about it even if he did see through it. It'd be all on the log and according to regs. All he could report to the Council would be a suspicionand they'd prob- ably discount it. Everybody knows that these second-class types are quick to think they're being persecuted. It's my theory that that's why they are persecuted, a lot of the time at least." "I don't follow you." "The man I shipped under before I came on board the In- defeasible," Averdor said, "was one of those people who don't even trust themselves. They expect everybody they meet to slip a. knife into them when their backs are turned. And there are always other people who make it almost a point of honor to knife a man like that, just because he seems to be asking for it. He didn't hold that command long." "I see what you mean," Corbel said. "Well, I'll think about it." But by the next ship's day, when Hoqqueah returned to the greenhouse, Gorbel still had not made up his mind. The very fact that his own feelings were on the side of Averdor and the crew made him suspicious of Averdor's "easy" solu- tion. The plan was tempting enough to blind a tempted man to flaws that might otherwise be obvious. The Adapted Man settled himself comfortably and looked out through the transparent metal. "Ah," he said. "Our tar- get is sensibly bigger now, eh. Captain? Think of it: in just a few days now, we will bein 'the historical sensehome again." And now it was riddles! "What do you mean?" Corbel said. "I'm sorry; I thought you knew. Earth is the home planet of the human race. Captain. There is where the basic form evolved." Gorbel considered this unexpected bit of information cau- tiously. Even assuming that it was trueand it probably was, that would be the kind of thing Hoqqueah would know about a planet to which he was assignedit didn't seem to make any special difference in the situation. But Hoqqueah had ob- viously brought it out for a reason. Well, he'd be trottingout the reason, too, soon enough; nobody would ever accuse the Altarian of being taciturn. Nevertheless, he considered turning on the screen for a close .look at the planet. Up to now he had felt not the slight- est interest in it. "Yes, there's where it all began," Hoqqueah said. "Of course at first it never occurred to those people that they might pro- duce pre-adapted children. They went to all kinds of extremes to adapt their environment instead, or to carry it along with them. But they finally realized that with the planets, that won't work. You can't spend your life in a spacesuit, or under a dome, either. "Besides, they had had form trouble in their society from their earliest days. For centuries they were absurdly touchy over minute differences in coloring and shape, and even in thinidng. They had regime after regime that tried to impose its own concept of the standard citizen on everybody, and en- slaved those who didn't fit the specs." Abruptly, Hoqqueah's 'chatter began to make Gorbel un- comfortable. It was becoming easier and easier to sympathize with Averdor's determination to ignore the Adapted Man's existence entirely. "It was only after they'd painfully taught themselves that such differences really don't matter that they could go on to pantropy," Hoqqueah said. "It was the logical conclusion. Of course, a certain continuity of form had to be maintained, and has been maintained to this day. You cannot totally change the form without totally changing the thought proc- esses. If you give a man the form of a cockroach, as one an- cient writer foresaw, he will wind up thinking hie a cock- roach, not like a human being. We recognized that. On worlds where only extreme modifications of the human form would make it suitablefor instance, a planet

of the gas giant type no seeding is attempted. The Council maintains that such worlds are the potential property of other races than the human, races whose psychotypes would not have to undergo radical change in order to survive there." Dimly, Capt. Gorbel saw where Hoqqueah was leading him, and he did not like what he saw. The seal-man, in his own maddeningly indirect way, was arguing his right to be con- sidered an equal in fact as well as in law. He was arguing it, however, in a universe of discourse totally unfamiliar to Capt. Gorbel, with facts whose validity he alone knew and whose relevance he alone could judge. He was, in short, loading the dice, and the last residues of Corbel's tolerance were evapo- rating rapidly. "Of course there was resistance back there at the begin- ning," Hoqqueah said. "The kind of mind that had only re- cently been persuaded that colored men are human beings was quick to take the attitude that an Adapted Manany Adapted Manwas the social inferior of the 'primary' or basic human type, the type that lived on Earth. But it was also a very old idea on the Earth that basic humanity inheres in the mind, not in the form. "You see. Captain, all this might still have been prevented, had it been possible to maintain the attitude that changing the form even in part makes a man less of a man than he was in the 'primary' state. But the day has ,come when that at- titude is no longer tenablea day that is the greatest of all inoral watersheds for our race, the day that is to unite all our divergent currents of attitudes toward each other into one common reservoir of brotherhood and purpose. You and I are very fortunate to be on the scene to see it." "Very interesting," Gorbel said coldly. "But all those things happened a long time ago, and we know very little about this part of the galaxy these days. Under the circumstances which you'll find clearly written out in the log, together with the appropriate regulationsI'm forced to place the ship on emergency alert beginning tomorrow, and continuing until your team disembarks. I'm afraid that means that henceforth all passengers will be required to stay in quarters." Hoqqueah turned and arose. His' eyes were still warm and liquid, but there was no longer any trace of merriment in them. "I know very well what it means," he said. "And to some extent I understand the needthough I had been hoping to see 'the planet of our birth first from space. But I don't think you quite understood me. Captain. The moral watershed of which I spoke is not in the past. It is now. It began the day that the Earth itself became no longer habitable for the so- called basic human type. The flowing of the streams toward the common reservoir will become bigger and bigger as word spreads through the galaxy that Earth itself has been seeded with Adapted Men. With that news will go a shock of recog- nitionthe shock of realizing that the 'basic' types are now, and have been for a long time, a very small minority, de- spite their pretensions." Was Hoqqueah being absurd enough to threatenan un- armed, comical seal-man shaking a fist at the captain of the indefeasible? Or "Before I go, let me ask you this one question, Captain. Down there is your home planet, and my team and I will be going out on its surface before long. Do you dare to follow us out of the ship?" "And why should I?" Gorbel said. "Why, to show the superiority of the basic type. Captain," Hoqqueah said softly. "Surely you cannot admit that a pack of seal-men are your betters, on your own ancestral ground!" He bowed and went to the door. Just before he reached it, be turned and looked speculatively at Gorbel and at Lt. Averdor, who was staring at him with an expression of rigid fury. "Or can you?" he said. "It will be interesting to see how you manage to comport yourselves as a minority. I think you lack practice." He went out. Both Gorbel and Averdor turned jerkily to the screen, and Gorbel turned it on. The image grew, steadied, settled down. When the next trick came on duty, both men were still staring at the vast and tumbled desert of the Earth.

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