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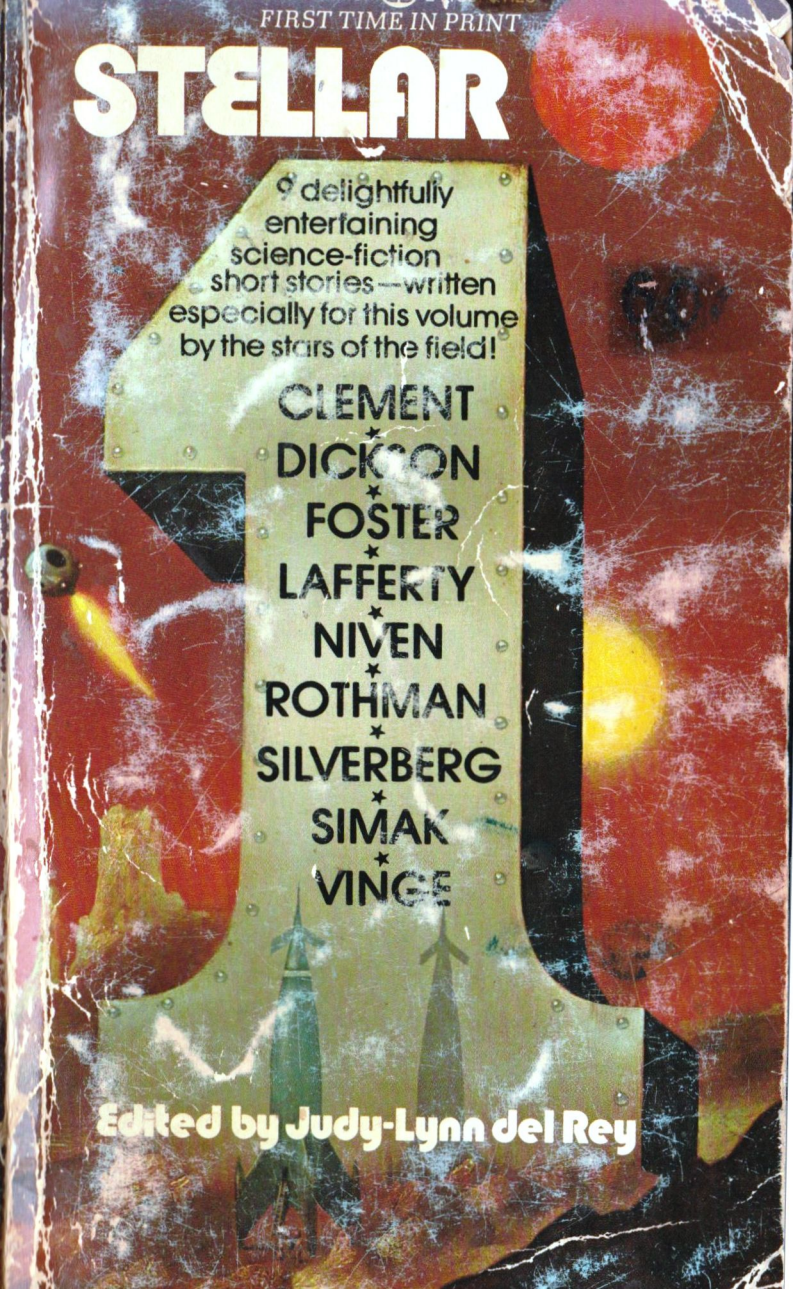

A NEW STAR IS BORN

Remember the story that first turned you on to science fiction and perhaps made you a fan for life? Who, if anyone, is writing fiction—especially short fiction—like that now? And where is it being published?

Science fiction *should* be fun . . . should offer some of that sense of wonder and achievement we used to expect as a matter of course. And that is what the *Stellar* series is all about.

This first volume showcases superior short stories by the major writers in the field—with each story in print here for the first time anywhere.

Edited by

Judy-Lynn del Rey

BALLANTINE BOOKS • NEW YORK

To Zach and Norma Benjamin,
two of my favorite parents,
with love!

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Why Anthologize?

If you have looked at the science-fiction displays in a bookstore recently, you may feel that the field needs another anthology of original short stories about as much as the Hercules Cluster needs another star.

Nevertheless, here is *Stellar 1!*

Why? Well, perhaps you can answer that question yourself. How long has it been since you found a new book full of good old-fashioned stories that are fun to read? You can easily find a plethora of stories designed to be meaningful, relevant and even significant. But how about one that is genuinely entertaining?

Remember the story that first turned you on to science fiction and perhaps made you a fan for life? Who, if anyone, is writing fiction like that now—especially short fiction? And where is it being published?

There is nothing wrong, of course, with serious science fiction that serves some deep—if obscure—social purpose. We need it, and we may even need some of the experimental fiction and other artistic efforts that fill the magazines and anthologies now. Perhaps we also need the messages of doom and destruction that have been borrowed from mainstream literature. But surely science fiction can offer more than mere messages wrapped up in inflated and often self-conscious prose.

It seems to me that science fiction should again be fun and should offer some of that sense of wonder and achievement we used to expect as a matter of course. That was before the second-rate academics—self-proclaimed critics—began picking the flesh off the body of science fiction, telling us that if a story is merely fun, it can't be any good.

Without stories of honest entertainment, however, there is no balance.

To restore such a balance of values, the *Stellar* series (of which this is volume one) was created. And to get the right stories for the book, I sent a letter to the top writers and agents in the field asking for the kind of sto-

ries needed for what I had in mind. Let me share the important paragraphs of that letter with you:

> First I want *stories*. That is, I don't want mood pieces without plots; I don't want vignettes; I don't want character sketches; and I don't want obvious extrapolations of current fads and newspaper stories. These yarns should have beginnings, middles and—most important—ends! I want writers to solve the problems they postulate and not pawn off implicit endings as great art. I have seen too many stories that just stop dead without even an attempt at a resolution. Either the author has run out of words or ideas—or both. Not for *Stellar*, please!
>
> I am looking for characters the readers will not only believe in, but will care about. I am not interested in a character who merely fades away on the penultimate page because his author does not know how to get him out of his predicament. Furthermore, I am looking for stories that will entertain a reader out there and will leave him with a feeling of genuine satisfaction, whether or not the story has a happy ending. If the readers *really* like (not just admire) the story, we have won. If our fellow writers and critics also like the story, that's gravy. But the readers—whoever they may be—must come first.

Well, in response to that call for submissions, most writers reacted enthusiastically. And the stories began to come in. Some went back—some required changes. But out of all those stories, this book began to shape up according to plan.

So here is *Stellar 1*. I meant it for you, the reader. And I hope you enjoy it!

Now on to *Stellar 2* . . .

—Judy-Lynn del Rey

New York City
May, 1974

The Birch Clump Cylinder

Clifford D. Simak

1

As Bronson drove the car up the curving road that led to the front of Cramden Hall, I became aware that there had been some change, although it took a moment to figure what it was.

"The pagoda's gone," I said.

"Blew down one night several years ago," said Bronson. "High wind came up. Flimsy thing, it was."

Nothing else had changed, it seemed. Coon Creek didn't change. It stayed stodgy and a bit ramshackle and tried its humble best to seem of no account.

"Just as well it's gone," said Bronson. "It never seemed to fit. Just a little flighty for my taste."

The car wheeled up and stopped in front of the pillared portico.

"You go on in," said Bronson. "Old Prather's waiting for you. I'll put away the car and bring in your bags."

"Thanks for meeting me," I said. "It's been a long time, Bronson."

"Fifteen years," said Bronson. "Maybe nearer twenty. None of us gets any younger. You never have been back."

"No," I said, "I haven't."

The car pulled away, and as it moved out of my line of vision I saw I had been wrong. For the pagoda wasn't gone; the pagoda was still there. It squatted in the evening light exactly as I remembered it, standing in the park-like area inside the driveway curve, with a pine at one corner of it and a sprawling yew along the side.

"Charles," a voice said behind me. "Charles, it's good to see you."

I turned and saw it was Old Prather, fumbling down the steps toward me.

I went rapidly up to meet him, and we stood there for a moment, looking at one another in the fading light. He hadn't changed too much—a little older, perhaps, a bit more frazzled at the edges, but the same erect, stiff posture that barely escaped being military. The imagined scent of chalk dust still clung to him; he was as imperious as ever, but, I thought, looking at him, perhaps a shade more kindly, mellowed with the years.

"The place looks the same as ever," I said. "Too bad the pagoda—"

"The pesky thing blew down," he said. "Gave us no end of trouble cleaning up the mess."

We went trudging up the steps together. "It was kind of you to come," he said. "As you may have gathered, we have a spot of trouble. On the phone, you understand, I couldn't be specific."

"I jumped at the chance to come," I said. "Not doing anything, of course. Not since I was booted out of Time Research."

"But that was two years ago. And you weren't booted."

"It is three years," I said, "and I most emphatically was booted."

"Dinner, I think, is ready," he said, "and we had best get to it. Old Emil—"

"Emil is still here?" I asked.

Old Prather chuckled thinly. "We carry on," he said. "Bronson and myself and Emil. Young men coming up, but they are not quite ready. We all get crotchety and at times a little prickly. Emil, especially. He is crustier than ever and is apt to scold you if you're late for meals or don't eat quite enough. He takes it as a slur on his cooking."

We reached the door and went into the foyer.

"And now," I said, "suppose you spell out this pagoda mummery."

"You saw it, then?" he said.

"Of course I saw it. After Bronson had told me it had blown down. And it was still there when you said it had

blown down. If this is some elaborate gag, just because I worked on Time Research—"

"It is no trick," he said. "It's part of the reason you are here. We'll talk about it later, but now we must go in to dinner or Emil will be outraged. Did I mention, by the way, that a couple of your classmates will be dining with us? Leonard Asbury. You remember him, of course."

"Dr. Prather," I said, "I have spent all these years trying not to remember him. He was a little twerp. And what other assorted alumni have you hauled in on this pagoda business?"

He said, without any shame at all, "Only one other. Mary Holland."

"She was the one who broke your heart. She went into music."

"Charles," he said, "you mistake my function and the purpose of this institute if you think she broke my heart. The world could ill have afforded to lose the kind of music she has written."

"So," I said, "a famous mathematician, a talented composer, a down-at-the-heels time researcher. When it comes to picking a team, you really go all out."

His eyes took on a merry twinkle. "Come on in to dinner," he said, "or Emil will wear out his tongue on us."

2

The dinner had been a good one, simple and hearty—vichyssoise, a salad, prime ribs and a baked potato, with wine that was not bad at all.

Old Prather had done a lot of inconsequential and rather pompous talking. The man was a good host; you had to give him that. The rest of us said little—the kind of tentative, exploratory talk that old acquaintances, too long separated, are likely to engage in.

I studied the two of them, and I knew that they were studying me as well. I could imagine both were wondering why Old Prather had invited me, for which I could not blame them.

Leonard Asbury, I decided, was still a little twerp. His thin black hair was slicked down against his skull. His

face had a hard and foxy look. When he spoke, his thin lips scarcely moved. I didn't like the bastard a bit more than I ever had.

Mary was something else again. She had been a pretty girl, and we had had some dates—nothing serious, just dates. But now her beauty had settled into a sort of matronly composure, and I had the feeling there was a lot of emptiness behind that contented face.

It was damned unsettling—the two of them. I was uneasy and wished I had not come.

"And now," said Old Prather, "let us get down to business. For I suppose you must guess that there is some business. A rather urgent matter."

He wiped his lips with his napkin, then bunched it on the table.

"I think," he said, "that Charles may have some inkling of it. He saw something when he came in that you others missed."

Both Leonard and Mary looked at me. I didn't say a word. This was Old Prather's show; let him carry on.

"It seems quite likely," he said, "that we have a time machine."

For a moment no one of us said anything, then Leonard leaned forward and asked, "You mean someone here has invented—"

"I am sorry," said Old Prather. "I do not mean that at all. A time machine has fallen into a clump of birch just above the little pond back of the machine shops."

"Fallen?"

"Well, maybe not fallen. Appeared, perhaps, is a better word. Limpy, the gardener, found it. He is a simple lad. I guess none of you remember him. He came to us just a few years ago."

"You mean to say it just showed up?" asked Mary.

"Yes, it just showed up. You can see it lying there, although not too clearly, for often it seems a little hazy. Objects at times appear around it, then disappear again—shunted in and out of time, we think. There have been some rather strange mirages around the campus. The pagoda, for example."

He said to me, "The contraption seems to have a penchant for the pagoda."

Leonard said, with barely concealed nastiness, "Charles is our expert here. He is the time researcher."

I didn't answer him, and for a long time nothing was said at all. The silence became a little awkward. Old Prather tried to cover up the awkwardness. "You must know, of course," he said, "that each of you is here tonight for a special reason. Here is a situation that we must come to grips with and each of you, I'm sure, will make a contribution."

"But Dr. Prather," Mary said, "I know less than nothing about the subject. I've never thought of time except in an abstract sense. I'm not even in the sciences. My whole life has been music. I've been concerned with little else."

"That is exactly my point," said Old Prather, "the reason that you're here. We need an unsullied, an unprejudiced mind—a virgin mind, if you don't resent the phrase—to look at this phenomenon. We need the kind of thinking that can be employed by someone like yourself, who has never thought of time except, as you have said, in an abstract sense. Both Leonard and Charles have certain preconceptions on the subject."

"I am gratified, of course," said Mary, "for the opportunity to be here, and quite naturally I am intrigued by what you call the 'phenomenon.' But actually, as you must realize, I have so provincial an attitude toward time that I doubt I can be any help at all."

Sitting there and listening to her, I found myself in agreement with what she said. For once, Old Prather had managed to outsmart himself. His reason for bringing Mary in as a member of his team seemed utter nonsense to me.

"And I must tell you, as well," said Leonard, "that I have done no real work on time. Naturally, in mathematics—that is, in some areas of mathematics—time must be taken as a factor, and I am, of course, quite familiar with this. But I have never been primarily concerned with time, and I think you should know—"

Old Prather raised a hand to stop him. "Not so fast,"

he said. "It seems to me that all of you are hurrying to disqualify yourselves." He turned to me. "So you are left," he said. "You've said exactly nothing."

"Perhaps," I said, "because I have nothing to say."

"The fact remains," he insisted, "that you were with Time Research. I'm burning with curiosity about the project. At least you can tell us something of what it's all about. I'm particularly interested in how you came to disassociate yourself."

"I didn't disassociate myself. I was fired. I was booted out the door. You know the background of the project. The premise, and it is a solid premise, is that if we're ever to venture beyond the solar system—if we hope to reach the stars—we have to know a little more about the space-time concept than we know now."

"I heard some rumor," said Leonard, "of a terrific row. My informant said—"

"I don't know how terrific," I said, "but, as far as I was concerned, it was sort of final. You see, I thought in terms of divorcing time from space, splitting the two into separate entities. And, goddam it, when you think of it, they are two separate factors. But science has talked so long of the space-time continuum that it has become an article of faith. There seems to be a prevalent idea that if you separate the two of them you tear the universe apart—that they are somehow welded together to make up the universe. But if you're going to work with time, you have to work with time alone, not with time and something else. Either you work with time or you work with nothing."

"It all sounds highly philosophical to me," said Old Prather.

"Here at Coon Creek," I told him, "you and several others taught us the philosophical approach. I remember what you used to tell us. Think hard and straight, you said, and to hell with all the curves."

He coughed a highly artificial cough. "I rather doubt," he said, "I phrased it quite that way."

"Of course you didn't. Mine was an oversimplified translation. Your words were very much more genteel and greatly convoluted. And it's not as philosophical as it

seems; it's just common sense—some of that hard, straight thinking you always urged upon us. If you are to work with anything, you must first know what you are working with, or at least have some theory as to what it is. Your theory can be wrong, of course."

"And that," said Leonard, "was the reason you were canned."

"That was the reason I was canned. An unrealistic approach, they said. No one would go along with it."

While I had been talking, Old Prather had risen from the table and walked across the room to an ancient sideboard. He took a book from one of the drawers and walked back to the table. He handed the book to Leonard, then sat down again.

Leonard opened the book and started riffling through the pages. Suddenly he stopped riffling and stared intently at a page.

He looked up, puzzled. "Where did you get this?" he asked.

"You remember I told you certain objects were appearing around the time machine," said Old Prather. "Appearing and then disappearing—"

"What kind of objects?" Mary asked.

"Different things. Mostly commonplace things. I recall there was a baseball bat. A battered bicycle wheel. Boxes, bottles, all kinds of junk. Close around the contraption. We let them go. We were afraid to come too close to it. One could get tangled up with the time effect. No one knows what it might do."

"But someone," said Leonard, "managed to snag this book."

"Limpy," said Old Prather. "He's a little short of sense. But, for some reason, he is intrigued by books. Not that he can do much reading in them. Especially in that one."

"I should think not," said Leonard. He saw that I was looking intently at him. "All right, Charles," he said, "I'll tell you. It is mathematics. Apparently a new kind of mathematics. I'll have to study it."

"From the future?" I asked.

"From about two centuries in the future," said Old Prather, "if you can believe the imprint date."

"There is no reason, is there, to disbelieve it?"

"Not at all," said Old Prather, happily.

"One thing," I said, "that you haven't mentioned. The dimensions of this machine of yours. What characteristics does it have?"

"If you're thinking of a container that was designed to carry a human passenger, it's not that at all. This one's not nearly big enough. It's cylindrical, three feet long or less. It's made of some sort of metal—a metal cylinder. Grillwork of some sort at each end, but no sign of any operational machinery. It doesn't look like what one would think of as a time machine, but it does seem to have the effects of one. All the objects appearing and disappearing. And the mirages. We call them mirages for lack of a better term. The pagoda, for example, the pagoda that really did blow down, flicking on and off. People walking about, strangers who appear momentarily, then are gone. Occasional structures, like the ghosts of structures, not quite in the present, but not in the future, either. And they have to be from the future, for there's never been anything like them here. A boat on the pond. So far as I know, the pond has never had a boat. Too small for a boat. As you recall, just a little puddle."

"You've taken precautions against someone stumbling into its field?"

"We've put a fence around it. Ordinarily, someone is watching to warn off stray visitors. But, as you know, we seldom have stray visitors. We'll all go out and have a look at it tomorrow, first thing after breakfast."

"Why not now?" asked Leonard.

"No reason," said Old Prather, "but we wouldn't be able to see much. We have no lights out there. However, if you wish—"

Leonard made a gesture of agreement. "Tomorrow's soon enough," he said.

"Another thing you may have been wondering about," said Old Prather, "is how it got there. As I told you, the gardener found it. I said at first it fell, then corrected myself and said it had arrived. The correction was not quite an honest one. There is some evidence it fell—some bro-

ken branches in the birch clump that might have been broken when the thing plunged through the trees."

"You say 'fell,' " said Mary. "Fell from where?"

"We are not sure, but we do have a hypothesis. Something happened west of here a few nights ago. A plane was reported down. Out in the hills. A wild and tangled country, as you may remember. Several people saw it falling. Searchers were sent out, but now the story is that there never was a plane. The news reports indicate it might have been a meteorite, mistaken for a plane. It is fairly clear that someone stepped in and quickly hushed it up. I made a few discreet inquiries of friends in Washington, and the word seems to be that a spaceship fell. Not one of our ships. All of ours can be accounted for. The supposition is that it may have been an alien ship."

"And you think the time machine fell off the alien ship," said Leonard. "It was breaking up and—"

"But why would an alien ship carry a time machine?" asked Mary.

"Not a time machine," I said. "A time engine. A drive that uses time as a source of energy."

3

Unable to sleep, I let myself out to go for a walk. The moon had just risen above the eastern hills, shedding a sickly light that barely dispersed the dark.

I hadn't been able to sleep. I had closed my eyes and tried, but then had been compelled to open them and stare up at the ceiling that was really not a ceiling, but just a square of darkness.

A time engine, I told myself. Time used as energy. Christ, then, I had been right! If it turned out that the thing in the clump of birch out there above the lake actually was an engine, then I had been right and all the others had been wrong. And, more than that, if time could be used as an energy, the universe lay open—not just the nearby stars, not just the galaxy, but the entire universe, everything that was. For if time could be manipulated—and to use it as a source of energy would mean that it would have to be capable of manipulation—then the dis-

tances of space would no longer count at all, would never need to be considered, and man could go anywhere he wished.

I looked up at the stars and I wanted to shout at them: Now we have you by the throat, now you are reachable, now your remoteness can no longer count with us. Your remoteness or the even more incredible remoteness of your sister stars that are so far that no matter how fiercely the fires may burn within them, we can catch no glimpse of them. Not even the dimmer stars, nor even the stars unseeable, are beyond our reach.

I wanted to yell at them, but of course I did not yell at them. You do not yell at stars. A star is too impersonal a thing to think of yelling at.

I walked down the driveway and followed a sidewalk that angled up the hill toward the observatory, and looking off to my left, I thought: Just over that little rise of ground in the clump of birch that stands above the pond. Trying to envision the cylinder that lay in the clump of birch, I wondered for the thousandth time if it might really be what I thought it was.

As I went around a curve in the winding walk, a man rose silently from a bench where he had been sitting. I stopped, somewhat startled by his sudden appearance; I had thought that at this time of night I would have been alone.

"Charley Spencer," said the man. "Can it be Charley Spencer?"

"It could be," I said. His face was in the shadow, and I could not make it out.

"I must apologize," he said, "for intruding on your walk. I thought I was alone. You may not remember me. I am Kirby Winthrop."

I went back through my memory, and a name came out of it. "But I do remember you," I said. "You were a year or two behind me. I have often wondered what became of you." Which was a lie, of course; I'd never thought of him.

"I stayed on," he said. "There's something about the place that gets into the blood. Doing some teaching.

Mostly research. Old Prather pulled you in on the time machine?"

"Myself and some others," I told him. "What do you know about it?"

"Nothing, really. It's outside my field. I'm in cybernetics. That's why I'm out here. I often come out on the hill, when it's quiet, and think."

"When it comes to cybernetics," I told him, "I rank as fairly stupid."

"It's a wide field," he said. "I'm working on intelligence."

"Indeed," I said.

"Machine intelligence," he said.

"Can machines be intelligent?" I asked.

He said, "I rather think they can."

"You're making progress, then?"

"I have a theory I am working on," he said.

"Well, that is fine," I said. "I wish you all success."

I sensed in him a hunger to talk, now that he had found someone new he could tell about his work; but I was not about to stand around with him out there in the night.

"I think I'll turn back," I said. "It's getting chilly and maybe now I can get some sleep."

I turned to go, and he said to me, "I'd like to ask you something, Charley. How many people have you ever told you got your education at Coon Creek?"

The question startled me, and I turned back to face him.

"That's a funny question, Kirby."

"Maybe so," he said, "but how many have you?"

"As few as possible," I said. I hesitated for a moment, waiting for him to speak, and when he didn't, I said, "It was good to see you, Kirby," and I headed back toward the hall.

But he called after me, and I swung around again.

"There is something else," he said. "What do you know of the history of Coon Creek?"

"Not a thing," I said. "I'm not even curious."

"I was," he said, "and I did some checking. Do you know there has never been a cent of public money in this

place? And in all its history, it has never had a research grant. So far as I can find, it has never applied for one."

"There is an endowment of some sort," I said. "Someone by the name of Cramden, way back in the eighties. Cramden Hall is named for him."

"That is right," said Winthrop, "but there never was a Cramden. Someone put up the money in his name, but there never was a Cramden. No one by the name of Cramden."

"Who was it, then?"

"I don't know," he said.

"Well," I said, "I don't suppose it makes a great deal of difference now. Coon Creek is here and that is all that counts."

I started off down the walk again, and this time he let me go.

Good to see you, I had told him, but it had not been good. I scarcely remembered the man—a name out of the past, a name without a face. And I still did not have the face, for his back had been toward the moon and I had not seen his face.

And all that silly talk about did I often mention Coon Creek and who had endowed the college. What had the man been getting at and why should he be so concerned? In any case, I told myself, it did not matter to me. I wasn't going to be here long enough for it to matter to me.

I went back to the driveway. When I got to the foot of the stairs that led to Cramden Hall, I turned around and looked back down the curving drive toward the manicured landscape that lay within the curve.

Coon Creek, I thought. God, yes, Coon Creek. It was a place you never mentioned because it had a corny sound and people always asked you where it was and what kind of school it was; and there really were no answers. "I never heard of it," they'd say, "but it sounds so interesting."

You couldn't tell them they had never heard of it because they were not supposed to hear of it, that it was quietly tucked away and had its corny name so that no one in his right mind would ever want to go to it. Nor

could you tell them that the school selected its students rather than the students selecting it, that it went out and recruited brains, exactly as other colleges, intent on winning football teams, recruited brawn.

"Brains" would not be the precise word, since some of us—and I was one of them—were not all that brainy. Rather it was an ability of a certain kind which had never been quite defined, an approach to problems and a philosophy that was undefined as well—known, of course, to certain people, but certainly not to those chosen ones who were invited to become students at Coon Creek. How they found us no one really knew, and who was behind it all was unknown as well. The government, I had always thought, but I had been far from sure. The selection process had a sort of undercover secret sneakiness that had the feel of government. Although, if what Winthrop had told me was correct, it was not government.

Not all of us, of course, turned out as well as might have been expected. I had not for one. And Mary ... well, maybe Mary hadn't either. During her days at the institute, I recalled, she had exhibited an interest in economics that must have been upsetting to Old Prather and perhaps to many others; and then she had gone off at a tangent into music, which must have been the farthest from what those who engineered the college must have had in mind. Leonard, of course, was another case—one of the more successful ones—a brilliant mathematician who was pushing science beyond logic and into an intuitional area that gave some promise of arriving at some understanding not only of the mechanism, but of the purpose of the universe.

I stood for a short time looking at the driveway and the area it enclosed—waiting, I think, for the pagoda to come back again; but it did not come back, so I turned and went up the stairs.

4

The time machine, as Old Prather had described it, was wedged between the boles of the clump of birch. It had a sort of hazy, flickering look to it, but not so much

that it could not be seen with some clarity. The space around it was fairly clear of time-debris. There were a tennis ball and an old boot, but that was all. While we watched the boot went away.

"We did a little preliminary investigation," Old Prather said, "before the three of you arrived. We rigged up a camera on a boom and got it in as close as we could manage to photograph the entire surface—all, that is, except the portion of it that is resting on the ground. We lost the first camera. It was shifted into time or whatever happens when you get too close to it. We didn't lose the second camera, and we found out one thing. Close down against the ground and shielded by a tree trunk is what appears to be a control of some sort."

Old Prather opened the folder he carried underneath his arm, and we crowded around to look. A couple of photographs showed what seemed to be a control, a circular patch set into the metal of the cylinder—but that was all, a circular patch. There were no calibration marks, but there seemed to be three little projections set into the edge of the circle. The projections at one time could have been tied into a control mechanism of some sort, but there was nothing to indicate they had.

"Nothing else?" asked Leonard.

"Only a couple of rough spots on the surface," said Old Prather. He found the photographs. "One on one end, another on the opposite end."

"They could mark the positions," I said, "where the time engine was mounted on the craft. If it is a time engine and was on a craft. The spots where the engine broke from its mountings."

"You're fairly certain of that, though," said Leonard, a little nastily.

"It's an idea," I said. "That is all it is."

"It seems to me," said Leonard, "that we need more people in on this than just the three of us. Charley here is the only one of us who knows anything about time and—"

"Whatever I know of it," I told him, "is only theoretical. I'd have no idea how a contraption like this could be put together. We can't just go wading in. If it is a time

engine, I would guess it is only idling; but we still have no idea what a time-force can do. Maybe it's not too powerful, but the power is probably fluctuating. If we start messing around with it and do something that turns it on full power—"

Old Prather nodded gravely. "I can realize the danger," he said, "but if it's possible to do so, I'd prefer to see this discovery kept within the family. It would be against my grain to share it with someone else—especially with the government. And if we went to anyone it should be the government."

"Our time machine would be easier to work with," said Mary, "if we could get it out of that birch clump—out into the open where we could roll it around and get at it better."

"We had thought of that," said Old Prather, "but we were afraid to touch it. We could pry it out of there, of course, but—"

"I don't think," said Leonard, "that we should touch it yet. Even the slightest jar might affect the mechanism. Trouble is we're working in the dark. We don't know what we have. If we could turn it off—but I haven't the faintest idea how to turn if off. That control circle, maybe, if it is a control. But how do you get to it to turn it?"

"You said Limpy got the book," Mary said to Old Prather. "How did he manage it? Did he reach in and get it?"

"He was carrying a hoe," Old Prather said. "He hooked it out with that."

"Maybe," said Leonard, "someone in the shops could rig up something we could use to manipulate the circle. Attach it to a long handle, and we might reach in. There are those three little nibs on the outside of the circle. If we had a tool of some sort that would engage them, we might be in business."

"That's fine," I said, "but would you know which way to turn the circle?"

We needn't have worried which way to turn it. The shop rigged up a tool, working from the photographs. The first time it was not quite the right size. The second

time around it fit, but it didn't work. It slid past the nibs. The metal had what appeared to be an oily quality. There seemed no way to get a grip on it. The shop went on, working into the night, trying to engineer something that might do the job. But all of us, even the shop, knew there was little chance.

That night at dinner we tried to talk it out. There was no talking it out, however. The problem had too many angles to it—not just how we'd get the engine shut down, but what we'd do with it once it was shut down. How did you go about investigating a time mechanism? If you were lucky, of course, you might take it apart, photographing and diagramming each step in taking it apart. You might even be able to take it apart and put it back together and still not be able to find what made it operate. Even when you had it all spread out, even when you had examined every component of it, understanding the relationship of each component to all the rest of it, the principle might still escape you.

Chances were, we agreed, that stripping it down would involve some danger, perhaps considerable danger. Somewhere within that metal cylinder was a factor no one understood. Checks and balances were built into the machine to control that factor. Unbalance this system and you would be face to face with time, or that factor we called 'time'; and no one, absolutely no one, knew what time might be.

"What we'll need," said Leonard, "is something that will contain time, that will insulate it."

"Okay," I said. "That is exactly it. Something that damps the time factor while we work, so that we aren't blown back into the Carboniferous or forward to the point where the universe is approaching heat death."

"I don't think the time force is that strong," Old Prather objected.

"Probably not, the way it is now," said Leonard. "Charley thinks the engine is idling, maybe barely functioning. But if that thing out there is what we think it is, it has to have the requisite power to drive a spaceship over many light-years."

"The damping factor would have to be something that

is immaterial," I said. "Something that is not a part of the material universe. Anything that has mass would be affected by time. What we need is something upon which time has no effect."

"Light, maybe," said Mary. "Lasers—"

Leonard shook his head. "Either time affects light," he said, "or light has established its own time parameter. It travels only so fast. And while it may not seem so, it is actually material. Light can be bent by a strong magnetic field. What we need is something outside time and independent of it."

"Well, maybe the mind, then," said Mary. "Thought. Telepathic thought aimed at the engine, establishing some sort of rapport with it."

"That fits our specifications," Old Prather agreed, "but we're a thousand years too soon. We don't know what thought is. We don't know how the mind operates. We have no telepaths."

"Well," said Mary, "I did my best. I came up with two bad ideas. How about the rest of you?"

"Witchery," I said. "Let us go to Africa or the Caribbean and get us a good witch doctor."

I had meant to be facetious, but it didn't seem to strike them that way. They sat there looking at me like three solemn owls.

"A resonance of some sort," said Leonard.

"I know about that," said Mary, "and it wouldn't work. You're talking about a kind of music, and I know music. Time is a part of music. Music is based on time."

Leonard frowned. "I said it wrong," he told us, "and without too much thought. What I was thinking about were atoms. Perhaps there is no such thing as time in atomic structure. Some investigators have advanced the theory. If we could line up atoms, get them into some sort of random step—" He shook his head. "No, it wouldn't work. There's no way in God's world that it could be done, and even if it could, I guess it wouldn't work."

"A strong magnetic field," said Old Prather. "Wrap the engine in a magnetic field."

"Fine," I said. "That might do the trick. The field

might bend and contain time. But, aside from the fact that we can't build such a field . . ."

"If we could," said Mary, "we couldn't work inside the field. What we're talking about is how to control time so we can investigate the engine."

"The only thing left is death," I said. "Death is a timeless thing."

"Can you tell me what death is?" snapped Leonard.

"No, I can't," I said, grinning at him.

"You're a smart aleck," he said viciously. "You always were."

"Now, now," said Old Prather, completely horrified. "Let us have more wine. There's still some left in the bottle."

"We aren't getting anywhere," said Mary, "so what difference does it make? Death sounds as good to me as any of the others."

I bowed to her with mock gravity, and she made a face at me. Old Prather went skipping around the table like a concerned cricket, pouring the wine.

"I hope," he said, "the boys in the shop can come up with something that will turn the control dial."

"If they don't," said Mary, "we'll do it by hand. Have you ever thought how the human hand is often more versatile than the finest tool?"

"Trouble is," said Leonard, "that however ingenious the tool may be, it is going to be awkward. You have to stand so far away, and you're working at a dirty angle."

"But we can't do it by hand," Old Prather protested. "There is the time effect."

"On little things," said Mary. "On books and tennis balls and boots. Never on a living thing. Never on anything with the mass of a human body."

"I still wouldn't want to try it," said Leonard.

5

We tried it. We had to try it.

The tools the shop dreamed up wouldn't work, and we simply couldn't leave the time machine there in the clump of birch. It was still operating. While we watched,

a battered wrist watch, a tattered notebook, an old felt hat appeared and disappeared. And momentarily the boat was upon the pond that had never known a boat.

"I spent last night with the mathematics text," said Leonard, "hoping I might find something that might help us, but I didn't find a thing. Some new and intriguing concepts, of course, but nothing that could be applied to time."

"We could construct a good strong fence around it," said Old Prather, "and leave it there until we know what to do with it."

"Nonsense," said Mary. "Why, for heaven's sake, a fence? All we need to do is step in there—"

"No," said Leonard. "No, I don't think we should. We don't know—"

"We know," said Mary, "that it can move small objects. Nothing of any mass at all. And all of them are inanimate. Not a single living thing. Not a rabbit, not a squirrel. Not even a mouse."

"Maybe there aren't any mice," said Old Prather.

"Fiddlesticks," said Mary. "There are always mice."

"The pagoda," said Leonard. "Quite some distance from this place and a rather massive structure."

"But inanimate," said Mary.

"You mentioned mirages, I believe," I said to Old Prather. "Buildings and people."

"Yes," he said, "but merely shadows. Very shadowy."

"God, I don't know," I said. "Maybe Mary's right. Maybe it has no real effect on anything that's living."

"We'd be gambling, you know," said Leonard.

"Leonard, that is what is wrong with you," said Mary. "I've been wondering all this time what was wrong with you. And now it seems I know. You never gamble, do you?"

"Never," said Leonard. "There is no sense in gambling. It's a sucker's game."

"Of course not," said Mary. "A computer for a brain. A lot of little mathematical equations to spell out life for you. You're different from the rest of us. I gamble; Charley, here, would gamble—"

"All right," I said, "cut out the arguing. I'll do the job.

You say fingers are better than tools, so let us find out. All you have to tell me is which way I should turn it."

Mary grabbed my arm. "No, you don't," she said. "I was the one who started this. I'm the one to do it."

"Why don't the two of you," Leonard said in his nasty, twerpy way, "draw straws to determine which one of you it'll be?"

"Now that is a good idea," Mary said. "But not the two of us. It'll be the three of us."

Old Prather had been doing some twittering around, and now he blurted out, "I think this is the height of foolishness. Drawing straws, indeed! I do not approve of it. I approve it not at all. But if straws are being drawn, there must be four of them."

"Not on your life," I said. "If it should happen that the three of us are caught up in time and whisked very swiftly hence, someone must be left to explain it all. And you are the man to do that. You explain everything so well. You've been doing it for years."

It was insane, of course. If we had taken all of thirty seconds to really talk it over, we would not have done it. But each of us had got caught up in the excitement and each of us had invested some ego in the project, and we couldn't back away. Leonard could have, probably, but he'd got caught up in a sort of stubborn pride. If he had said, "No, I won't go along with it," that might have ended it. But if he'd done that he'd have confessed to cowardliness, and he couldn't quite do that.

We didn't draw straws. We put three pieces of paper in Old Prather's hat, the pieces of paper marked 1, 2, and 3.

Mary got the 1, Leonard the 2, and I came up with 3.

"Well, that settles it," said Mary. "I'm the first to try it. Which is only right, since I suggested it."

"The hell with that," I said. "Just tell me which way it should be turned—if it can be turned, that is."

"Charles," said Mary, primly, "after all these years you are being chauvinistic, and you know very well I'll insist upon my right."

"Oh, for Christ sake," said Leonard, "let her go ahead! She's the one who's sure."

"I still do not approve," said Old Prather, rather fussily, "but you did draw numbers. I wash my hands of the matter. I disassociate myself from it."

"Bully for you," I said.

"I shall turn it clockwise," said Mary. "After all, that is the way—"

"You can't be sure," said Leonard. "Just because that is a human convention—"

Before I could reach out to stop her, she darted into the clump of birch and was bending over to reach the control circle. Fascinated, I watched in that split second when her fingers gripped and turned. I distinctly saw the control circle move. So she had been right, after all, I thought: fingers were better than a tool.

But even as I thought it, Mary disappeared, and around the cylinder there was a sudden flurry of many different articles dredged out of time and moved into the present from the past and future and—once arrived—shunted to the past or future, continuing the direction of their flow. There was a pocket radio, a brightly colored shirt, a knapsack, a couple of children's blocks, a pair of spectacles, a woman's purse and, so help me God, a rabbit.

"She turned it the wrong way!" I shouted. "It's no longer idling."

Leonard took a quick step forward, then paused, took another slow step. For an instant more I waited, and when he didn't move, I reached out an arm and swept him to one side. Then I was in the clump of birch and reaching down. I felt my fingers on the circle, felt the flesh sink into the little nibs, and my brain roared at me: counterclockwise, counterclockwise, counterclockwise . . .

I don't really remember turning the control circle, but suddenly the time debris that had been washing over and around my feet was no longer there, and neither was the cylinder.

Slowly I straightened up and backed out of the clump of birch. "What the hell happened to the engine?" I asked. And as I said it, I turned around to catch the response of the others, but there were no others.

I stood alone and shivered. Everything was the way it had been before. The day was still a sunny day, the birch

clump looked the same as ever, and the pond was the same as well, although not quite the same, for now a small rowboat was pulled up on the shore.

I shivered at the sight of it, then held myself stiff and straight to forestall further shivering. My mind clicked over reluctantly and told me what I fought against believing.

Had I done the job? I wondered. Had I turned the engine off, or had Leonard had to go in and complete the job? Then I knew I must have done it, for neither Leonard nor Old Prather would have followed up.

The cylinder was gone and gone how long ago? I wondered. And where was Mary? And what about the boat?

I headed across the slope toward Cramden Hall, and as I went along I kept a sharp outlook for changes. But if there were changes, they were not pronounced enough for me to notice them. I remembered that through the years Coon Creek did not change. It stayed stodgy and a bit ramshackle and tried its humble best to seem of no account. It wore an ancient coat of protective coloration.

There were a few students about. As I came down to the sidewalk that led to the curving driveway, I met one face to face; but he paid no attention to me. He was carrying a clutch of books underneath his arm and seemed in something of a hurry.

I climbed the stairs in front of the hall and let myself into the hushed twilight of the foyer. There was no one around, although I heard the sound of footsteps going down a hall that was out of sight.

Standing there, I felt unaccountably an outsider, as if I had no right to be there. Just down the hall was Old Prather's office. He would have the answer, and whether I belonged or not, I told myself, I was entitled to the answer.

But there was a chilliness in the place that I didn't like, a chilliness and, now that the sound of distant footsteps had ceased, a silence that went with the chilliness.

I half turned to leave, then turned back, and as I turned, a man came out of the door of Old Prather's office. He headed down the hall toward me, and I stayed standing there, not knowing what to do, not wanting to turn

about and leave, wishing in a frantic moment that the man coming down the hall should fail to see me there, although I knew that undoubtedly he had seen me.

It was time displacement, I knew, a sense of time displacement. It was something we had often talked about in idle moments back at Time Research. If a man were moved in time, would he feel out of place? Would he sense a different time frame? Was man aware of time? Was a specific temporal bracket an unseen factor of personal environment?

The light in the hall was dim, and the face of the man who was approaching me was a very ordinary face—a stereotype, one of those faces that one sees on thousands of different people, with so little remarkable about them that there is nothing to remember, with the end result that all of these faces come to look alike.

The man slowed his pace as he came nearer to me. Then he said, "Is there any way I can help you? Are you looking for someone?"

"Prather," I said.

A change came over his face, a sudden change that was at once fear and wonderment. He stopped and stared at me.

"Charley?" he asked, questioningly. "You are Charley Spencer?"

"That is who I am," I said. "And now about Old Prather."

"Old Prather's dead," he said.

"And you?"

"You should remember me. I am Kirby Winthrop. I took over Prather's place."

"Fast work," I said. "I saw you just the other night."

"Fifteen years ago," said Kirby. "Our meeting on Observatory Hill was fifteen years ago."

It staggered me a little, but I guess I was prepared for it. I hadn't really thought about it; I had not allowed myself to think about it. If I had any real reaction, it would have been relief that it was not a hundred years.

"What about Mary?" I asked. "Has she shown up yet?"

"I think perhaps you could stand a drink," said Kirby. "I know damn well I could. Let's go and have a drink."

He came up to me and linked his arm in mine, and we went marching down the hall to the room he'd left.

He said to the girl in the outer office, "Hold all calls. I'm in to no one." Then he hustled me into the inner office.

He almost pushed me into a deep, upholstered chair in one corner of the office and went to a small bar under the windows.

"Have you a preference, Charley?"

"If you have some scotch," I said.

He came back with the glasses, handed one to me and sat down in an opposite chair.

"Now we can talk," he said. "But get down a slug of liquor first. You know, all these years I've been sort of expecting you. Not wondering when you would show up, of course, but if you would."

"Afraid I would," I said.

"Well, maybe something of that, too. But not very much. Slightly embarrassing, of course, but—"

Kirby left the sentence hanging in the air. I took a snort of scotch. "I asked you about Mary."

He shook his head. "She won't be coming. She went the other way."

"You mean into the past."

"That's right. We'll talk about it later."

"I see the time contraption's gone. Did I shut it off?"

"You shut it off."

"I wondered if maybe Leonard or Old Prather—"

He shrugged. "Not Leonard. He was a basket case. And Old Prather—well, you see, Old Prather never was a part of it. He never really was a part of anything at all. He stood outside of everything. Only an observer. That was his way of life, his function. He had people doing things for him—"

"I see," I said. "So you got it out of there. Where is it now?"

"It? You mean the engine?"

"That's right."

"Right at the moment it's up in the Astrophysics Building."

"I don't remember—"

"It's new," he said. "The first new building on the campus for more than fifty years. It and the spaceport."

I came half out of my chair, then settled back again. "A spaceport—"

"Charley," said Kirby, "we've been out to the Centauri system and 61 Cygni."

"We?"

"Us. Right here. Coon Creek Institute."

"Then it worked!"

"You're damned right it worked."

"The stars," I said. "My God, we're going to the stars! You know, that night when we met out on the hill ... that night I wanted to shout to the stars, to tell them we were coming. What have you found out there?"

"Centauri, nothing. Just the three stars. Interesting, of course, but no planets. Not even space-debris. A planetary system never formed, never got started. Cygni has planets, twelve of them, but nothing one could land on. Methane giants, others that are in the process of forming crusts, one burned-out cinder close up to the sun."

"Then there are planets."

"Yes, millions, billions of solar systems. Or at least that's what we think."

"You say us. How about the others? How about the government?"

"Charley," he said, "you don't understand. We are the only ones who have it. No one else."

"But—"

"I know. They've tried. We've said no. Remember, we are a private institution. Not a dime of federal or state or any other kind of money—"

"Coon Creek," I said, half choking at the ridiculous thought of it. "Good old Coon Creek, come into its own."

"We've had to set up a security system," Kirby said primly. "We have all sort of sensors and detectors and guards three deep around the place. It plays hell with the budget."

"You say you have the engine here. That means you were able to build others."

"No problem. We took the engine apart. We charted it, we measured its components, we photographed it. We have it down on tape to the last millimeter of it. We can build hundreds of them, but there is one thing—"

"Yes?"

"We don't know what makes it work. We missed the principle."

"Leonard?"

"Leonard's dead. Has been for years. Committed suicide. I don't think even if he'd lived—"

"There's something else," I said. "You wouldn't have dared to tinker with the engine if you hadn't had a way to damp the time effect. Old Prather and the three of us kicked that one around—"

"Intelligence," said Kirby.

"What do you mean—intelligence?"

"You remember that night we talked. I told you I was building—"

"An intelligent machine!" I shouted. "You mean to tell me?"

"Yes, I mean to tell you. An intelligent machine. I almost had it that night I talked with you."

"Mary was on the right track, then," I said. "That night at dinner she said 'thought.' Telepathic thought aimed at the engine. You see, it had to be some immaterial thing. We beat our brains out and could come up with nothing. But we knew we had to have a damper."

I sat silently, trying to get it all straight in my mind.

"The government suspects," I said, "where you got the engine. There was that crashed spaceship."

"There was a spaceship," said Kirby. "They finally got enough of it to guess how it was built. Picked up some organic matter, too, but not enough to get a good idea of its passengers. They suspect, of course, that we got the engine, although they aren't even sure there was an engine. We've never admitted we found anything at all. Our story is we invented it."

"They must have known, even from the first, something funny was going on," I pointed out. "Mary and I

disappeared. That would have taken some explanation. Not myself, of course, but Mary was something of a celebrity."

"I'm a bit ashamed to tell you this," said Kirby, and he did look a bit ashamed. "We didn't actually say so, but we made it seem that the two of you had run off together."

"Mary wouldn't have thanked you for that," I told him.

"After all," he said, defensively, "the two of you had some dates while you were students."

"There's one thing you've not been telling me," I said. "You said Mary went into the past. How do you know that?"

He didn't answer for a while, and then he finally asked a question. "You remember that night we talked out on the hill?"

I nodded. "We talked about your intelligent machine."

"More than that. I told you there never was a man named Cramden, that the endowment money came from someone else but was credited to a non-existent Cramden."

"So what does that have to do with it?"

"It was something that Old Prather remembered. He told me about the argument you had about the drawing of the straws or paper slips out of a hat or something of the sort. Leonard wanted none of it. Shutting off the engine the way you did it, he said, was a gamble. And Mary said sure it was a gamble and that she was willing to gamble."

He stopped and looked at me. I shook my head. "I don't get it," I said. "Is all this supposed to have some meaning?"

"Well, it turned out later that she was a gambler—a most accomplished gambler. She'd racked up half a fortune in the stock market. No one knew too much about it until later. She did it rather quietly."

"Wait a second, there," I said. "She was interested in economics. She took some courses and did a lot of reading. Economics and music. I've always wondered why she was ever chosen for the institute—"

"Precisely," he said. "Many times, in the dead of night, I've wondered that myself, and each time I have been somewhat frightened at how it all turned out. Can you imagine the sort of killing that someone like Mary, with her kind of background, could make if they were thrown a hundred years into the past? They'd know the pattern. They'd know what to buy, when to get in, when to get out. Not specifically, of course, but from their knowledge of history."

"Are you just guessing or do you have some facts?"

"Some facts," he said. "Not too many. A few. Enough for an educated guess."

"So little Mary Holland is thrown into the past, makes herself a bundle, endows Coon Creek Institute—"

"More than that," he said. "There was the initial endowment, of course, the one that got us started. And then, about fifteen years ago, about the time the time-engine business started, there was a supplementary endowment that had been in escrow in a New York bank for years, pegged to be paid off at a given time. A rather handsome sum. This time there was a name—a certain Genevieve Lansing. From the little I could find she had been an eccentric old character who was an accomplished pianist, although she never played in public. And the thing that made her so eccentric was that at a time when no one else ever even thought about it, she was utterly convinced that some day man would go out to the stars."

I said nothing for a long time and neither did he. He got up and brought a bottle from the bar and splashed some more liquor in our glasses.

Finally I stirred in my chair. "She knew," I said. "She knew you'd need that supplementary endowment to develop a spaceship and spaceport facilities."

"That's what we used it for," he said. "We named the ship the *Genevieve Lansing*. I ached to call it the *Mary Holland*, but I didn't dare."

I finished off my liquor and put the glass down on a table. "I wonder, Kirby," I said, "if you'd put me up for a day or two. Until I can get my feet under me. I don't quite feel up to walking out immediately."

"We couldn't let you go in any case," said Kirby. "We

can't have you turning up. Remember, you and Mary Holland ran off together fifteen years ago."

"But I can't just stay here. I'll take a different name if you think I should. At this late date, no one would recognize me."

"Charley," he said, "you wouldn't just be staying here. There's work for you to do. You may be the one man alive who can do the job that's waiting."

"I can't imagine . . ."

"I told you we can build time engines. We can use them to go out to the stars. But we don't know why they work. We don't know the principle. That's an intolerable situation. The job's less than half done, there's still a lot to do."

I got out of the chair slowly. "Coon Creek," I said. "Tied forever to Coon Creek."

He held out his hand to me. "Charley," he said, "we're glad to have you home."

And standing there, shaking hands with him, I reminded myself it need not be Coon Creek forever. One of these days I might be going to the stars. ☆

Fusion

Milton A. Rothman

The only thing Russell Hertzberg could see of Bill Kramer as the bulky engineer climbed atop the magnet coil was his voluminous posterior jutting massively among the busbars and cryogenic pipelines of Toroidal Device Number 3.

"Okay, let her go," Kramer finally called down, having settled into an uncomfortable crouch.

Hertzberg fingered the intercom switch as he shot a glance across to the control room out past the great glass window. "Close the interlocks and enable the pulsed confining field generators," he spoke into the microphone. "Prepare to pulse every thirty seconds, starting at one kilogauss and gradually increasing up to fifty kilogauss, or until I tell you to stop."

At the door, sealing the control room off from the machine room, he heard the clicking of the locks as Bruce Kelly, the head technician, turned the keys and isolated the two of them inside the machine room. In another moment the klaxon sounded, warning the lab that machine pulsing was about to begin.

This raucous horn was the signal for anyone accidentally locked inside the machine room to run, not walk, to one of the big red panic buttons and to punch it hard. Not by accident did Hertzberg and Kramer remain in the machine room during this operation, however. On occasion, when standing 100 meters away in the safety of the control room would not suffice, safety regulations were purposely overridden so that observations could be made right at the machine.

However, Hertzberg had never before watched such a

hairbrained stunt as the one now being performed by Bill Kramer, who was about to perch right on one of the TD-3 magnet coils while the machine was in the process of being pulsed. To be sure, there was no plasma in the two-meter-diameter vacuum vessel, nor a discharge of any kind, so no danger from radiation existed. All that was about to happen was that slow pulses of electric current—each two seconds long—were to be sent through the coil windings. With each pulse the amount of current was to be increased, until fifty thousand amperes flowed through each coil and the magnetic field strength went up to a rather impressive fifty thousand gauss. During this process Bill Kramer would strain his eyes in the dark to look for the flashes that would be evidence of intermittent arcing at one of the busbar connections.

The only dangers were the snapping of mechanical parts, the ejection of molten copper through the air from electric arcs, and similar straightforward electromechanical hazards—hazards that were encountered rarely, but with finite probability.

The countdown bell sounded, and Hertzberg focused his attention on the machine in front of him. The room was darkened so that Kramer could more clearly see the electric arc whose position he was trying to locate, but enough light filtered in from the control-room window to outline the towering bulk of the fusion device. Twenty feet high it loomed, a massive form of magnet coils arranged like the segments of a tangerine around a doughnut-shaped vacuum vessel lying flat on its side. In the horizontal direction, the machine spanned a diameter greater than fifty feet, while auxiliary coils, cooling pipes, vacuum pumps and sundry instrumentation stretched out over an area the size of a baseball field. The ultraviolet spectrometer lurked in one corner, flanked by the laser scattering system and the neutral injection apparatus.

When in full operation, the enormous toroidal vacuum vessel would be filled with low-pressure deuterium gas, and an electric current amounting to many tens of thousands of amperes would be magnetically induced to travel round and round the circumference of the doughnut, using the gas itself as the conductor. In the process, the

outer electrons of the deuterium atoms would be stripped from their nuclei, ionizing the gas so that it became a plasma—a volume of positive and negative charges moving around separately but intermingling with one another. Confined by the intense magnetic field so that it did not physically touch the walls of the container, the plasma could be studied with the vast array of diagnostic instruments, with the aim of understanding the numerous oscillations, instabilities, diffusions, and other mechanisms by which it attempted to wriggle its way out of its magnetic confinement.

Hertzberg himself felt utterly dwarfed by the immensity of the apparatus and could comprehend the machine and its paraphernalia only by breaking them down mentally into individual parts that could be handled. At this moment he stood close to the base of the coil atop which Kramer perched, so that he could relay communications through the intercom to the control room. A slight, white-bearded man in a tan jump suit, whose silvery hair haloed his head, Hertzberg somehow seemed out of place in the midst of all the machinery. His recurrent fantasy placed him, instead, on the platform of a lecture hall—or better yet, seated on a sunlit lawn surrounded by young and attentive students.

Next year, he thought. Next year. Right here and now was the problem of the troublesome arc, and he forced his attention to return to the business at hand.

Nowhere in the vicinity of the machine was there any indication that at this very moment electric current flowed through the coils, producing an invisible, intangible magnetic field that pervaded the space in and around the torus. Only in the control room did the meters and oscilloscopes signal the event.

To Hertzberg it seemed strange that the strongest magnetic field was almost without perceptible biological effect. He could stand next to a magnet coil, Kramer could perch on top, and neither could feel anything out of the ordinary. Only as the current pulsed repeatedly, building up in intensity each time, did a visible effect begin to take place.

The effect was this: When the current grew greater

than thirty thousand amperes, the magnetic field drew adjacent coils together with such a ferocious force that the ten-inch-thick coil cases of stainless steel could be seen to bend toward each other slowly and ponderously until the current passed its peak, whereupon the coils slowly moved back to their normal position. Any force that could make those solid steel members bend even slightly out of shape—the intensity of that force simply boggled the imagination. Here was something that could not be comprehended. Yet nothing could be seen pushing the coil, nothing could be felt by the human hand—nothing but the invisible magnetic field.

Hertzberg could remember seeing a steel tool box, forgotten in a far corner of the laboratory, hurtled violently from its resting place and dashed to bits against one of the coils undergoing testing. Every nut and bolt of the machine was constructed of nonmagnetic stainless steel, so that the only mechanical forces were those between the electric currents themselves.

At forty thousand amperes the creaking of the coil frames became audible. Suddenly Kramer stiffened.

"Okay," he said. "It's starting to arc. One more pulse and I'll have the location pinned down."

At the next pulse he grunted in satisfaction. "Good. That does it. Tell the boys to shut it down so that I can get my tail off of this monstrosity."

Hertzberg pushed the intercom switch once more. "Okay, Bruce. Stop pulsing and open up. We're coming out."

In a minute Kramer had crawled down from his perch. "The arc is in a nasty place. Should take the boys two or three days to pull the busbars apart and retape the insulation. Then you should be on the air first thing next week."

Hertzberg drew in a deep breath. The moment of truth was coming closer, and the accumulated anxieties of the last twenty years began to build their pressures to the point where safety-valving was becoming necessary. He followed Kramer out into the control room, where the technicians busied themselves with last minute details, getting the equipment ready for the big push.

Feeling unwanted there, Hertzberg wandered next door to the empty conference room and sank into one of the cushioned swivel chairs arrayed around the long table. Closing his eyes and relaxing, he fell into a soft darkness. He became aware of tension in his back muscles and massaged them in fantasy, constantly sinking deeper into his self-imposed hypnotic state. For a time he concentrated on nothing and then became aware of somebody nearby. With a feeling of lightness, he zoomed upward and opened his eyes.

Bill Hawke sat there in the next chair, a grin splitting his black-bearded face.

"Where've you been, Russ?" he asked lightly.

"Only inside," Hertzberg replied. "Just getting the brain tuned up and ready for work. The day of reckoning is upon us."

He nodded his head in the direction of the bulletin board where future schedules were to be posted.

Hawke threw a newspaper onto the table, leaned back and stretched.

"You said it, buddy. Look at that headline and weep."

Hertzberg leaned forward and experienced a shock. He read:

COURT NIXES BREEDER REACTOR

The Federal District Court, in the case of *Sierra Club vs Consolidated Utilities*, has overturned the permit of the power company to build a liquid-sodium breeder reactor in New Jersey because of safety considerations. Population density was cited as the main reason for refusal to . . .

Hertzberg looked up and whistled. "Well, now it's really hit the fan. Bully for the Sierra Club, but if we can only build breeders in the middle of the desert—and how are we going to do that without water?—then we get into a real energy distribution problem. And even nonbreeder reactors are in trouble because of the radioactive waste hassle. So the crunch is really on as far as energy is con-

cerned. The dream of uranium fission powering our new world of the future may turn out to be just a fantasy."

Bill Hawke nodded. "That means it's up to us. Either we put up or shut up. We said we were going to get controlled fusion on this machine, so that is it. Either we make it or we don't. And if we don't, well, good-bye tomorrow."

This was really the moment of truth.

Instantly, Hertzberg's mind flashed back to the early days, twenty-five years ago, when he had switched from research in nuclear physics to controlled thermonuclear fusion. He was all starry-eyed and excited by the promise of this new, clean, inexhaustible form of energy. Even then it was beginning to look as if uranium fission was running into trouble because of the radioactive waste problem. And when the environment crowd started to raise hell about it, fusion began to look even better as a source of energy for the future.

Into fusion research he plunged, together with a number of other physicists recruited from various specialties. For naturally, nobody had ever taken courses in thermonuclear fusion in school, and plasma physics was barely heard of in the outside world. A whole new field of science had to be developed, and new fields of science, by definition, are invariably developed by people who never formally studied those subjects.

This meant months of labor to learn the theory of this brand new branch of science—plasma physics—and more months of floundering through experiments with strange and complex machines in order to become expert with the techniques of dealing with the heating and confinement of ionized gases in magnetic fields.

Then had come the years of plodding and frustration, for between the theory of thermonuclear fusion and the actual taming of the process lay a gulf that narrowed ever so slowly and reluctantly, despite the utmost efforts of thousands of scientists all over the world. It was easy enough to say that a self-sustained thermonuclear reaction required the heating of a container of deuterium-tritium mixture to a temperature of 100 million degrees Kelvin together with the confinement of the resulting ionized

gas—the plasma—for a period of about one second in a properly shaped magnetic field. Under those conditions one could predict that the deuterium and tritium nuclei would fuse together copiously enough so that they would give off more energy than was used to get the reaction started. From then on, the reaction would keep going, and there would be a generator of power whose basic fuel—deuterium—could be obtained easily and cheaply from sea water.

Since the fuel was essentially unlimited—and since there was little of the problem concerning intense radioactivity that dogged the fission process—thermonuclear fusion was the answer to the question of what to do when coal and oil ran out. On the success or failure of this project rested the question of whether the twenty-second century would be an era of high-or-low-intensity energy usage.

Those facts were well-known and easy to explain. Theoretically, one could devise a dozen ways to attain the goal. But to do it, that was another story. Heating a plasma was easy. Just send a big enough blast of electric current through a tube of gas at low pressure. Then watch the plasma twist and writhe and vanish from the tube in less than a millionth of a second. In so doing, the physicists learned about hydromagnetic instabilities and found that trying to confine a plasma in a magnetic bottle was something like trying to maintain water in the top half of a container by means of compressed air in the bottom half. The air pressure might be strong enough to keep the water up top, but the water just won't stay up there. It's an unstable situation.

Thus the main effort was directed at devising ways to stabilize the plasma container. Over the years Hertzberg worked with devices whose fanciful names—*stellarator, tokamak, levitron*—represented various attempts to tailor magnetic fields into shapes that provided hydromagnetic stability to the plasma confined within. Year by year the plasma physicists discovered the different types of instabilities and learned how to cope with them, and gradually their ability to maintain higher plasma temperatures for longer periods of time brought them closer to their goal.

One fact remained clear during all this time. The bigger the volume of plasma, the longer it would remain confined and the more time it would have to react. Thus the plasma devices grew larger and larger, until now the third-generation toroidal confinement device lay out there in the machine room, ready to start operation, with the theorists predicting that in this machine the conditions for a self-sustained thermonuclear reaction should be reached.

But—and here the damnable pessimism resulting from twenty years of experience nagged at his brain cells and turned his feet into clay—never did a plasma device work according to theory. Something unexpected always happened because some aspect of the theory had not been understood properly because it was too complicated for anybody to understand properly. And so one never knew what was going to happen the first time one of these machines was turned on.

So Hertzberg could only shrug his shoulders at Bill Hawke's remark: "Either we make it or we don't."

"I'm willing to bet," Hertzberg said, cautiously, "that we almost make it. The machine will almost work, but something will happen to keep it from working all the way. And then nobody will be satisfied, and we will spend years trying to analyze what went wrong and trying to sort out the four or five different instabilities that cause the plasma to run out of the machine."

"Oh come on, Russ. How did you manage to last this long in this business with such a pessimistic attitude? You have to be an optimist to keep going around here. It's going to work. I just feel it. This is going to be the machine that gets fusion off the ground."

Hertzberg grinned at Bill Hawke's enthusiasm. "I hope you're right. I'd like a success before I retire."

Yet he didn't quite believe it was going to happen.

As it turned out, at least another month passed before the moment of truth arrived. First, Ralph Petty had to spend a week checking the alignment of the magnetic field with his little electron gun. The size of a thimble, the electron gun was thrust into the center of the vacuum vessel on the end of a remote drive, and brief mi-

crosecond pulses of electrons were ejected along the magnetic axis so that they went round and round the doughnut. By minute adjustment of the coil positions and by the application of currents to auxiliary coils, the alignment of the magnetic field was touched up until the electron beam went around the torus dozens of times before vanishing into obscurity. A small amount of gas in the vessel made the circling beam visible, and it gave Hertzberg a big kick to see the narrowly focused threads of electrons wind their way around the tube. It really gave him faith in the existence of those little beasts.

Next, the interior of the vacuum vessel had to be cleaned up—rid of impurities and gases adsorbed onto the inner surface of the hollow stainless steel doughnut. This operation was a simple matter of running a discharge—a huge low-pressure electric arc—inside the vacuum vessel. A small amount of hydrogen gas was admitted into the tube, and an electric current of several thousand amps was magnetically induced in the gas itself to flow around the torus. Electrons were separated from atoms, ionizing the gas and creating a plasma, bombarding the wall with electrons, protons, and ultraviolet photons, sputtering off a flood of adsorbed impurities.

For hours and days the continuous bombardment went on, while the color of the plasma changed from the bright bluish violet of nitrogen and oxygen to the palest red of hydrogen, and the intensity of the impurity lines in the spectrometer decreased to a negligible amount.

Now the machine was ready to go.

With some trepidation Hertzberg came to the Wednesday staff meeting, wondering what his position would be on the schedule. One part of his head wanted to be in front of the line, to have the first crack at the big time. Another part said, No, I don't want to be first. Let somebody else take the responsibility of being the first to fall flat on his face. Thus a small portion of relief mingled with disappointment when he saw the lab director Ned Fraser making notations on the blackboard.

"We decided," Fraser explained, "to do the first experiment with neutral injection rather than with RF heating. If the experiment works, that way will be easier and more

economical, and that's the path we're going to take. So Ron Warner goes first, and Hertzberg goes second."

Hertzberg shrugged. "As long as I get on the machine before July first, that's all I care about. One final fling before my retirement date."

But then the feeling of insult overcame the feeling of I-don't-care, and he suddenly realized how glad he was going to be to retire and get out of there. He was completely fed up with playing second fiddle to fair-haired boys like Ron Warner, who was going to get first shot on the machine simply because he tooted his own horn loudest and so was more noticed and as a result was put into position to get the credit for the first big breakthrough on the big new machine.

But as he watched Ron Warner get the neutral-injection equipment ready during the next few days, Hertzberg realized he was being unfair. Warner was good; that's all there was to it. Young and energetic, intense and outspoken, popping off ideas in all directions—he had that rare ability to do theoretical calculations of a fairly sophisticated nature, then to turn around and do the experiments based on the theory. It may be that he batted only .500 accurate on his ideas and theories, but—what the hell? That's the way you do scientific research. Generate theories as fast as you can, test them with experiments and throw away the ideas that don't work. Warner's primary fault was that sometimes he fell in love with his own theories and held on to them a little too long, thus generating heated arguments with those who disagreed.

But perhaps that was better than the caution with which Hertzberg proceeded, with the result that very few original ideas emanated from him. Those ideas he did have were presented with such diffidence that very little attention was paid to them. And when, occasionally, he came up with a really important experimental result, it slid past the consciousness of his colleagues, hardly noticed at all.

Just a sophisticated technician, that's what he felt himself to be. An old workhorse knowledgeable in pushing buttons, collecting data, programing the computer to an-

alyze the data and trying to fit the data to one or another of the theories that had been generated in the minds of the theoretical physicists who inhabited the other end of the building. That was, of course, a useful occupation, since the theories were so complex that nobody could guess which one correctly represented the real world unless people like Hertzberg slogged through the long, tedious experiments, gathering data, plotting curves and applying ingenious devices to help compare the experimental results with the theoretical predictions.

Hertzberg sat in the control room with the rest of the staff as Warner began his first machine run. Maybe another reason for being grateful. Who could do research with everybody looking over his shoulder? Warner could. He gloried in it. Leaning back in his swivel chair, he smoothly dictated the starting conditions to the head technician, who in turn adjusted the knobs and threw the switches that sent the operating sequences on their way.

The control room was long and narrow, running the full width of the machine room. Along one wall was the large window through which the observers could see the TD-3, squatting there like an enormous metallic insect. In front of the window was the control console, with switches and dials to regulate the operation of the many parts of the system. Flanking the control console were the observation posts, consoles with oscilloscopes and other instrument readouts, together with the remote controls for the operation of the numerous diagnostic instruments surrounding the machine. Many of the scopes had Polaroid cameras for capturing photographs of the signals received during the machine operation. The rear wall of the room consisted of a computer installation for automatic storage and manipulation of the experimental data. Often the raw electrical signs required considerable mathematical processing before the resulting numbers had meaning to the experimenters. Graph plotters allowed the computer to display the end results of these calculations automatically.

As Hertzberg looked around the control room, he wondered idly how many people in the room really wished Warner well and how many hoped for a minor catastro-

phe—just enough to slow Warner down a little. For there were at least three groups of people there, each with a stake in a different method of attaining thermonuclear fusion in this particular device. While there was a clear-cut end goal—a temperature of 100 million degrees, a density of 10^{15} ions per cubic centimeter, and a confinement time of one second—there were numerous and devious paths to that end.

The most direct—which was Hertzberg's—was to produce and heat the plasma right inside the confining magnetic field. A more devious method—Warner's—involved injecting high-energy deuterium nuclei into the magnetic field from the outside and then trapping them so that they formed a hot, confined plasma.

Since the injection of ionized atoms into a magnetic field involved serious difficulties, a roundabout method had been devised. In an ion source outside the magnet, electrons were stripped from deuterium atoms, and the resulting ions were accelerated to high velocity by electric fields. They were then passed through a chamber filled with gas where they captured orbital electrons from the atoms of that gas—a process known as "charge exchange." The result was a mass of fast, neutral deuterium atoms passing down a tube without hindrance through the magnetic field of the TD-3 into its toroidal vacuum chamber. There it encountered a low-temperature plasma produced by passing electric current around the torus. Again charge exchange took place. The high-energy atoms were stripped of orbital electrons and became high-energy ions. Now they were trapped within the magnetic field, and in this way the desired high-temperature plasma was formed.

That, at least, was the theory. The method had been tried on smaller devices and was now about to make its debut on the giant TD-3. Ron Warner, leaning lazily back in his chair, kept an eagle eye on the meters and digital readouts that signaled the important machine conditions. Axial current flowed smoothly—just enough to keep the deuterium ionized and to form the magnetic lines of force into the requisite corkscrew shape.

Warner flicked the switch that lit the filament in his

ion source. While the others in the room leaned forward and conversations dropped to silence, Warner seemed to grow even more nonchalant. He was the maestro and he knew he was onstage. His deft fingers set the switches that started the discharge in the ion source.

All eyes shifted to a large oscilloscope screen where the output of a diamagnetic loop was displayed. The loop was nothing but a coil of wire wrapped around the vacuum vessel, sensitive to the changing magnetic fields inside it. Heating or cooling the plasma produced small variations in the magnetic field, inducing tiny voltages in the coil. By processing the signal in a small analog computer, the output picture could show directly the plasma temperature. Hertzberg was rather proud of this simple device, for he had worked out the technique twenty years ago. It was his little part of the machine.

Now the screen showed that the injection of ions into the plasma produced a small increase in temperature. Something was beginning to happen.

"Well, folks, don't break out the bottle of champagne yet," Warner drawled. "We still have a way to go. Gotta tune up the ion source a little better. Just relax for a while."

Hertzberg nervously joined a little group at the coffee pot in the corner. When he returned to the screen, the signal had grown somewhat bigger. Every time the ion source pulsed, the green line would slope upwards, reach a maximum and then trail off as the pulse ended. As Warner skillfully turned the controls, homing in on a region of optimum operation, the pulse height began to zoom upwards to a value representing a temperature of one thousand electron-volts—about ten million degrees.

The temperature within the control room appeared to rise, also, as a result of the breath-holding going on. Suddenly Warner leaned forward to inspect the oscilloscope screen more closely.

"Damn!" he exclaimed. "It's saturating."

The temperature was no longer increasing, but was rising to a maximum value, leveling off and then dropping rapidly. Close inspection showed the top of the curve to be broken by a number of wiggles and oscillations.

Then, abruptly, there was no signal at all on the scope, and a pair of red lights appeared on one of the wall panels.

Warner leaped out of his seat, his cool evaporating. "The rotten son-of-a-bitch," he grated. "The ion source is gone. Shut down the machine."

He raged around the control room, beating on the tables, walls and consoles with his fists while the switches were thrown and the door to the machine room unlocked.

"Damn it," he complained to the others who crowded around. "Something was just beginning to happen. I think we hit an instability and the plasma started running out too fast so that it stopped heating. Then the ion source conked out, so we lost everything. We'll have to see what's wrong."

He tore out onto the machine floor and began poking at the injection apparatus with an ohmmeter, muttering to himself. Presently he came back, dejected.

"We'll have to open up. The filament is shot, but I think there's also been some arcing from the high-voltage electrodes. I don't know how much time it'll take to fix it."

"Take whatever time you need," Ned Fraser told him. "This is a high-priority operation."

And he turned to the others, saying, "You might as well go home for the night and keep the champagne on ice. It might be a few days before we operate again."

There were sighs and condolences, but since it was getting late and nobody could think of a good reason to hang around, they quickly dispersed.

"What a frustrating business!" Hertzberg remarked to Bill Hawke as they walked out of the building. "That instability is a mystery. It showed up just on the last few pulses. A high-temperature effect, maybe? But just before we get a chance to study it, the machine blows up."

"Yup. It's frustrating," Hawke agreed. "But what about you? I thought you were scheduled for the next run on the machine. Are they going to cut into your time?"

Hertzberg stopped. He hesitated. He blushed. Once

more he had avoided recognizing when he was being screwed. "You're right, of course," he said.

He looked at Bill Hawke, and the two locked eyes. He knew and Bill knew that the machine was supposed to run on the schedule that was posted in the conference room. Each experimental group had two days to run the machine and ten days to analyze data in between runs. If someone had a breakdown that could not be fixed during his time, then he was out of luck. One waited for the regular maintenance days. But no one could use somebody else's time to fix up his own experiment.

"I'll talk to Fraser tomorrow morning," Hertzberg promised.

He had to. Because he just could not afford to give time away any longer. As a result, he knew that he had nothing to lose when he stood in Fraser's office the next day.

"Look," he said. "I know you're backing Warner's experiment, and you're giving it first priority. But I've a right to my time on the schedule according to our regular procedure. You know I'm due to retire in July, and I can't afford to give my time away."

The urgency vibrating in his voice suggested much more than the bare words. Not only had the July deadline staring remotely down time's corridor become important, but each moment, each quantum of life, had suddenly become infinitely precious, as though it might be the last.

Fraser, tall and thin behind his desk, blinked in amazement and embarrassment. Not being used to the spectacle of Hertzberg standing straight in front of his desk and demanding his rights, Fraser had casually and thoughtlessly proceeded to walk right over Hertzberg's rights. He knew it, and he knew Hertzberg was right.

"Why sure, Russ. If that's the way you feel. We do have to go by the schedule, don't we?"

And that was all there was to it. Hertzberg, his breath taken away by the victory, now had to look forward to the big test—the experimental run coming up in two days. The repairs on the injector were still not complete in that time, and a disgruntled Warner carried his armful

of notebooks out of the control room to make room for Hertzberg's group.

It was Hertzberg's turn to remember the old saying: "Beware of the day when you finally attain your heart's desire." Now, after insisting on his rights, the burden was firmly and squarely on his shoulder to do something.

Realistically, however, the responsibility was not entirely his. Entering the control room with him were his two partners. The Russian, Denis Ivanovich, youngish and intense. The Israeli, Zalman Avivi, stocky, fiercely moustached and wildly energetic. Each was responsible for operating certain units of the instrumentation, and all three combined wits to plot the strategy of the experimentation.

The first few hours of the morning were spent checking out the instruments while the machine was rapid-pulsed to clean up the vacuum system a bit more. Following lunch, Hertzberg called in the engineers to stand by while the ohmic heating system was brought up to full power. Ohmic heating was the brute-force method of inducing an enormous electric current to flow around the doughnut-shaped plasma, ionizing the gas and accelerating the electrons to a moderately high temperature—one million degrees—leaving the ions at a somewhat lower temperature.

Since the aim of the game was to make the ions hot, this method of preparing a plasma was useful only as a preliminary device—just to get things started. The real problem was devising a way to energize the ions to a higher temperature. A dozen methods had been invented over the years. Some turned out to be inefficient. Others were not useful in a toroidal device. Some, like the neutral injection, were still in the running.

Hertzberg's pet method—radio-frequency heating—had proven powerful in the past, but the plasma never stayed confined in the magnetic field for a long enough time to reach maximum temperature. Therefore the first order of business was to check the confinement time, which was done simply by pulsing the ohmic heating to bring the plasma up to maximum density quickly, shutting off the

current, and then watching the decay of the plasma density after the pulse.

To measure the plasma density, the laser-scattering equipment was used. Light from a high-intensity laser was reflected from the electrons in the plasma. The amount of scattered light indicated the number of electrons along the path of the light beam, while an on-line computer interpreted the results instantly and displayed them on an oscilloscope screen.

Every thirty seconds they heard the ding of the countdown bell and the click of relays as the machine went into its pulse. Simultaneously, the traces flashed across the faces of the many scopes ranged along the control panel. Hertzberg recalled how fast the sweep speeds had been when he first came into the project. In those days each pulse of the machine constituted an experiment that lasted less than a thousandth of a second from beginning to end. Of course, since he had come into the plasma business from nuclear physics, a thousandth of a second had seemed to him like a tremendously long time. At that time he was accustomed to measuring events that took place in less than a millionth of a second!

Since then, the progress of thermonuclear fusion could be measured in the way the sweeps of the oscilloscopes grew progressively slower and slower—as the confinement time of the plasma grew longer and longer. So now it took a hundred milliseconds—a tenth of a second—for the electron beam to go from one side of the screen to the other. That was slow enough to see it move with the naked eye. Before the present set of experiments was finished, Hertzberg aimed to turn the sweep-speed knob on the scope another notch.

Looking at the density scope, he saw the plasma easily going up to 10^{15} electrons per cubic centimeter and then decaying after the pulse, with a lifetime that was automatically computed and written out on the face of the scope: twenty-three milliseconds.

Not bad for a start, Hertzberg thought. On the last-generation machine he would have had to work hard for that result.

"Okay," he said, "let's take the confining field up to maximum, in steps of one kilogauss."

A certain amount of routine surveying had to be done to determine how the machine operated under various conditions of currents and magnetic fields. If he wanted to make a really thorough survey over all the parameters available, it literally would take weeks of continuous running. For there was not only the confining field as a variable, but a number of auxiliary fields that changed the pitch of the field corkscrew, so that there were regions of stability and instability that could be—and should be—mapped out in order to really understand how the machine behaved.

The thought of that tedium brought a feeling of revulsion, and he thought to himself, This is not physics. This is just studying the behavior of one particular machine. I'm a machine psychiatrist, that's what I am.

"Hey buddy," Zalman boomed. "Let's give the RF a try. Enough of this monotony."

"As soon as we finish this confining field survey. You young people must learn patience."

Hertzberg loved to put on the act of the old patriarch, something he knew and they knew was completely fraudulent.

Denis Ivanovich fingered the keys of a computer terminal and announced, "The confinement time does increase with the magnetic field, but not directly. The function is a complicated one."

Hertzberg nodded. "That's what I would expect. So far things are going smoothly."

And peace was in his heart. He had under his control the largest confined plasma in the world—fifty cubic meters of ionized gas held in the torus by the magnetic field, heated to a temperature of one million degrees Kelvin by a fifty-megawatt pulse of power lasting forty milliseconds. Yet this was only the beginning. The next sequence of steps had to raise the plasma temperature to a peak one hundred times greater.

"Okay," he said. "Let's warm up the RF generators and get ready to tickle the plasma a little bit."

Heating a plasma by shooting high-power radio waves

into the ionized gas was nothing new. Twenty years ago he had helped with some of the early experiments in ion-cyclotron resonance heating. In these experiments, induction coils surrounding the plasma had generated electromagnetic fields within the plasma that acted in rhythm with the natural frequency of the ions whipping around in the magnetic field, accelerating them in the manner of a cyclotron. While a highly efficient way of accelerating ions, this method could only be used with plasmas of lower density and was not suitable for the high-density plasma in the machine now.

However, there were many types of waves that could be launched into a plasma cylinder, and a number of frequencies that provided resonances which allowed strong transfer of energy from the transmitting antenna to the ions and electrons in the plasma. The main problem was strictly an engineering one of concentrating enough electromagnetic energy into the small volume of the transmission lines and coupling devices. Extremely high voltages had to be encountered and overcome.

As the technicians flipped the proper sequence of switches and the pilot lights changed from red to green, the tension in Hertzberg's back began to increase. He leaned back in his chair, forced himself to relax. Zalman appeared with a cup of coffee in each hand.

"Thanks," Hertzberg breathed, gratefully.

Releasing a deep breath, he pushed the button starting the flow of radio-frequency power into the coupling structure—a sort of antenna designed to project power *inward* into the plasma rather than outward into space. Only a few watts went down the transmission line.

Hertzberg sipped at his coffee and said to the others, "Better relax for a few hours. First I have to tune the coupler and then search for the plasma resonance. Then retune again. It's going to be a dull afternoon."

The others groaned. Denis returned to the computer terminal and buried himself in his calculations. Zalman sat at the control console, rocked back and forth, singing to himself, as though by force of will he could induce the temperature of the plasma to increase.

Hertzberg turned control knobs until his arms ached,

cursing the inability of the engineers to put all the knobs within easy reach. But after all, his set of knobs was only one out of many. Gradually he began to zero in on the optimum coupling condition. Until the frown that creased his forehead began to deepen and puzzlement pulled down the corners of his mouth.

"Hey Bruce," he called over to the head technician. "Would you go out on the platform and check tuning control number three? I don't think it's doing anything."

Hiatus. The TD-3 stopped pulsing, the door to the machine room was unlocked, Bruce Kelly went out and located the tuning control, then watched to see what happened as Hertzberg turned the knob. Nothing.

"The shaft doesn't turn," Kelly called back on the intercom. "I'll have to check further to see if the trouble is with the selsyn motor or with a slipping shaft. It'll take a little while."

"Okay," Hertzberg sighed. The delay only served to increase the rate at which the initial spurt of driving energy was seeping out of his body. He said to the others, "I guess we might as well break for dinner. Come back in two hours and see if we can get back on the air tonight. We still have till midnight."

The long hours stretched onward into the evening. When the pulsing of the machine resumed, Hertzberg tuned the coupler with a precise hand until almost all the electromagnetic waves went into the plasma and very few were reflected out. Then, varying the magnetic field strength in tiny steps, he searched for the precise combination of field strength and plasma density that provided the energy absorption resonance he needed to heat the plasma.

Slowly, as he converged on the proper condition, the oscilloscope trace that signaled the plasma temperature began to show an abrupt rise at the instant the RF power was applied during each pulse. Zalman leaned forward, and his singing took on a more intense character.

"Tune in there, baby," he crooned. "Hey, Russell, how about a little more power. Give us some action."

Hertzberg shook his head. "Tune first. Then power.

Don't want to get high voltage in the transmission lines. But we're close. Just a couple more minutes."

At this point the RF power going into the plasma was several kilowatts, just enough to warm the ions gently.

"Okay," he said presently. "Here we go."

With his hand shaking just the tiniest bit, Hertzberg approached the knob that controlled the output power of the RF generator—essentially a super-high-power radio transmitter. A small turn of the knob and immediately he could see changes in all the outputs. The power indicator read one megawatt, and the temperature signal made a distinct climb during the forty-millisecond time of the pulse.

"Oh baby, come on baby," Zalman crooned in his ear. The Russian had left his console and was now breathing down his neck.

Another turn of the knob. Power up to fifty megawatts. Ion temperature was up to 500 electron-volts—equivalent to five million degrees. That had been the all-time record on the old stellarator, and now they had equaled that record in one afternoon. The big difference was that to heat this enormous volume of high-density plasma, a vastly greater quantity of power was required.

Up to 100 megawatts. The ion temperature signal from the diamagnetic loop leaped upward gratifyingly. Onward to 200 megawatts, and the plasma temperature reached well over 1000 electron-volts. Hertzberg became aware of a buzzing sound and a red light flashing atop the control panel, while the illuminated numbers of a scaler began flashing with increasing rapidity.

A grin split his face from side to side. "Hey, we're making neutrons! That's a sign of progress."

Zalman's song became a prayer of thanks. But Denis remained dour.

"You know making neutrons is nothing new. You made them twenty years ago."

"To be sure. And just because the temperature is high enough to get some of the deuterons to fuse, it doesn't mean we have a self-sustained reaction. But when we made neutrons before it was in a localized region of the machine—a hot spot. Now we have the entire torus hot

enough. That's something. Let's try another notch on the power."

Hertzberg twisted the knob another fraction of a turn. Again the temperature went up, but, he noticed, not very much. His eyes rapidly scanned from one scope to another. Abruptly he glared at the density signal.

"Uh-oh." His finger darted out and pointed to a sudden dip in plasma density that appeared during the application of RF power. "We're losing plasma. Density is going down and heating is running out."

Zalman broke into a song of lamentation, while Denis nodded, his lips pinched tightly together.

"I think," he said, "that we have run into a region of instability, so that we're losing energy as fast as we are putting it in. Look, the confinement time is way down."

Hertzberg glanced at the clock. It was past 11:00 PM, and the weariness in his shoulders coupled with the growing pain in his back made the beginning of a cry poke its head up from some dark depth down below. But he pushed it under. No crying in the control room. Don't freak out in front of the technicians. Be calm and in control. After all, it's a control room. For both man and machine.

"Okay," he said. "That's the way it goes. That plasma will do it every time. I go into an experiment with a scenario nicely plotted. I know what I am going to do, and I imagine what the machine and the plasma are going to do in response. But the plasma has a way of its own, and it pays no attention to what I had planned for it."

Hertzberg winked at Zalman. "That's the colossal joke that nature plays on all of us. We go around deluding ourselves that we control nature by means of our machinery. In actuality, all we can do is to arrange things so that when they do what they *must* do according to their nature, then the resulting actions will agree with our expectations and desires. But we can't make any thing do anything that it doesn't have to do. A stone doesn't have to fall up, so you can't make it fall up. A plasma doesn't have to be stable with our screwy magnetic field, so it's not stable. What can we do?"

He slumped in discouragement. Zalman put a hand on

his shoulder. "The first thing we can do is get some sleep. Then in the morning, worry about what to do."

Denis said, "Surely we can trace down a region that is more stable."

"Okay, we'll do both those things," Hertzberg said, and plodded off to home.

To awaken the next morning, muscles screaming in stiffness, was an act of torture.

"I'm too old for this," he agonized, bitterly wishing he had never gone into a laboratory. Then, stubbornly gritting his teeth, he crawled out of bed and into the shower.

By the time he arrived at the lab, the technicians had the TD-3 pulse-cleaning, and the computer readouts of last night's accumulated data were piled on the worktables. He sat staring into a cup of coffee while Zalman and Denis wandered in.

Denis started right out. "We need more ohmic heating current to give more rotational transform. That will put us into a region of greater stability."

Hertzberg shook his head in violent disagreement. "Nope, that will only give us greater turbulence and make things worse than ever."

The two went back and forth for a period of time. Anybody who thought that science was based on hard, cold facts was simply not acquainted with this kind of situation, where the variables were so numerous and the theoretical knowledge so complex that you could make arguments to prove any point you wanted, depending on what approximations you chose to make and what variables you chose to omit.

Finally Hertzberg said, "Look, sometimes experience is better than all the theoretical arguments. Let me try something that once worked for me a long time ago in a different context. If it doesn't work now, then you can try out your idea. What do you have to lose? You have plenty of time."

Hertzberg set the controls so that the ohmic heating current ran at top level for only a millisecond and then was reduced to a trickle for the remainder of the fifty-millisecond pulse—just enough to keep the electrons warmed up. Auxiliary coils were activated to increase the stability

of the plasma. Hertzberg worked with notebook and computer to calculate the precise amount of current needed in all the coils. The RF power was turned on, tuning checked and gradually increased in magnitude. As during last night's run, the plasma temperature smoothly increased until the neutron monitor started clicking away. At 400 megawatts input, the temperature was still rising. Two kilo-electron-volts! Twenty million degrees! The neutron counter clicked at a furious rate.

Hertzberg could feel a chill run up and down his spine. His bearded face was split with a grin so wide he felt the top of his head expanding. Sitting cross-legged in his chair, he looked like a triumphant gnome. He had not yet reached self-sustained fusion, but the ion temperature and density were approaching the magic conditions.

Heart pounding, he turned the power up to 500 megawatts. Still the temperature rose. Take it up to 1000 megawatts and then call up Ned Fraser. Blow your horn, he advised himself gleefully.

He turned to Denis, who was busy plotting a graph. "Is the temperature still going up linearly?" he asked.

Denis frowned. "I'm not sure. The last two points are a little low. Give me some more data."

Six—seven—eight hundred megawatts. Brief pulses of concentrated energy directed into the heart of the trapped plasma. Each time Denis read the maximum temperature and added another point to his graph.

Then, sadly, he took a straightedge and drew a line through the first few points. The last three points fell far below, and a pencil line drawn through those points showed in actuality a curve that flattened off instead of rising steadily upward.

"Hell. It's saturating." Hertzberg's eyes clouded with disappointment. No matter how much power they poured into the plasma, the temperature was not going to rise any further. Something was stealing energy out of the cloud of ionized gas as fast as they poured it in.

With his hands pressed together under his chin, his body slumped deeply into the chair, his eyelids narrowed to a slit, Hertzberg thought and worried and tried to visu-

alize what was happening inside the machine. Whatever he thought at this point, it could only be guesswork.

Finally he said, "I imagined a long time ago that charge exchange might be a serious loss mechanism. A small percentage of neutral gas comes into the machine from wall sputtering—the neutral atoms exchange electrons with the energetic ions. The result is energetic neutral atoms leaving the plasma, leaving cold ions behind. And stealing away all that energy."

"You could check that theory," Zalman said, "by using the neutral atom spectrometer."

"That's the next thing to do," Hertzberg sighed, as he got up and directed the technicians to cease pulsing. It had been close. Very close indeed.

But that was the way things went in the fusion business. The expected never happened. Fantastic breakthroughs occurred only in the fevered brains of science-fiction writers, for the real world of research consisted of patient slugging, gradual enlightenment and step-by-step resolution.

After checking his theory concerning charge exchange, Hertzberg found his two-day run on the machine over. He crawled back to his apartment one solid ache of fatigue. One large vodka on ice sent a relaxing wave through his body.

"Oh man," he gasped, sprawling on the couch. "I just can't take that routine anymore."

It was not just the running till midnight, the getting up early next day—but rather the constant tension at the control panel, trying for the right decisions, coping with the unexpected.

He was determined to take the next day off, but the afternoon found him back in his office, scanning the data, plotting graphs, mapping strategy. Somehow the world seemed a little brighter.

"Look," he said to Zalman, "I can get two more runs in before July. Then you can ship me off to the old folks' home. But until then I'm going to hang in."

"What about the charge exchange?" Denis Ivanovich demanded, practical as usual.

For a moment Hertzberg looked pensive, then replied,

"The answer to that question is the most basic of all. Improve the confinement of the plasma and you have fewer ions hitting the wall and knocking out junk to give you trouble. So on our next run we go for broke. One second confinement time."

"Oh."

Zalman and Denis appeared stunned. One second—one thousand milliseconds. A plasma confined in the magnetic field one thousand times longer than the plasmas commonplace at the beginning of the project.

Denis recovered. "Assuming, of course, that Warner does not do it first."

Hertzberg looked at him. "I don't see," he said, "why that should stop us."

He enjoyed the momentary feeling of heady arrogance that passed through him.

It turned out that Warner did not do it. But he came close again. Everything worked—almost perfectly, but not quite. And again it was Hertzberg's turn.

He slowly walked into the control room on the morning of the run, pulling fretfully on his beard. His back pained him in spite of his efforts to stop worrying. In his arms were charts of magnetic fields and regions of plasma stability on computer printouts. They were to be his weapons in the battle coming up.

He settled in his swivel chair with the first of many cups of coffee. Ned Fraser walked by and said, "Hey, I hear you're going for broke today."

Hertzberg put his finger to his lips. "Shh. Don't let the machine know. It'll fight." But he was glad the director had noticed.

Denis and Zalman came in and found their seats. Zalman's song was unusually subdued, only a mournful hum floating through the quiet control room.

Finally Hertzberg activated himself. "Okay," he said to the technician in charge. "Set her up for rapid pulsing. We're going to do a little spectroscopy first, because I want the machine as clean as a whistle."

An hour was spent with the optical spectroscopes, scanning some of the well-known oxygen and hydrogen lines until Hertzberg was satisfied that the impurity level

was in fact better than the previous week. Then, with an unconscious hunching of his shoulders, he switched to slow pulsing and began to search for the magnetic configuration that led to long plasma confinement.

Slowly and patiently he crept through the contours of parameter space, varying first one magnetic field and then another, always keeping his eye on the oscilloscope that read out the plasma density. It was the rate at which the density decayed after the heating power was shut off that gave the clue to the confinement time.

With a wide grin fixed on his face, Hertzberg watched as the curve took longer and longer to come down. Finally, with a triumphant bellow, he leaned over and twisted a knob of the oscilloscope one position clockwise.

"A tenth of a second per centimeter," he exulted. "Just look at her go!"

The trace on the oscilloscope face was no longer a line, but it was a tiny spot of light that slowly moved from left to right, taking one entire second of time to go from one end of the screen to the other. Oh glorious slowness!

But on the next machine pulse the trace never rose above the baseline.

Hertzberg climbed out of his seat in consternation. "What the hell's wrong?"

Denis frowned, his eyes darting back and forth among the other scopes.

"The machine's working all right. Current and voltage traces are normal. Better check the laser."

Hertzberg fussed and fumed and went out on the platform to breathe down the neck of the laser technician, who finally determined that a vital power supply in the laser-scattering system had acquired a short circuit and had given up the ghost. By the time the components were replaced, it was well into the afternoon. Savagely he went back to pulsing the machine, regaining the previous conditions and moving forward.

Came time to activate the radio-frequency power. Bruce Kelly pushed the appropriate buttons, and nothing happened.

"Oh, no! What now?" Hertzberg demanded.

Zalman Avivi, head between his knees, hummed a dirge of mourning.

Kelly did nothing but mumble to himself, staring off into the distance, while poking at one of the buttons uselessly. Finally he sighed.

"Guess we'll have to check out the relays and interlocks."

An enormous chart was spread out on the table; Kelly counted off all the interlocks that had to be fastened tight before anything would operate. Hertzberg scratched his head in bafflement at the complex circuit diagram. Finally Kelly walked off into the RF transmitter room, Hertzberg, Avivi and Ivanovich trailing behind. The RF room, a vast bay filled with cabinets of electronics, stretched for many yards in all directions. For several minutes Kelly walked among the cabinets, opening doors and slamming them shut, checking with the control room through the intercom until he got the word that a red pilot light had changed to green.

"Damn sticky switches," he grumbled. "We'll have to change that one next maintenance period."

By that time the crew was grumbling because it was past dinner time.

"What next?" Hertzberg asked himself when they returned, having barely eaten, his mood sinking lower and lower.

Next on the program was a stuck and shredded IBM card in the data-acquisition system.

"Good God!" he screamed. "I'm being nibbled to death by trivial accidents. All I need is one goddamn second of good plasma on the machine. One sixtieth of a minute. Is that too much to ask? Why does anyone in his right mind ever get into this business in the first place?"

He crawled home in real pain, his back muscles in spasm. Aspirins, a drink and a session of autohypnosis managed to sink him into slumber.

In the morning he sat and stared glumly at the machine. It was not his friend anymore.

"Well?" Zalman boomed, sitting down next to him. "Ready for another struggle?"

Hertzberg lifted an eyebrow at him. "You can have all

the struggles after today. I'm going to wrap it up. Just too old for this routine."

"Oh, come on," Zalman said. "Give it one more try. Just relax. I'll get the machine started."

Hertzberg was grateful. There was a day when he had that kind of resiliency.

The magnetic field was started up, as was the pre-ionizer and the ohmic heating. The instrumentation was checked out. Returning to the conditions they had left the day before, they found the confinement time still gratifyingly approaching the magic period of one second.

The RF came on, and its power was applied to the plasma in increasing doses. Hertzberg suddenly found himself sitting erect in his chair, feeling as if an invisible cord lifted his head vertically, an electric shock passing down his spinal cord. An incredulous stare alternated with an intoxicated grin as he saw what the plasma temperature was doing.

With the longer confinement time, less power was required to reach a given temperature. With only ten megawatts going in, the temperature was already up to ten million degrees. As he increased the power, the neutron counters buzzed merrily away and the signal showing the temperature kept climbing. In the control room there was an increasing flurry of sound, and gradually, as he looked out of the corner of his eyes between pulses, he saw that the room was filling with staff members. The word had gotten around that a record was being broken that morning. Soon Ned Fraser arrived.

With a start Hertzberg noticed that Fraser was followed by Matt Brackett, the thin and elegant white-haired old man who was the grandaddy of fusion research, having designed the first toroidal device built at the lab many years ago. He smiled and waved, and then his right hand turned the knob that raised the RF power to 100 megawatts.

"Let's take this next one," he said, in a businesslike tone of voice. Zalman and Denis swung their cameras into position, and as the machine pulsed they caught the indelible images of the oscilloscope traces spelling out: plasma density, 10^{15} electrons per cubic centimeter; ion

temperature 950 electron-volts—or about ninety-five million degrees Kelvin; confinement time, 0.98 seconds.

Hertzberg swung around in his chair. His white hair and beard stood out so that from a distance he appeared to be a happy grin surrounded by a luminescent halo.

"Welcome to fusion land," he croaked.

The audience cheered, laughed and applauded. Bill Hawke came over and squeezed Hertzberg's shoulders. Then the machine sounded a warning that the next pulse was coming up, and Hertzberg turned back to the control panel.

"In honor of ecology and of our electric bill," he said, "let's not waste power. We're still working."

The next pulse verified the results of the last, and it was with a light heart that Russell Hertzberg faced the future. At this point he really didn't care what the machine did. He had finished his job.

POSTSCRIPT: Were it not for two prophetic items, this piece would be historical fiction rather than science fiction. Except for those two details, every major scientific event in this story has actually taken place. What makes this story science fiction? Simply the fact that Toroidal Device Number 3 has not —as yet—been built, so that the high temperatures and confinement times needed for thermonuclear fusion have not yet been reached. Otherwise, this story is based—rather loosely—on events that have happened. And some of them happened to me.

—M.A.R.

A Miracle of Small Fishes

Alan Dean Foster

These days the old purse seiner had the long dock pretty much to itself. Few fishing boats were left in San Quintin, and only one went out with any regularity. But Grandfather Flores was fortunate. The dock was kept in good repair for the powerful cruisers and sailing yachts of the rich men from Mexico City and Acapulco, and for the wealthy Norteamericanos who made San Quintin a quaint overnight stop on their journeys.

He waved to Josefa, then vanished into the little cabin below the bridge. Moments later he reappeared and tossed the line over the side. He could still vault the ship's rail, and did. But the vault was lower than it had once been, the hand on the rail taking more care in its grip. And he did not bend as easily as before when he stooped to make fast the line to the rusty red cleat.

Grandfather had a long brown face, with smooth lines in it like the crinkled sand dunes in the Desert Vizcaino to the south. His hair was nearly all gone gray now, and when he smiled his teeth flashed many colors besides white. But the light in the back of his eyes still winked as regularly as the old buoy marking the bay entrance. And although Josefa was no longer a baby, but a fine slim girl of nine, the powerful muscles under the stained shirt could still lift her a thousand meters high for a friendly shake, bring her close for a warm kiss redolent of garlic and onions.

Josefa preferred Grandfather's breath to the new-linen smell of roses in the church garden. He did not take her hand as they walked into town—that would have been

unseemly. But he slowed his pace carefully so that she would not have to run to keep up.

Grandfather's body was cold steel—until he coughed. Then the sun dimmed a little and the shadows of the houses moved closer.

"How was the fishing today, Grandfather?" She knew the answer, but any break in this ritual would have worried him.

"Not too bad, *querida*. A few yellowtail, some bonita, one good shark—"

"And the sardines, Grandfather?"

He shook his head and smiled sadly. "No, *querida*, the sardines did not come this week. Perhaps it is too early in the season for them."

He coughed then, a long dry rasp like burning eucalyptus. To Josefa that was more horrible than any scream. She gave no sign of this, but waited until it was finished and Grandfather had resumed the walk.

No, it was too early in the season for the sardine. It had been too early in the season since before the second great war of the nations. Then San Quintin and the other villages along the coast had supported many fishing boats. The men had gone out every morning in season and returned with fine, smelly catches, for the beautiful and delicious California sardine had spawned from Mexico to Alaska.

But there had been too much fishing, especially by the Norteamericanos of Monterey and San Francisco. Were not the schools of sardine never-ending, like the buffalo and passenger pigeon? Then suddenly there were no sardines. The long purse seines brought up only free swimmers and last survivors. And not all the demands of the markets or the raise in prices could entice the sardine back. For many, many years after that there were none at all.

Now there were more sardines than ever before. But not for Grandfather's net. The great fishing fleets of Alta and Baja California trapped them all past the Bahia de Todos Santos, far to the north.

Josefa had never seen the great fleets. But the young men of the village, sons of fishermen's sons, went every

year to work on them. Grandfather's little *Hermosa* would be only a lifeboat for such ships, and not a very big one at that.

Grandfather could have gone too. At least, he could have gone a few years ago, before the cough had come to weaken him so much. But he would not go like the others.

"That is not fishing," he told them, wagging a knobby finger at those who would listen. "That is manufacturing." And he would tell Josefa to see the difference between the bread her mother baked in the little brick oven at home and the pale white things Diego's store kept on its shelves for the tourist boats. She did not understand, really, but since Grandfather said it was so, there must be some truth in it.

"Perhaps the sardines will come next week, Grandfather."

"Perhaps," he replied, nodding down at her.

Another attack of the cough came, and this time it bent him over and he had to put a hand against a wall for support. Josefa wanted to scream. Instead she looked away to where a dog was sniffing at a mousehole. Grandfather stopped coughing, forced a grin at her.

"That was a bad one. But I know how to handle it. You must roll with the cough, the way the *Hermosa* rolls with the big seas in a storm. Now I think it is time for you to go home, *querida*."

"I would rather go with you, Grandfather, and make the tea for you."

"No." He bent to kiss her in the parting of the night-black hair that fell to her waist. "Your mother and father would not like it. Go home now, and maybe I will see you tomorrow. I will have some splices to make in the net and you can help."

He turned and walked away from her, a tall, proud silhouette against the evening sunset. But he was only a shell. Josefa could remember, just two years ago, when Grandmother had left them. That had weakened Grandfather more than the cough. Soon the seas would grow too high for him to roll with. Then he would join Grandmother in the little family plot behind the church.

She ran home, but she did that often, these days.

Thousands of kilometers to the north, past huge smoking cities and lime-colored cliffs, past thousand-year-old trees and day-old babies, a billion young sardines swam idly in a cool deep sound and waited without awareness of their impending destiny.

Father Peralta permitted himself a quiet, inward smile of satisfaction. It had been a good mass and a fine sermon. Now he would listen to the simple confessions of his simple people, and then maybe he could get some work done with the new books that had been sent by the university.

He settled himself comfortably in the box. There had been a big celebration in the village two nights ago—a wedding—and a small fight had broken out. Nothing serious, but unusual for San Quintin. This day would be longer than most.

The voices he knew. Martin, Benjamin, Marceal, Carmen, little Josefa Flores . . .

"Father, Maria Partida got a new dress last week. I envied her for it."

"Perhaps you just admired it, *niña*."

"No, Father. I desired it, badly."

Father Peralta thought. The Flores were not as well off as some of the other villagers.

"This is a small thing, *niña*, that will pass quickly. Do not worry on it."

There was a pause from the other side. A long pause.

"What is it, child?"

"Last week, Father, José and Felipe—"

. José and Felipe. Peralta knew them. Good boys, made a little wild by too much money too soon. And those motorcycles, ay!

"—they laughed at Grandfather when he was going out to fish. I thought some terrible things about them, Father."

"Why were they laughing, child?"

"They said Grandfather would catch more fish at the market than he would with the *Hermosa*. They called it a

hotel for worms and said the only way to fish was with the new ships they use at Ensenada and San Diego."

"And how did your grandfather respond to this?"

"He ignored them, Father. He always ignores such things and pretends they do not bother him. But I know. It's not the poor fishing he minds so much, I think. But the laughter hurts him inside. Even his friends wish he would go to Diego's and sit with them on the porch and play checkers and watch the tourists."

Peralta smiled. "I know your grandfather, *niña*. He is not one to sit on a porch and spend his days staring at the sun. Now, you must not hate José and Felipe, or the others. They laugh because they are still young and do not know better. Since the big fishing fleet makes work for all, few in the village the age of José and Felipe have known hard times. They cannot understand why your grandfather would never work for another man, for a salary. When they are older they will understand.

"You must try to understand now, *niña*."

"I think I do, Father," she replied quietly, after another pause. "Father, why don't the sardines come south anymore?"

Father Peralta considered. How could he explain the economics of managed migration and spawning and factory-ship mechanics to a nine-year-old girl?

"They do not come anymore, *niña*, because the great, great engines make much better livings for them in the north, at special times and places. And the big ships are so good and smart that they take all the fish above Ensenada before they can swim this far south."

"But there must be so many fish, Father," she said. "Surely some must swim past the nets?"

Peralta shook his head, realized foolishly that the girl couldn't see the gesture.

"No, *niña*, none get through. The big boats and the fishermen on them are too good for that."

"If Grandfather could only make one more catch," came the small voice. "Just one more catch—before the cough takes him. Then he could laugh, too. And José and Felipe and all the others would have to say they were wrong."

"I'm afraid that would take a miracle, *niña*."

"Then I will pray for a miracle!" The words were excited and determined, with just a shading of grandfather steel in them. "I will light candles and pray to San Pedro for one more catch for my grandfather."

Peralta smiled. "And I will pray for that, too, child."

It was a blistering hot day, and there were many hot days in San Quintin. But when all the others had left the church, even the widow Esteban, a small angel with hair and eyes of Indian obsidian was still there, praying in front of the altar. And when Father Peralta looked in from his study that evening, she was still there.

Finally he walked over to her, made her straighten her dress, and sent her home before she would worry her parents. Yes, she had prayed well, and perhaps San Pedro would be kind.

But, he cautioned her, San Pedro was a very busy saint.

He returned to his study and pulled close to his desk, opening a thick book. He began to write.

"Again we can see that the primitive hieroglyphs of the aboriginal inhabitants of Baja California are in no way ... in no way—"

He stopped, rolled the pen between his fingers and sat back in the stiff chair, thinking. The book that had already taken six months to accumulate lay in a pile of paper to one side—the manuscript that none but a few elderly professors and graduate students in far places would ever bother to read. Then he looked out the window, toward the serrated silhouette of the Sierra San Pedro Martir. He pulled a fresh sheet of paper from the virgin pile, considered briefly.

He began to write.

The crowd had grown smaller year after year. Now, barely a decade after fireworks and television crews had shed lights on the program's beginning, only a pair of minor functionaries from the mayoral offices in Seattle and Victoria, a few news-photographers and the fisheries men were there to observe the ceremonial opening.

The chief engineer checked his watch against the wall chronometer and took a bite out of his sandwich.

"Okay, Milt . . . might as well open 'er up."

The fourth engineer nodded easily and threw the switch. A few flashguns conjured memories of Christmas. Milt obligingly reopened the switch and threw it again for the photographers' benefit.

Grumbling about the inclement weather and hoping they could make it home before dark, the newsmen shuffled away. The representative functionaries exchanged signatures on the traditional scrolls and went their separate ways—one to his wife, the other to his mistress. The fourth engineer performed a routine check of dials and meters to ensure that the closing of the switch opened what the manuals claimed it would, and he went to try and rewire the lamp he had promised his spouse he would fix. Then the chief engineer returned to the gustatory pleasures of ham sandwich and pickle. All was quiet again.

Nor was there visible change offshore, either. No bubbling and heaving, no seething disturbance of the halcyon surface. But below . . .

Instead of being recycled by the station's own cooling plant, the heated seawater of the Port Hardy Fusion Station was being returned directly to the ocean. Water that mollified terrible energies was forced out half a hundred nozzles in Davy Jones' locker. Disruption and a great upwelling commenced on the abyssal plain below. Water and nutrients rose as the sun set.

Bacteria and phytoplankton floated delirious in the sudden confluence of sunlight and nutritive material from the depths. Multiplication and growth took place exponentially, until the sea resembled a thick soup.

Sun retired and Moon clocked in for a night's work. Up with the moon came the zooplankton: minute crustacea, tiny crabs and shrimps with unpronounceable names, miniature fish larvae—all intent on a morphean orgy of feeding.

And orgy it was, for tonight food abounded in unnatural concentration. Brilliantine specks of life shot hysterically through the murky waters, reproducing and growing with nonhuman desperation. A million billion translucent

monsters swam, all wriggling antennae and claws and phosphorescent eyes.

To the north, a few quarter-meter-long shining fish impinged on this cauldron of infinitesimal life, darted into it and gorged themselves. Others nearby noticed the change in feeding pattern, turned and followed. Still others further north, leaders of schools small and great, came also.

A mountain of finned silver began to move south.

The Charlotte Sound Plankton Pod was devoured quickly, but the engines of Cape Flattery Station promptly took over, catalyzing their own section of ocean. The station lit and warmed and fueled the cities of Olympia, Tacoma, Seattle, Bellingham, Everett and most of Washington State. Now it employed the sweat of its primary function to play god with small universes. Even this mass of life, too, was consumed.

But the hand of production was passed on as each pod did its job, vanishing sequentially down uncountable hungry maws, moving the growing mountain south down the finest coast in the world.

Astoria Station ... School coming! Coos Bay ... School coming! Crescent City and Ukiah, San Mateo and San Luis Obispo and Santa Barbara.

El Pueblo de la Nuestra Señora de Los Angeles ... School coming!

"Well, what does the system bring today, Mendez?"

Archbishop Estrada stared back out the window, felt the surge of loving and cursing and wheeling and dealing of millionaires and beggars that was the life of Mexico City. He took in a deep, heady draught of the still clear mountain air, not smog-choked yet, by God, that eddied down from the slopes of slumbering Popocatépetl.

Gustavo and the other stalwarts on the anti-pollution board deserved recognition. A commendation or something, yes. He turned from the window.

At two meters and a solid hundred kilos, the archbishop was a giant of a man. In his casual slacks and shirt he was an imposing executive. In his churchly robes of office, he seemed a biblical visitation.

"Mendez, make a note. A plaque should be prepared in

which the church recognizes and applauds the contribution of the Air-Pollution Board of Mexico City, making particular note of the activities of chairman Gustavo Marcos."

"Yes, sir. Your mail, sir."

"Thank you, Mendez."

The secretary put the stack of letters and brown manila envelopes on the archbishop's desk. Estrada glanced down at his watch. Plenty of time to bless the new elementary school and still make the meeting of the Urban Renewal Commission.

Most of the mail looked the usual. Requests for information, blessings, money, advice, praises for the active role the archbishop was playing in city affairs, damnations for the active role the archbishop was playing in city affairs.

He went through them rapidly, occasionally putting one aside for more personal scrutiny. His secretary could handle most of these. An invitation from the Colombian ambassador to a formal diplomatic dinner, a letter from a certain lady in Guadalajara . . .

Then he came to the letter from San Quintin.

"I'll be damned! Oh, sorry, Mendez," he said hurriedly at the stunned look on the young man's face. "Don't take it seriously." He lowered his voice, muttered to himself in surprise.

"*Madre de dios*, a letter from Father Peralta!"

He slit the unlucky envelope with sharp anticipation. He'd known Father Peralta since they had played together on the university's champion soccer team. What a pro! Peralta had a brain as fast as his feet. True, he, Estrada, had risen much farther and faster in the church hierarchy. Peralta had chosen to take over the tiny church in San Quintin and pursue his scholarly anthropology.

Ah, well. He read. There were the expected greetings and small talk, all the pleasure and entertainment inherent in a predictable letter. Then . . .

"By the way, Luis, there's an old fisherman in the village who persists in going out with a rotting purse seiner every week, despite the fact that Fisheries Control has been harvesting nearly 300 kilometers north of here for

years now. He's a good fellow, but stubborn as a brick and too set in his ways to change.

"As you can imagine, his antics serve as a large source of humor for the rest of the village, most of it good-natured joshing. He's got a granddaughter though, the most exquisite little thing you ever saw, who absolutely dotes on him. I see no harm in the relationship, but the parents wish she wouldn't see so much of the old man, considering her impressionable age and his terminal illness.

"Love, however, doesn't subscribe to the rules of reason. I tried to explain to her, very simply, why her grandfather can't catch sardines any more. All I did was get her to spend most of a hellishly hot day on her knees in the church, praying to San Pedro for one last catch for her grandfather. I told her it would take a miracle, not thinking she'd take me at my word.

"Then our days at school came back to me. If I remember right, you and Martin Fowler himself were quite good friends. I didn't know the man—never even met him. Only read about him in the school paper. But it occurs to me that if anyone can do anything to fulfill even a little part of this child's dream, even if it's only dumping a few dozen sardines in her grandfather's fishing grounds by airdrop, it would be Fowler.

"Of course, I realize that I'm presuming on a friendship that may not even exist any longer. Indeed, one that may not have been that close at all. But it was the only thing I could think of. And if anyone ever deserved a miracle, even a small one, it is this Josefa Flores.

"Now, come out to San Quintin some time and get away from the noise of the city and the cardinal's griping. I'll show you the Painted Caves and some of the most beautiful, peaceful desert country you ever saw, you old reprobate.

"Sincerely, Francisco Peralta."

The archbishop looked at the letter for a long time. Then he put it in the *Answer* pile. He picked up the next envelope and started to slit it open, but his eyes and mind were elsewhere. Back and forth, back and forth ran

the opener along the top of the fresh envelope. When Mendez's voice broke the silence, he did not look up.

"Sir, there's a man here from the ministry of state to see you. Something about an official briefing for tonight's dinner."

Estrada continued to draw lazy abstracts with the opener on the back of the envelope, staring at a point within his desk. It was quite impossible, of course. Quite.

"Tell him," he told his secretary, "that I'll see him in an hour."

The mountain was in the Channel of Santa Barbara now, moving steadily south. The Point Vincente power plant initiated pumping, boosting the phytoplankton cycle twentyfold. In a little while the mountain would hit the major booster field off San Onofre. Then they would really begin to move.

Martin Fowler steadied himself, his eyes never moving from the target. He considered his position, then moved a step closer. Gripping the powerful club in both hands, he swung downward with all his strength.

"I think you've sliced into the rough again, Marty," said Wheeling noncommitally.

Fowler said a bad word, slung the club back in his bag. The two men took hold of their carts and started down the fairway. They could have ridden in comfort. But, as Wheeling said, walking was the only exercise to golf—might as well get remote-controlled clubs and play from bed as ride a cart. Other men followed.

After a while Wheeling looked over at his younger friend, spoke comfortingly.

"'Course, there's nothing unusual about me taking money from you, Marty—it's only natural that those of us with god-given talent should teach the amateurs. But you usually manage to argue the point. What's eating you—Petterson?"

"You have a devious and evil mind," countered the director of the North American Fisheries Control. "If that old crank and the cat-food freaks would just give me leave to open a partial gate—five minutes, that's all I want, just

five lousy minutes! You should see the projected five-year figures. The second year catch alone—"

"If any of the folks on the commission who lean to your way of thinking heard you refer to another United States senator, their peer, as 'that old crank,' they wouldn't give you a crack big enough to let a sick salmon through, let alone your precious gate."

"I know, Dave. I won't tell if you won't. Oh, the senator's not a bad person, personally. But so damned obstinate!"

"Why, Marty! I would think you'd have worked in Washington long enough to know that senators are born obstinate. That's why they gravitate toward becoming senators. Too obstinate and stubborn and bullheaded to go into something sensible when they mature, like plumbing or home videonics."

"But, dammit, Dave, all the indications—everything the computers and the guys in the office have been able to put together—point to the Islas San Benitos as the perfect spot for establishing the first yellowtail fishery. All we have to do is attract a natural seed crop there in the first place. You know we can't plant an ocean locale the way we do Lake Ontario or Tahoe. The tuna would never spawn there, they'd just swim away. We've got to generate a major influx of food fish."

"And that's just your problem, Marty," agreed Wheeling, deciding on a seven-iron. "Senator Petterson has constituents who depend on those food fish. Existing yellowtail don't vote, let alone imaginary ones."

"But anyone who can just take the time to analyze our figures, Dave—" He stopped and watched with distaste as his companion's ball landed short, bounced over the shoulder and onto the green. They moved to search for his own ball.

"Well, you'd better think of something fast if you expect to get that gate this year," warned Wheeling. "Last I heard, the School was passing L.A."

"Newport Beach," Fowler grumbled. "Look, you be there at the committee meeting tomorrow."

Wheeling eyed his friend with a compassion that reached beyond sympathy for his bad lie. "You never give

up, do you, Marty? I'm telling you, you can bury Petterson under a ton of influence and favorable figures. But all the maybes and probablys and could-bes in the world won't convince a politician with hungry people to feed—"

"Ah, here it is," interrupted Fowler, parting the grass. He evaluated the situation, then chose an iron. Wheeling peered toward the distant green.

"You've got a shot at it, but it won't be easy. Take it from me. I've played this course."

"I know. Maybe I should give up trying logic and reason. Oh, you mean the pin. That too. Funny, it's the damndest thing, but I got a letter the other day from a chap I haven't seen in twenty-five years. Went to school with him. Full of the usual reminiscences, what's happened to mutual acquaintances, what hasn't happened to mutual acquaintances, how the world's changed and how it should have and how we had nothing to do with it in spite of all our dreams.

"You know, at one time my greatest ambition was to become a resort hotel magnate? Another Conrad Hilton? Until I got too interested in the land I was supposed to blister with high-rises and planted swimming pools.

"Well, there was this postscript—cute little story about some kid he didn't even know. Should have just smiled and forgotten it, but the darned thing kept me up half the night, sitting and thinking, till Marjorie killed the light. Silly stuff, but—"

He hefted the club, stepped up to the ball.

"If it's something you think can get you past Petterson, I'd like to hear it."

Fowler paused, looked back over his shoulder. "See? No reason, no logic, and I finally got you interested. Come to the committee meeting tomorrow." He put his head down and took a vicious swipe at the ball.

"Okay, I'm hooked," confessed Wheeling, watching the white moon sail into the distance. "I shouldn't, but you got me fair and square." He looked back at his friend, eyed him evenly. "Looks like you're trapped."

The committee room was small and informal, with a stately atmosphere and sense of history hand-worn into

the rich wood paneling. There was just enough room for the long committee table and the modest guest gallery under the high window.

A single old pane let in sunlight and a respectable view of the mall. Wheeling quietly took a seat near the back of the gallery, on a bench that was made before the term "built-in obsolescence" was known. The gallery was practically deserted.

A small knot of youngsters sat at the far end and below him—early junior high or late elementary school by the looks of them, with their teacher. Though kids grew up so fast these days it was hard to tell. Question them about their favorite water hole, and they were likely to give you a lecture on spatial physics or oceanography. A couple of tired, bored-looking reporters and a few tourists completed the audience. Wheeling smiled and nodded politely to the newspapermen, then looked up.

Fowler sat at the near end of the thick walnut table. He kept running a hand through what was left of his sandy brown hair while he conferred with a neatly dressed subordinate from his department.

The children quieted, and the committee filed in, took their seats at the end of the table opposite the director. Fowler turned, saw Wheeling and grinned. Wheeling gave back the high sign and smiled in what he hoped was an encouraging manner.

Senator Vincente of Coahuila, Senator Kaiser of Oregon, Senator Brand of Maine, Senator Petterson of New Jersey, and Minister Stanislaus of Newfoundland.

Petterson opened the meeting in her usual no-nonsense, let's-get-on-with-it tones.

"The Committee for Maritime Resources, Organic, is now in session. Let's get cracking, gentlemen."

To look at her you'd think Senator Diana Petterson was the favorite grandmother of some Midwest farming clan. And, indeed, she was. She also had a command of the English language that could bend nails, a relentless questing mind that had given more than one cocky freshman senator the holly-gobbles on the floor of Congress, and a devotion to the basic needs of human beings that

was sufficiently uncompromising to have put her in the Senate for her fifth consecutive term.

The lawyer-type on Fowler's left stood, rustled a sheaf of forms and computer printouts. The paper sounded loud in the chamber. He cleared his throat and began to dryly recite facts and figures.

Production of pompano here, king crab fishery there, oyster take from Chesapeake off such and such percent, edible kelp harvest up so and so many tons . . .

Wheeling found himself looking elsewhere. The schoolchildren sat politely, storing material for the homework certain to come. The two reporters had turned on their recorders and gone to sleep. He found himself becoming engrossed in the antics of a fat bumblebee that had somehow blundered into the building and was now popping against the windowpane, trying to regain the cleaner sunlight outside. How like some Congressmen, Wheeling reflected.

Half an hour later the reciter concluded his report. The reporters turned over their cassettes, and the children shifted in their seats. The fortunate bee had escaped.

"Mr. Fowler, if there is no other new business, this committee can proceed to the matter of this year's final appropriations, and we can wind up this meeting early."

"Beg your pardon, Madame Senator, but there is the outstanding question of my formal request for a temporary gate in the season's Pacific Coast sardine take."

One of the other senators groaned.

"Really, Mr. Fowler," admonished Petterson, "you've assaulted us with this request at every meeting for over a year now!"

"I realize that, Senator," agreed Fowler amiably. "Nonetheless, I wish to submit the proposal again. If you wish, I can quote the section of proceedings regulations which—"

"I am fully conversant with the rules of procedure for this committee, Mr. Director, as are my fellow senators. If you *will* persist in this inexplicable masochism, we are compelled by courtesy to indulge you. But permit me to say that I have no reason to believe your proposal will be met by any more receptive an audience this time than in

the past. However, I suppose each administrator is entitled to one private aberration. Begin.

"But please have the grace to be as brief as possible. Most of us have important work to do." She did not have to stress the "us" to make her point.

Fowler rose. He had only a single sheet of notes in front of him, and he rarely referred to it. He had no need to. He had made this speech many times before.

He spoke about the history of the North American Fisheries Control, now concluding its first decade. For the first time, Canada, Mexico and the United States had organized together to properly manage and exploit the living resources of the sea. He related how excess heat and water from offshore and onshore fusion and fission plants had been used to drive nutrients from the ocean floor up to the surface, thus generating controllable and unprecedented population booms among commercially valuable surface-dwelling fish.

He told how the Alaskan king crab industry, once in danger of being fatally overfished, had been managed to the point where it could now support the hungry fleets of six nations and would still increase year by year.

How the cost of Maine lobster had been cut to sixty cents a half kilo, while lobster fishermen made more money than ever. How the neglected waters off the Yucatan Peninsula now supported the largest natural sponge industry in the world.

And finally, he outlined how the research staff at Fisheries Control had advised him that the world's largest yellowtail fishery could be created off the Bahia Sebastian Vizcaino only if enough food fish could be provided to meet the tuna as they were herded northward.

"And to do this," Senator Petterson concluded for him, "you propose to sacrifice perhaps a hundred thousand tons of one of the finest food fishes in the world, the California sardine."

"Not sacrifice, Madame Senator. The sardines would spark the first artificial spawning area for the most popular food fish in America. We can improve existing yellowtail fisheries, but the production from one managed and

controlled by us from its inception would be a dozen, eventually perhaps a hundred times greater!"

"How much will your dream cost the consumer, Mr. Director?"

"Research postulates at most a slight rise in the cost of basic sardine and sardine products."

"Slight!" Petterson's gray hair bobbed. "Mr. Fowler, do you have any idea how many people in my home state alone exist on minimal incomes? People for whom a 'slight' rise in food costs translates into a catastrophic effect on basic nutrition. People for whom seafood—in particular the sardine—is the only source of bulk protein?"

"Chances are good that none of them would ever be affected, Senator."

"Chances." She nodded knowingly. "Now we come down to it. I will not gamble with hungry people's bellies."

She smiled magnanimously, a smile which had come to be quite familiar to Fowler.

"But I tell you what, Director. I'm willing to take a reasonable risk. I like to be considered progressive. All you have to do is guarantee this committee a ninety percent probability of success for your tuna ranch, and I'll vote aye with the rest of 'em."

"You know our agency isn't experienced enough to guarantee a ninety percent chance of success, Madame Senator, but—"

"Then that's done with! I won't risk the well-being of thousands of humans on a radical new plan concocted by idle scientists who've probably never eaten an algaeburger in their overpaid lives." She grimaced with distaste and looked past Fowler to the placid form of Wheeling. "Not for anyone!"

She looked around the table. "And neither, I venture to say, will any of my fellow committee members."

There was a long pause. Fowler glanced down at his single paper. When he felt the senators were about to fidget, he resumed, a calculated note of anger just coloring his tone.

"Then if you won't do this for me, Senators, and you

won't do it for the men of Fisheries Control, maybe you'll do it for Josefa Flores."

"Josefa Flores?" echoed Petterson, looking wary. "Who, pray tell, is Josefa Flores? I'm afraid I don't know the lady."

"That's not surprising," continued Fowler. "She doesn't exactly wield strong influence in Congress. Or in the Canadian Parliament or in the National Assembly. You see, she's only nine years old.

"Her grandfather is a fisherman—or was, until in our combined wisdom we took away his livelihood, and . . ."

Wheeling perked up, sat straighter on the hard bench. This promised to be more entertaining than the bumblebee. For the first time the younger schoolchildren stopped squirming and paid attention. The pair of newshawks woke up and hurriedly restarted their recorders, leaning forward intently like wolves who've just crossed a new scent. Wheeling could almost see little neon lights flashing: *Human interest—human interest!*

Fowler told the committee about little Josefa Flores, about her dying grandfather and the fish that didn't come any more—and about her one wish: that before he died, her grandfather should enjoy one last taste of his youth by taking an honest day's catch of the sardine. Here was a story that even survived Fowler's unabashed emotional embroidery. He kept telling it until the banging of Senator Petterson's gavel drowned him out.

"Will you sit down, Mr. Fowler?" she finally shouted.

Smiling, Fowler sat.

"Now then," the lady senator began firmly, attempting to regain control of the meeting, "you may, of course, say whatever you like in support of your proposal, Mr. Fowler. It is so stated in the rules. But we are apparently now dealing with private lives and personal experiences of absurdly emotional overtones, which should not casually be aired in public. I therefore declare that the committee should recess for private consu—"

"Never mind, Dee," interrupted Senator Kaiser. He jerked his head towards the back of the room. "They've already left."

Wheeling looked down to the seats vacated by the departed reporters.

Petterson sighed slightly, then directed an unhappy glare at Fowler. He looked back innocently, for all the world a balding cherub in a sharkskin suit. A similarity, Wheeling reflected approvingly, that clearly went deeper than the weave.

"I confess I fail to understand your insertion of high-school melodramatics into what is, by your own admission, a matter of science, Mr. Fowler. Your statements do not reflect credit on your department."

"Your pardon again, Madame Senator, but may I remind you that the department had nothing to do with fixing a location for the sardine catch, and therefore it bears no responsibility for this elderly gentleman's sad existence. As a matter of fact, it was this committee—I beg your pardon, its ancestor—that settled on the U.S.–Mexican border. A decision which should have been made on the basis of solid scientific evidence, but which in actuality was decided by the insertion of melodramatics in the form of political maneuvering."

Petterson watched him finish, then commented dryly, "I'm not entirely satisfied that your description of this person's situation is all that you make of it, Mr. Director."

Fowler crossed mental fingers and blessed the air-conditioning. "It can, of course, be verified, Senator. Any independent news-team investigating—"

"Oh, I hardly think that's necessary," put in Senator Kaiser with admirable speed. "We all have great confidence in the accuracy of Mr. Fowler's research people."

Fowler knocked wood with those mentally crossed fingers, said quietly, "Then may I propose that that ability be put to a vote, Senators?"

"Oh, we can do that tomorrow, or even next week," continued Kaiser. "No need to take up with such a small matter now."

"Excuse me, Charley," said Senator Stanislaus, "but I do think there is need."

Petterson stared around the table, examined each face individually. "I see. Very well. You all know my views on

the matter, gentlemen. You've heard Mr. Fowler's—yet again. I think a simple show of hands will suffice.

"All those against?"

Two hands shot up, Petterson's and Kaiser's. They stayed up a long time, millennia it seemed to Fowler. But no third hand joined them.

Petterson kept her hand up while she bestowed a motherly smile on each of the three unvoting congressmen—a motherly smile that held promises of murder and total destruction if at least one other palm didn't expose itself. To their credit, the three remaining senators sat firm.

Finally she caved in—her arm was getting tired—and tried one last ploy.

"Abstentions?"

No hands went up. She didn't even bother to call for the affirmative vote.

"Congratulations, Mr. Fowler. Your proposal for a five-minute gate in this year's California take is hereby approved by vote in committee. Five minutes and not one second more. Rest assured the gate will be independently monitored." She rapped the table once, formally, with the gavel.

"This committee stands adjourned until tomorrow at one o'clock, at which time appropriations and additional business will be discussed and considered.

"And off the record, Mr. Director," she whispered out of earshot of the recording secretary, "I hope for your sake that the researchers in your department are more accurate in their predictions than the political pollsters who have been predicting my defeat in every congressional election for the last twenty-five years."

When the children had finished applauding and the tourists and senators had left, Wheeling walked down to join his young friend.

"Ready for a drink, Marty?"

Fowler let out a long sigh. "Now there's a prediction I *know* I can fulfill. But first I've got to call the Coast and then make a stop at the office and tell the staff in person. They've worked for this even harder than I have. It's a great thing."

"Sure," said Wheeling. "Tell me, was that sob story on the level, or something you cooked up?"

Fowler grinned. "It was and it wasn't. I had to rely entirely on the information in that friend's letter. But I think it's probably legit, though I had a bad moment when Petterson seemed ready to press for more facts. Anyway, this fellow isn't in a position where one has to make up stories to get by."

They rounded a turn in the hall, started down the well-worn stairs, smoothed and polished by the shoes of hundreds of lawmakers present and past.

"Frankly," Wheeling confessed, "I didn't think you'd pull it off. Dramatic appeal and all."

"I wasn't sure, either. But it helps if you've got a story to work with that you'd like to believe in."

"That's a fact," agreed Wheeling. "Also a help that Brand and Stanislaus are up for reelection this year. And the timely appearance of those two fellows from the *Post* and *Time*."

"Sure, all that contributed, Dave," agreed the director as they turned down the next hall and nearly bumped into a secret-service man. "But frankly, if you had come to a hearing before now, I might not have had to wait ten months to push this thing over."

"Sorry, Marty. You've got to remember that I'm retired, and I don't like to be accused of meddling. Not my place, even from a distance. But that letter was something different. Figured it couldn't hurt to sit in the back of the bus and smile a little in the right places.

"Now, you make that phone call and we'll have that drink. And then I'll beat you another eighteen holes."

"Not today," replied Fowler, cracking a broad smile. "I feel so good that I don't think I'd even have any compunctions about walloping an ex-president."

He took from his coat pocket the little communicator that linked him with his office and beeped for his aide.

"Sherrie, get me Papadakis."

Aristophanes Papadakis paced the outside bridge of the factory purse seiner *Cetacean* and surveyed the darkness. Occasionally a smoke-serpent appeared around the stem

of his meerschaum and vanished wraithlike into the crystal Pacific night.

The lights of the fleet formed uncertain trails of light on the calm black water. For a change, the Pacific seemed inclined to live up to its name.

When the School came through tonight, fishing conditions would be perfect.

He tried to pick out the other ships of the flotilla. The *San Cristobal, Quebec, Typee, Carcharodon, Scrimshaw*—the pride of the fishing fleets of three nations. Each vessel a food-processing factory in itself, dozens of them, scattered starboard, port and aft in orderly rows. As flagship, the *Cetacean* rode point, awaiting the southern charge.

And best of all, here was a great armada that would meet a charge with no guns, and fought only hunger.

"Captain?"

"Eh?" Papadakis turned from the floating city. "What is it, son?"

"Sir, sonar reports that they're inside the kilometer mark." The young officer's voice held barely repressed excitement.

"Be here soon, then. Good! Are all the other captains informed of my instructions concerning the gate?"

"Yes, sir," replied the other. "The communications mate on duty said to compliment you on your final instructions, sir. Said they were explicit and evocative beyond the call of duty."

"Did he now?" Papadakis smiled around the pipe stem. Mitchell and he had come up together, fishing off the municipal pier for rock cod and an occasional gift of halibut.

"Any man who closes his seine before the gate has been run gets packed in olive oil and shipped off with the first catch."

He turned away, stared back down into the secretive waters. Wondered how Fowler had been able to pull it off. Sardines were fine to catch, and good eating, but yellowtail—now that was a noble fish. After a while he became aware that the new officer was still standing in the doorway.

"Well, come in or out, son. Can't salt half a peanut."

"I'm sorry, sir," the youth replied, coming outside, "but this is my first actual catch—outside academy drills, of course. Tell me, can you see them when they go by?"

Papadakis made a sound, chomped hard on the pipe.

"Nope. More's the pity, too. Oh, the caravaners can, they and their porpoises. But they're so busy chasing off sharks and groupers and other predators that they've got no time to spend admiring things. Got better uses for their lights. Trying to cut a blue shark out of a school at night in this plankton stew is near impossible even with sonar. Couldn't do it without the porps."

A voice came from within the bridge.

"Two minutes, Cap'n." Papadakis acknowledged this information by grunting louder than usual.

"Isn't it exciting, sir?"

"Exciting? Just fish, son."

The youth stayed quiet for a minute. Then, "Sir, I know what the book says—it seems silly—but can you really feel them?"

"Oh, sometimes, sometimes not. Doesn't happen too often. Depends mostly on surface conditions. Then too, they've got to pass fairly close under your keel. The Cetacean and her cousins are *big*. Conditions got to be just about perfect."

"They're just about perfect tonight, aren't they, sir?"

"Yep." Papadakis spared an inquiring glance for the moon. Full. Good! Tonight they could use all the light they could get. Course, the moon was always full for the catch. Migration set it up that way. The crews would be working till daylight.

"You know, sir, it's still kind of mind-boggling when you think of it. I mean, a half a year's preparation and driving, all leading up to a single night's catch." The ship rocked to port, shifted gently back to starboard. Water patted at the waterline. "It's overwhelming, sir."

Papadakis sighed, looked at his watch. He knocked the dottle from his pipe and fed the sea dead tobacco.

"Odd sort of wave, sir. Must be getting rough further out."

"That was no wave, sonny." "Pappy" Papadakis bit

firmly into the well-worn stem. "That was a million tons of sardine racing south and eating like nobody's business."

He turned and headed for the interior bridge, checked his watch again. "Let's go. In five minutes you're going to start the busiest night of your life. And wait till the main School gets here. Then you better grab something and hang on tight."

The sun mixed paint with the ravines and peaks of the Sierra San Pedro Martir. Josefa Flores walked down the slight slope toward the old pier.

But there was something odd this evening. There were many people gathered around the pier, and not just tourists. Market-owner Diego was there, as were her friends Juana and Maria, and many others.

Then she saw the *Hermosa*, chugging slowly and painfully toward her mooring place at the pier's far end, a white stormcloud of seagulls and terns escorting her. She saw how close the old boat's sheer dipped to the water. She began to move faster, and as she got closer she could see the old man standing straight and proud on the tiny bridge, and the sun also made color with his teeth.

She was on the pier, the boards click-clacking under her soles as she ran and yelled, pushing past the people, not caring if she bumped the wealthiest Norteamericano in the world into the bay.

"Grandfather, Grandfather . . . !"

His hands smelled of fish when he picked her up, but they were good at brushing away tears.

The Whirligig of Time

Vernor Vinge

The defense station high in the Laguna Mountains had been on alert since dawn. The clear fall day had passed without event, and now the dark was closing in over the pine-covered hills. A cool, dry wind blew among the trees, nudged at the deep layers of pine needles and slid around the defense station's armored cupolas. Overhead, between the dark silhouettes of the pines, the stars were out, brighter and more numerous than they could ever seem in a city's sky.

To the west, limning the dark Pacific, a narrow band of greenish yellow was all that was left of day, and the city was a fine thin dusting of light spread inward from the ocean. From the Laguna Mountains, eighty kilometers inland, the city seemed a surrealistic carpet of tiny glowing gems—the most precious of the treasures this station had been constructed to protect.

This was the last moment of comfortable tranquillity that this land would know for many, many centuries.

The life in the forest—the birds asleep in the trees, the squirrels in their holes—heard and felt nothing; but deep within the station men looked out into space with microwave eyes, saw the tiny specks rising beyond the polar horizon, plotted their trajectories and predicted that hell would burn in heaven and on earth this night.

On the surface, concrete and steel cowlings whirred open to reveal the lasers and ABM's now tracking the enemies falling out of space. The birds fluttered nervously about their trees now, disturbed by the noises below, and a faint red light shone up from the holes in the ground.

Yet from the next ridgeline over, the night would still have seemed silent, and the starlit pine forest undisturbed.

Halfway up in the northern sky, three new stars lit, so bright that a blue-white day shone on the forest, still silent. Their glare faded swiftly through orange to red and guttered out, leaving a play of pale green and gold to spread through the sky. Those pastel colors were the only visible sign of the immense fog of charged particles the explosions had set between ground radars and the missiles that were yet to come. The men in the station held their fire. The explosions had not completely blinded them—they still had a proxy view of part of the battle space from a synchronous satellite—but the distance to their targets was far too great.

In the skies to the north and east more miniature stars were visible—mostly defensive fires. The unnatural aurora spread from horizon to horizon, yet in the west the lights of the city glowed as placidly, as beautifully as before the end began.

Now the defenders' radars could pick up the enemy warheads falling out of the ionospheric fog that had concealed them. But not one of the incoming missiles was targeted on the city to the west—all were falling in toward the defense station and the ICBM bases in the desert to the east. The defenders noticed this but had no time to puzzle over it. Their own destruction was seconds away unless they acted. The station's main laser fired, and the pines and the hills flashed red by its reflected light. The ten-centimeter beam was a hundred-kilometer-tall thread of fire, disappearing only at the top of the sensible atmosphere where there was no more air to be ionized. Its sound, the sound of whole tons of air being turned into plasma, was a bone-shattering crack that echoed off the distant hills to sweep back and forth across the land.

Now there was nothing left asleep in the forest.

And when the beam itself was gone, there—high in the sky—hung a pale blue thread, with a nob of faintly glowing yellow and gold at one end. The first target, at least, had been destroyed; the beam was so energetic it created

its own miniature aurora as it passed through the ionosphere, and the knob at the end of it marked a vaporized target.

Then the other lasers began firing, and the sky was crisscrossed by strange red lightning. The ABM's streaking from the hillside contributed their own peculiar roar to this local armageddon. The tiny rockets were like flecks of molten metal spewed up on rays of fire and smoke. Their success or failure was determined in the scant five seconds of their powered flight—five seconds in which they climbed more than thirty kilometers into the sky. The spaces above the hills were filled with bright new stars, and the more frequent—yet less impressive—glows that marked successful laser interceptions.

For seventy-five seconds the battle in the spaces over the defense station continued. During that time the men could do little but sit and watch their machines—the defense demanded microsecond reflexes, and only the machines could provide that. In those seventy-five million microseconds, the station destroyed dozens of enemy missiles. Only ten of the attacking bombs got through; bright blue flashes on the eastern horizon marked the end of the ICBM bases there. Yet even those ten might have been intercepted, if only the station had not held back its reserve, waiting for the attack that must sooner or later come upon the great city to the west.

Seventy-five seconds—and the city they waited to protect still lay glowing beneath the yellow-green sky.

And then, from the middle of the gleaming carpet that was the city, one more new star was born. In an astronomical sense, it was a very small star; but to itself and to what lay nearby, it was an expanding, gaseous hell of fission-fusion products, neutrons and x-rays.

In seconds the city ceased to be, and the defenders in the mountains realized why all the enemy missiles had been targeted on military installations, realized what must be happening to the larger cities all across the land, realized how much easier it had been for the enemy to smuggle his bombs into the nation's cities than to drop them in along ballistic trajectories.

From where the yacht floated, a million kilometers above the ecliptic and six million behind the Earth in its orbit, the home planet was a marbled bluish ball, nearly as bright as a full moon yet only a quarter the size. The moon itself, a couple of degrees further out from the sun, shone twice as bright as Venus. The rest of heaven seemed infinitely far away, misty sweeps of stars at the bottom of an endless well.

By the blue-white sunlight, the yacht was a three-hundred-meter silver crescent, devoid of fins and aerials and ports. In fact, the only visible marking was the Imperial escutcheon—a scarlet wreath and a five-pointed star—just short of the nose.

But from within, a large part of that hull was not opaque. Arching over the main deck it was as clear, as transparent, as the air of a desert night; and the lords and ladies attending the Prince's birthday party could see the Earth-Moon system hanging just above the artificial horizon created by the intersection of deck and hull. The scene was lost on most of them. Only a few ever bothered to look up into the strange sky. They were the fifteenth generation of an aristocracy that regarded the entire universe as its just due. They would have been just as bored—or just as amused—on Luna or back at the Avstralijan Riviera on Earth.

In all the two-million-ton bulk of the yacht, perhaps only four or five people were really aware of the surrounding emptiness:

Vanja Biladze floated near the center of the yacht's tiny control cabin—he liked to keep it at zero gee—steadying himself with one hand draped negligently around a wall strap. His three-man crew sat belted down to control saddles before the computer inputs and the holoscreens. Biladze gestured at the gray-white cone that tumbled slowly across the central screen. "Do you have any idea what it is, Boblanson?" he asked the fifth man in the control cabin.

The little man called Boblanson had just entered the cabin from the kennels below decks, and he still looked a bit green about the gills. His rickets-bent hands held tightly to the wall straps as his balding head bobbed

about in an attempt to focus on the screen. The three crewmen seemed as intrigued by this twisted dwarf as by what the long-range scope was throwing on their screen. The men were new to the Imperial yacht, and Biladze guessed they had never before seen a non-Citizen in person. Outside of the Preserves, about the only place one could be found was in the Emperor's menageries.

Boblanson's nearsighted eyes squinted for a long moment at the screen. The ship's computer had superimposed a reticle on the image, indicating the cone was about a meter wide and perhaps three meters long. Ranging figures printed below the reticle showed the object was more than two hundred kilometers away. Even at that range the synthetic aperture scope resolved a lot of detail. The cone was not a smooth, uniform gray but was scored with hundreds of fine lines drawn parallel to its axis. There were no aerials or solar panels protruding from the cone. Every fifteen seconds the base of the object rotated into view, a dark uninformative hole.

The little man licked his lips nervously. If it had been possible to grovel in zero gee, Biladze was sure that Boblanson would have done so. "It is marvelous, Your Eminence. An artifact, to be sure."

One of the crewmen rolled his eyes. "We know that, you idiot. The question is, would the Prince be interested in it? We were told you are his expert on pre-Imperial spacecraft."

Boblanson bobbed his head emphatically, and the rest of his body bobbed in sympathy. "Yes, Eminence. I was born in the Prince's Kalifornija Preserve. For all these centuries, my tribes have passed from father to son the lore of the Great Enemy. Many times the Prince has sent me to explore the glowing ruins within the Preserves. I have learned all I can of the past."

The crewman opened his mouth—no doubt to give his acid opinion of illiterate savages who pose as archeologists—but Biladze broke in before the other could speak. The crewman was new to the Court, but not so new that he could get away with insulting the Prince's judgment. Biladze knew that every word spoken in the control cabin was monitored by Safety Committee agents hidden else-

where in the ship, and every maneuver the crew undertook was analyzed by the Safety Committee's computers. Citizens of the Empire were used to surveillance, but few realized just how pervasive the eavesdropping could be until they entered the Imperial Service. "Let me rephrase Kolja's question," said Biladze. "As you know, we're tracking back along Earth's orbit. Eventually—in another fifteen hours, if we hadn't stopped for this thing—we will be far enough back to encounter objects in trojan orbits. Now there is some reason to believe that at least a few of the probes launched into Earthlike orbits eventually wound up near Earth's trojan points—"

"Yes, Eminence, I suggested the idea," said Boblanson. *So there is spirit in you after all,* thought Biladze with surprise; perhaps the little man knew that the Prince's pets sometimes counted for more than an Imperial Citizen. And the fellow's education obviously went beyond the folk tales his tribe passed from generation to generation. The idea of looking for artifacts near the trojan points was clever, though Biladze guessed that careful analysis would show it to be unpractical for at least two different reasons. But the Prince rarely bothered with careful analysis.

"In any case," continued Vanja Biladze, "we've found something, but it's nowhere near our destination. Perhaps the Prince will not be interested. After all, the chief reason for this excursion is to celebrate his birthday. We are not sure if the Emperor and the Prince and all the gentle people attending will really be too happy if we interrupt them with this matter. But we know that you have the special confidence of the Prince when it comes to his collection of pre-Imperial space probes. We hoped—"

We hoped you'd take us off the hook, fellow, thought Biladze. His predecessor at this job had been executed by the teen-age prince. His crime: interrupting the boy at dinner. For the thousandth time, Biladze wished he were back in the old-time Navy—where research had been disguised as maneuvers—or even back on Earth in some Gruzijan lab. The closer a Citizen came to the centers of power, the more of a madhouse the universe became.

"I understand, Eminence," said Boblanson, sounding as

if he really did. He glanced once more at the screen, then back at Biladze. "And I assure you that the Prince would hate to pass this up. His collection is immense, you know. Of course it contains all the moon landers ever launched. They are rather easy to find, given your Navy's maps. He even has a couple of Martian probes—one Republican and one launched by the Great Enemy. And the surviving near-Earth satellites are generally quite easy to find, too. But the solar and outer planet probes—those are extremely difficult to recover, since they are no longer associated with any celestial body but roam through an immense volume of space. He has only two solar probes in his entire collection, and both were launched by the Republic. I've never seen anything like this," he motioned jerkily at the tumbling white cone on the screen. "Even if it were launched by your ancestors in the days of the Republic, it would still be a find. But if it belonged to the Great Enemy, it would be one of the Prince's favorite acquisitions, without doubt." Boblanson lowered his voice. "And frankly, I think it's conceivable that this spacecraft was not launched by either the Republic or the Great Enemy."

"*What!*" The exclamation came simultaneously from four throats.

The little man still seemed nervous and half-nauseated, but for the first time Biladze saw an almost hypnotic quality about him. The fellow was diseased, half-crippled. After all, he had been raised in a poisoned and desolate land, and since coming to the Imperial Service he had apparently been used to explore the radioactive ruins of the Great Enemy's cities. Yet with all that physical abuse, the mind within was still powerful, persuasive. Biladze wondered whether the Emperor realized that his son's pet was five times the man the Prince was.

"Yes, it would be fantastic," said Boblanson. "Mankind has found no evidence of life—much less intelligent life—anywhere else in the universe. But I know ... I know the Navy once listened for signals from interstellar space. The possibility is still alive. And this object is so strange. For example, there is no communication equipment sticking through its hull. I know that you of the

Empire don't use exterior aerials—but in the time of the Republic, all spacecraft did. And, too, there are no solar panels, though perhaps the craft had an isotopic power source. But the pattern of rays along its hull is the strangest thing of all. Those grooves are what you might expect on a meteorite or a space probe—after it had come down through a planetary atmosphere. But there is simply no explanation for finding such an ablated hull out in interplanetary space."

That certainly decides the question, thought Biladze. Everything the non-Citizen had said was on tape somewhere, and if it ever came out that Vanja Biladze had passed up an opportunity to obtain an extraterrestrial artifact for the Prince's collection, there would be need for a new pilot on the Imperial yacht. "Kolja, get on the printer, and tell the Lord Chamberlain what Boblanson has discovered here." Perhaps that phrasing would protect him and the crew if the whirling gray cone did not interest the Prince.

Kolja began typing the message on the intraship printer. Theoretically, a Citizen could talk directly to the Lord Chamberlain, since that officer was a bridge of sorts between the Imperial Court and its servants. In fact, however, the protocol for speaking with any member of the aristocracy was so complex that it was safest to deal with such men in writing. And occasionally, the written record could be used to cover your behind later on—if the nobleman you dealt with was in a rational mood. Biladze carefully read the message as it appeared on the readout above the printer, then signaled Kolja to send it. The word ACKNOWLEDGED flashed on the screen. Now the message was stored in the Chamberlain's commbox on the main deck. When its priority number came up, the message would appear on the screen there, and if the Lord Chamberlain were not too busy supervising the entertainment, there might be a reply.

Vanja Biladze tried to relax. Even without Boblanson's harangue he would have given an arm and a leg to close with the object. But he was far too experienced, far too cautious, to let such feelings show. Biladze had spent three decades in the Navy—whole years at a time in deep

space so far from Earth-Luna and the pervasive influence of the Safety Committee that the home world might as well not have existed. Then the Emperor began his crackdown on the Navy, drawing them back into near-Earth space, subjecting them to the scrutiny accorded his other Citizens and outlawing what research they had been able to get away with before. And with the new space drive, no point in the solar system was more than hours from Earth, so such close supervision was practical. For many officers, the change had been a fatal one. They had grown up in space, away from the Empire, and they had forgotten—or else never learned—how to mask their feelings and behave with appropriate humility. But Biladze remembered well. He had been born at Suhumi in Gruzija, a favorite resort of the nobility. For all the perfection of Suhumi's blindingly white beaches and palm dotted parks, death had been waiting every moment for the disrespectful Citizen. And when he had moved east to Tiflis, to the technical schools, life was no less precarious. For in Tiflis there were occasional cases of systematically disloyal thoughts, thoughts which upset the Safety Committee far more than accidental disrespect.

If that had been the sum of his experience on Earth, Biladze, like his comrades, might have forgotten how to live with the Safety Committee. But in Tiflis, in the spring of his last year at the Hydromechanical Institute, he met Klaśa. Brilliant, beautiful Klaśa. She was majoring in heroic architecture, one of the few engineering research fields the Emperors had ever tolerated on Earth. (After all, statues like the one astride Gibraltar would have been impossible without the techniques discovered by Klaśa's predecessors.) So while his fellow officers managed to stay in space for whole decades at a time, Vanja Biladze had returned to Tiflis, to Klaśa, again and again.

And he never forgot how to survive within the Imperial system.

Abruptly, Biladze's attention returned to the white-walled control room. Boblanson was eyeing him with a calculating stare, as if making some careful judgment. For a long moment, Biladze returned the gaze. He had seen

only four or five non-Citizens in the flesh, though he had been piloting the Imperial yacht for more than a year. The creatures were always stunted, most often mindless—simple freaks kept for the amusement of noblemen with access to the vast Amerikan Preserves. This Boblanson was the only clever one Biladze had ever seen. Still, he found it hard to believe that the frail man's ancestors had been the Great Enemy, had struggled with the Republic for control of Earth. Very little was known about those times, and Biladze had never been encouraged to study the era, but he did know that the Enemy had been intelligent and resourceful, that they had never been totally defeated until they finally launched a sneak attack upon the Republic. The enraged Republic beat back the attack, then razed the Enemy's cities, burned its forests and left its entire continent a radioactive wasteland. Even after five centuries, the only people living in that ruin were the pitiful non-Citizens, the final victims of their own ancestors' treachery.

And the victorious Republic had gone on to become the world Empire.

That was the story, anyway. Biladze could doubt or disbelieve parts of it, but he knew that Boblanson was the ultimate descendant of a people who had opposed the establishment of the Empire. Vanja briefly wondered what version of history had been passed down the years to Boblanson.

Still no answer on the printer readout. Apparently the Lord Chamberlain was too busy to be bothered.

He said to Boblanson, "You are from the Kalifornija Preserve?"

The other bobbed his head. "Yes, Eminence."

"Of course I've never been there, but I've seen most of the Preserves from low orbit. Kalifornija is the most terrible wasteland of them all, isn't it?" Biladze was breaking one of the first principles of survival within the Empire: he was displaying curiosity. That had always been his most dangerous failing, though he rationalized things by telling himself that he knew how to ask safe questions. There was nothing really secret about the non-Citizens—they were simply a small minority living in areas too de-

solate to be settled. The Emperor was fond of parading the poor creatures on the holo, as if to say to his Citizens: "See what becomes of my opponents." Certainly it would do no harm to talk to this fellow, as long as he sounded appropriately impressed by the Enemy's great defeat and yet greater treachery.

Boblanson gave another of his frenetic nods. "Yes, Eminence. I regret that some of my people's greatest and most infamous fortresses were in the southern part of Kalifornija. It is even more to my regret that my particular tribe is descended from the subhumans who directed the attack on the Republic. Many nights around our campfires—when we could find enough wood to make a fire—the Oldest Ones would tell us the legends. I see now that they were talking of reaction-drive missiles and pumped lasers. Those are primitive weapons by the Empire's present standards, but they were probably the best that either side possessed in those days. I can only thank your ancestors' courage that the Republic and justice prevailed.

"But I still feel the shame, and my dress is a penance for my ancestry—it is a replica of the uniform worn by the damned creatures who inspired the Final Conflict." He pulled fretfully at the blue material, and for the first time Biladze really noticed the other's clothing. It wasn't that Boblanson's dress was inconspicuous. As a matter of fact, the blue uniform—with its twin silver bars on each shoulder—was ludicrous. In the zero gee of the control cabin, the pants were continually floating up, revealing Boblanson's bent, thin legs. Before, Biladze had thought it was just another of the crazy costumes the Imperial family decreed for the creatures in the menagerie, but now he saw that the sadism went deeper. It must have amused the Prince greatly to take this scarecrow and dress him as one of the Enemy, then have him grovel and scuttle about. The Imperial family never forgot its opponents, no matter how far removed they were in time or space.

Then he looked back into the little man's eyes and realized with a chill that he had seen only half the picture. No doubt the Prince had ordered Boblanson to wear the uniform, but in fact the non-Citizen was the one who

was amused—if there was any room for humor behind those pale blue eyes. It was even possible, Biladze guessed, that the man had maneuvered the Prince into ordering that he be dressed in this way. So now Boblanson, descendant of the Great Enemy, wore that people's full uniform at the Court of the Emperor. Biladze shivered within himself, and for the first time put some real credit in the myths about the Enemy's subtlety, their ability to deceive and to betray. This man still remembered whatever had happened in those ancient times—and with greater feeling than any member of the Imperial family.

The word ACKNOWLEDGED vanished from the screen over the printer and was replaced by the Lord Chamberlain's jowly face. The crew bowed their heads briefly, tried to appear self-composed. The Chamberlain was usually content to communicate by printer, so apparently their message—when it finally got his attention—was of interest.

"Pilot Biladze, your deviation from the flight plan is excused, as is your use of the Prince's pet." He spoke ponderously, the wattles swaying beneath his chin. Biladze hoped that old Rostov's implied criticism was *pro forma*. The Lord Chamberlain couldn't afford to be as fickle as most nobles, but he was a hard man, willing to execute his patrons' smallest whim. "You will send the creature Boblanson up here. You will maintain your present position relative to the unidentified object. I am keeping this circuit open so that you will respond directly to the Emperor's wishes." He stepped out of pickup range, ending the conversation as abruptly as if he had been talking to a computer. At least Biladze and his crew had been spared the trouble of framing a properly respectful response.

Biladze punched HATCH OPEN, and Boblanson's keepers entered the cabin. "He's supposed to go to the main deck," Biladze said. Boblanson glanced briefly at the main screen, at the enigma that was still slowly turning there, then let his keepers bind him with an ornamental leg chain and take him into the hallway beyond. The hatch slid shut behind the trio, and the crew turned back to the holographic image above the printer.

The camera sending that picture hadn't moved, but

Rostov's obese hulk was no longer blocking the view and there was a lot to see. The yacht had been given to the Prince by the Emperor on the boy's tenth birthday. As with any Imperial gift, the thing was huge. The main deck—with its crystal ceiling-wall open to all heaven—could hold nearly two thousand people. At least that many were up there now, for this party—the whole twenty hour outing—celebrated the Prince's eighteenth birthday.

Many of the lords and ladies wore scarlet, though some had costumes of translucent and transparent pastels. The calculated nudity was not limited to the women. The lights on the main deck had been dimmed, and the star clouds, crowned by Earth-Luna, hung bright above the revelers—an incongruous backdrop to the festivities. That these people should be the ones to rule those worlds . . .

Scattered through the crowd, he caught patches of gray and brown—the uniforms of the traybearers, doing work any sensible culture would reserve to machines. The servants scuttled about, forever alert to their betters' wishes, forever abjectly respectful. That respect must have been mainly for the benefit of Safety Committee observers, since most of the partygoers were so high on thorn-apple or even more exotic drugs that they wouldn't have known it if someone spit in their eye. The proceedings were about three-quarters of the way to being a full-blown orgy. Biladze shrugged to himself. It was nothing new—this orgy would simply be bigger than usual.

Then the tiny figures of Boblanson and his keepers came in from the right side of the holoscreen. The two Citizens walked carefully, their shoulders down, their eyes on the floor. Boblanson seemed to carry himself much the same, but after a moment Biladze noticed that the little man shot glances out to the right and left, watching everything that went on. It was amazing. No Citizen could have gotten away with such brazen arrogance. But Boblanson was not a Citizen. He was an animal, a favored pet. You kill an animal if it displeases you, but you don't put the same social constraints on it that you would upon a human. No doubt even the Safety Committee

passed over the fellow with only the most cursory inspection.

As the figures walked off to the left, Biladze leaned to the right to follow them in the holo and saw the Emperor and his son. Paśa III was seated on his mobile throne, his costume a cascade of scarlet and jewels. Paśa's face was narrow, ascetic, harsh. In another time such a man might have created an empire rather than inherited one. As it was, Paśa had consolidated the autocracy, taking control of all state functions—even and especially research—and turning them to the crackpot search for reincarnators.

On only one issue could Paśa be considered soft: his son was just eighteen today, yet the boy had already consumed the resources and the pleasures of a thousand adolescences. Saśa X, dressed in skintight red breeches and diamond-encrusted belt, stood next to his father's throne. The brunette leaning against him had a figure that was incredibly smooth and full, yet the Prince's hand slid along her body as negligently as if he were stroking a baluster.

The keepers prostrated themselves before the throne and were recognized by the Emperor. Biladze bit back a curse. The damn microphone wasn't picking up their conversation! How would he know what Paśa or his son wanted if he couldn't hear what was going on? All he was getting were music and laughter—plus a couple of indecent conversations close by the mike. This was the type of bungle that made the position of Chief Yacht Pilot a short-lived one, no matter how careful a man was.

One of his crew fiddled with the screen controls, but nothing could really be done at this end. They would see and hear only what the Lord Chamberlain was kind enough to let them see and hear. Biladze leaned toward the screen and tried to pick out from the general party noises the conversation passing between Boblanson and the Prince.

The two keepers were still prostrate at Paśa's feet. They had not been given permission to rise. Boblanson remained standing, though his posture was cringing and timid. Servants insinuated themselves through the larger

crowd to distribute drinks and candies to the Imperial party.

The Emperor and his son seemed totally unaware of this bustle of cringing figures about them. It was strange to see two men set so far above the common herd. And it all brought back a very old memory. It had been the summer of his last year at Tiflis, when he had found both Klaśa and the freedom of the Navy. Many times during that summer, he and Klaśa had flown into the Kavkaz to spend the afternoon alone in the alpine meadows. There they could speak their own minds, however timidly, without fear of being overheard. (Or so they thought. In later years, Biladze realized how terribly mistaken they had been. It was blind luck they were not discovered.) On those secret picnics, Klaśa told him things that were never intended to go beyond her classes. The architecture students were taught the old forms and the meaning of the inscriptions to be found upon them. So Klaśa was one of the few people in all the Empire with any knowledge of history and archaic languages, however indirect and fragmentary. It was dangerous knowledge, yet in many ways fascinating: In the days of the Republic, Klaśa asserted, the word "Emperor" had meant something like "Primary Secretary," that is, an elected official—just as on some isolated Navy posts, the men elect a secretary to handle unit funds. It was an amazing evolution—to go from elected equal to near godling. Biladze often wondered what other meanings and truths had been twisted by time and by the kind of men he was watching on the holoscreen.

"—Father. I think it could be exactly what my creature says." The audio came loud and abrupt as the picture turned to center on the Prince and his father. Apparently Rostov had realized his mistake. The Chamberlain had almost as much to lose as Biladze if the Emperor's wishes were not instantly gratified.

Biladze breathed a sigh of relief as he picked up the thread of the conversation. Saśa's high-pitched voice was animated: "Didn't I tell you this would be a worthwhile outing, Father? Here we've already run across something entirely new, perhaps from beyond the Solar System. It

will be the greatest find in my collection. Oh, Father, we must pick it up." His voice rose fractionally.

Paśa grimaced, and said something about Saśa's "worthless hobbies." Then he gave in—as he almost always did—to the wishes of his son. "Oh very well, pick the damned thing up. I only hope it's half as interesting as your creature here," he waved a gem-filthy arm at Boblanson, "says it is."

The non-Citizen shivered within his blue uniform, and his voice became a supplicating whine. "Oh, dear Great Majesty, this trembling animal promises you with all his heart that the artifact is perfectly fit to all the greatness of your Empire."

Even before Boblanson got the tongue-twisting promise out of his mouth, Biladze had turned from the holo and was talking to his men. "Okay. Close with the object." As one of the crew tapped the control board, Biladze turned to Kolja and continued, "We'll pick it up with the third-bay waldoes. Once we get it inside, I want to check the thing over. I remember reading somewhere that the Ancients used reaction jets for attitude control and thrust—they never did catch on to inertial drive. There just might be some propellant left in the object's tanks after all these years. I don't want that thing blowing up in anybody's face."

"Right," said Kolja, turning to his own board.

Biladze kept an ear on the talk coming from the main deck—just in case somebody up there changed his mind. But the conversation had retreated from the specifics of this discovery to a general discussion of the boy's satellite collection. Boblanson's blue figure was still standing before the throne, and every now and then the little man interjected something in support of Saśa's descriptions.

Vanja pushed himself off the wall to inspect the approach program his crewman had written. The yacht was equipped with the new drive and could easily attain objective accelerations of a thousand gravities. But their target was only a couple hundred kilometers away and a more delicate approach was in order: Biladze pressed the PROGRAM INITIATE, and the ship's display showed that they were moving toward the artifact at a leisurely two

gravities. It should take nearly two hundred seconds to arrive, but that was probably within Saśa's span of attention.

One hundred twenty seconds to contact. For the first time since he had called Boblanson into the control cabin ten minutes earlier, Biladze had a moment to ponder the object for himself. The cone was an artifact; it was much too regular to be anything else. Yet he doubted that it was of extraterrestrial origin, no matter what Boblanson thought. Its orbit had the same period and eccentricity as Earth's, and right now it wasn't much over seven million kilometers from Earth-Luna. Orbits like that just aren't stable over long periods of time. Eventually such an object must be captured by Earth-Luna or be perturbed into an eccentric orbit. The cone couldn't be much older than man's exploration of space. Biladze wondered briefly how much could be learned by tracing the orbit back through some kind of dynamical analysis. Probably not much.

Right now the only difference between its orbit and Earth's was the inclination: about three degrees. That might mean it had been launched from Earth at barely more than escape velocity, along a departure asymptote pointing due north. Now what conceivable use could there be for such a trajectory?

Ninety seconds to contact. The image of the slowly tumbling cone was much sharper now. Besides the faint scoring along its hull, he could see that the dull white surface was glazed. It really did look as if it had passed through a planet's atmosphere. He had seen such effects only once or twice before, since with any inertial drive it was a simple matter to decelerate before entering an atmosphere. But Biladze could imagine that the Ancients, having to depend on rockets for propulsion, might have used aerodynamic braking to save fuel. Perhaps this was a returning space probe that had entered Earth's atmosphere at too shallow an angle and skipped back into space, lost forever to the Ancients' primitive technology. But that still didn't explain its narrow, pointed shape. A good aerodynamic brake would be a blunt body. This thing looked as if it had been designed expressly to minimize drag.

Sixty seconds to contact. He could see now that the black hole at its base was actually the pinched nozzle of a reaction jet—added proof that this was an Earth-launched probe from before the Final Conflict. Biladze glanced at the holoscreen above the printer. The Emperor and his son seemed really taken with what they were seeing on the screen set before the throne. Behind them stood Boblanson, his poor nearsighted eyes squinting at the screen. The man seemed even stranger than before. His jaws were clenched and a periodic tic cut across his face. Biladze looked back at the main screen; the little man knew more than he had revealed about that mysterious cone. If he had not been beneath their notice, the Safety Committee would have long since noticed this, too.

Thirty seconds. What was Boblanson's secret? Biladze tried to connect the centuries-deep hatred he had seen in Boblanson with what they knew about the tumbling white cone: It had been launched around the time of the Final Conflict on a trajectory that might have pointed northwards. But the object hadn't been intended as a space probe since it had evidently acquired most of its speed while still within Earth's atmosphere. No sensible vehicle would move so fast within the atmosphere . . .

. . . *unless it was a weapon.*

The thought brought a sudden numbness to the pit of Biladze's stomach. The Final Conflict had been fought with rocket bombs fired back and forth over the North Pole. One possible defense against such weapons would be high acceleration antimissile missiles. If one such missed its target, it might very well escape Earth-Luna—to orbit the sun, forever armed, forever waiting.

Then why hadn't his instruments detected a null bomb within it? The question almost made him reject his whole theory, until he remembered that quite powerful explosions could be produced with nuclear fission and fusion. Only physicists knew such quaint facts, since null bombs were much easier to construct once you had the trick of them. But had the Ancients known that trick?

Biladze casually folded his arms, kept his position by hooking one foot through a wall strap. Somewhere inside himself a voice was screaming: *Abort the approach, abort*

the approach! Yet if he were right and if the bomb in that cone were still operable, then the Emperor and the three highest tiers of the nobility would be wiped from the face of the universe.

It was an opportunity no man or group of men had had since the Final Conflict.

But it's not worth dying for! screamed the tiny, frightened voice.

Biladze looked into the holoscreen at the hedonistic drones whose only talent lay in managing the security apparatus that had suppressed men and men's ideas for so long. With the Emperor and the top people in the Safety Committee gone, political power would fall to the technicians—ordinary Citizens from Tiflis, Luna City, Eastguard. Biladze had no illusions: ordinary people have their own share of villains. There would be strife, perhaps even civil war. But in the end, men would be free to go to the stars, from where no earthly tyranny could ever recall them.

Behind the Emperor and the nobles, Boblanson cringed no more. A look of triumph and hatred had come into his face, and Biladze remembered that he had said this would be a gift fit for the Empire.

And so your people will be revenged after all these centuries, thought Biladze. As vengeance it was certainly appropriate, but that had nothing to do with why he, Vanja Biladze, floated motionless in the control cabin and made no effort to slow their approach on the tumbling cone. He was scared as hell. Mere vengeance was not worth this price. Perhaps the future would be.

They were within a couple thousand meters of the object now. It filled the screen, as if it whirled just beyond the yacht's hull. Biladze's instruments registered some mild radioactivity in the object's direction.

Good-bye, Klaśa.

Seven million kilometers from Earth, a new star was born. In an astronomical sense, it was a very small star, but to itself and what lay nearby it was an expanding, plasmatic hell of fission-fusion products, neutrons and gamma rays.

Schwartz Between the Galaxies

Robert Silverberg

This much is reality: Schwartz sits comfortably cocooned—passive, suspended—in a first-class passenger rack aboard a Japan Air Lines rocket, nine kilometers above the Coral Sea. And this much is fantasy: the same Schwartz has passage on a shining starship gliding silkily through the interstellar depths, en route at nine times the velocity of light from Betelgeuse IX to Rigel XXI, or maybe from Andromeda to the Lesser Magellanic.

There are no starships. Probably there never will be any. Here we are, a dozen decades after the flight of Apollo 11, and no human being goes anywhere except back and forth across the face of that little O, the Earth, for the planets are barren and the stars are beyond reach. That little O is too small for Schwartz. Too often it glazes for him, it turns to a nugget of dead porcelain; and lately he has formed the habit, when the world glazes, of taking refuge aboard that interstellar ship. So what JAL Flight 411 holds is merely his physical self, his shell, occupying a costly private cubicle on a slender 200-passenger vessel which, leaving Buenos Aires shortly after breakfast, has sliced westward along the Tropic of Capricorn for a couple of hours and will soon be landing at Papua's Torres Skyport. But his consciousness, his *anima*, the essential Schwartzness of him, soars between the galaxies.

What a starship it is! How marvelous its myriad passengers! Down its crowded corridors swarms a vast gaudy heterogeny of galactic creatures, natives of the worlds of Capella, Arcturus, Altair, Canopus, Polaris, Antares—

beings both intelligent and articulate, methane-breathing or nitrogen-breathing or argon-breathing, spiny-skinned or skinless, many-armed or many-headed or altogether incorporeal, each a product of a distinct and distinctly unique and alien cultural heritage. Among these varied folk moves Schwartz, that superstar of anthropologists, that true heir to Kroeber and Morgan and Malinowski and Mead, delightedly devouring their delicious diversity. Whereas aboard this prosaic rocket, this planetlocked stratosphere-needle, one cannot tell the Canadians from the Portuguese, the Portuguese from the Romanians, the Romanians from the Irish, unless they open their mouths, and sometimes not always then.

In his reveries he confers with creatures from the Fomalhaut system about digital circumcision; he tapes the melodies of the Achernarnian eye-flute; he learns of the sneeze-magic of Acrux, the sleep-ecstasies of Aldebaran, the asteroid-sculptors of Thuban. Then a smiling JAL stewardess parts the curtain of his cubicle and peers in at him, jolting him from one reality to another. She is blue-eyed, frizzy-haired, straight-nosed, thin-lipped, bronze-skinned—a genetic mishmash, your standard twenty-first-century-model mongrel human, perhaps Melanesian-Swedish-Turkish-Bolivian, perhaps Polish-Berber-Tatar-Welsh. Cheap intercontinental transit has done its deadly work: all Earth is a crucible, all the gene pools have melted into one indistinguishable fluid. Schwartz wonders about the recessivity of those blue eyes and arrives at no satisfactory solution. She is beautiful, at any rate. Her name is Dawn—O sweet neutral non-culture-bound cognomen!—and they have played at a flirtation, he and she, Dawn and Schwartz, at occasional moments of this short flight. Twinkling, she says softly, "We're getting ready for our landing, Dr. Schwartz. Are your restrictors in polarity?"

"I never unfastened them."

"Good." The blue eyes, warm, interested, meet his. "I have a layover in Papua tonight," she says.

"That's nice."

"Let's have a drink while we're waiting for them to un-

load the baggage," she suggests with cheerful bluntness. "All right?"

"I suppose," he says casually. "Why not?" Her availability bores him: somehow he enjoys the obsolete pleasures of the chase. Once such easiness in a woman like this would have excited him, but no longer. Schwartz is forty years old, tall, square-shouldered, sturdy, a showcase for the peasant genes of his rugged Irish mother. His close-cropped black hair is flecked with gray; many women find that interesting. One rarely sees gray hair now. He dresses simply but well, in sandals and Socratic tunic. Predictably, his physical attractiveness, both within his domestic sixness and without, has increased with his professional success. He is confident, sure of his powers, and he radiates an infectious assurance. This month alone eighty million people have heard his lectures.

She picks up the faint weariness in his voice. "You don't sound eager. Not interested?"

"Hardly that."

"What's wrong, then? Feeling sub, Professor?"

Schwartz shrugs. "Dreadfully sub. Body like dry bone. Mind like dead ashes." He smiles, full force, depriving his words of all their weight.

She registers mock anguish. "That sounds bad," she says. "That sounds awful!"

"I'm only quoting Chuang Tzu. Pay no attention to me. Actually, I feel fine, just a little stale."

"Too many skyports?"

He nods. "Too much of a sameness wherever I go." He thinks of a star-bright top-deck bubble-dome where three boneless Spicans do a twining dance of propitiation to while away the slow hours of nine-light travel. "I'll be all right," he tells her. "It's a date."

Her hybrid face glows with relief and anticipation. "See you in Papua," she tells him, and winks, and moves jauntily down the aisle.

Papua. By cocktail time Schwartz will be in Port Moresby. Tonight he lectures at the University of Papua; yesterday it was Montevideo, the day after tomorrow it will be Bangkok. He is making the grand academic circuit. This is his year: he is very big, suddenly, in anthro-

pological circles, since the publication of *The Mask Beneath The Skin*. From continent to continent he flashes, sharing his wisdom, Monday in Montreal, Tuesday Veracruz, Wednesday Montevideo. Thursday—Thursday? He crossed the International Date Line this morning, and he does not remember whether he has entered Thursday or Tuesday, though yesterday was surely Wednesday. Schwartz is certain only that this is July and the year is 2083, and there are moments when he is not even sure of that.

The JAL rocket enters the final phase of its landward plunge. Papua waits, sleek, vitrescent. The world has a glassy sheen again. He lets his spirit drift happily back to the gleaming starship making its swift way across the whirling constellations.

He found himself in the starship's busy lower-deck lounge, having a drink with his traveling companion, Pitkin, the Yale economist. Why Pitkin, that coarse, florid little man? With all of real and imaginary humanity to choose from, why had his unconscious elected to make him share this fantasy with such a boor?

"Look," Pitkin said, winking and leering. "There's your girlfriend."

The entry-iris had opened and the Antarean not-male had come in.

"Quit it," Schwartz snapped. "You know there's no such thing going on."

"Haven't you been chasing her for days?"

"She's not a 'her,' " Schwartz said.

Pitkin guffawed. "Such precision! Such scholarship! *She's* not a *her*, he says!" He gave Schwartz a broad nudge. "To you she's a she, friend, and don't try to kid me."

Schwartz had to admit there was some justice to Pitkin's vulgar innuendos. He did find the Antarean—a slim yellow-eyed ebony-skinned upright humanoid, sinuous and glossy, with tapering elongated limbs and a seal's fluid grace—powerfully attractive. Nor could he help thinking of the Antarean as feminine. That attitude was hopelessly culture-bound and species-bound, he knew; in

fact the alien had cautioned him that terrestrial sexual distinctions were irrelevant in the Antares system, that if Schwartz insisted on thinking of "her" in genders, "she" could be considered only the negative of male, with no implication of biological femaleness.

He said patiently, "I've told you. The Antarean's neither male nor female as we understand those concepts. If we happen to perceive the Antarean as feminine, that's the result of our own cultural conditioning. If you want to believe that my interest in this being is sexual, go ahead, but I assure you that it's purely professional."

"Sure. You're only studying her."

"In a sense I am. And she's studying me. On her native world she has the status-frame of 'watcher-of-life,' which seems to translate into the Antarean equivalent of an anthropologist."

"How lovely for you both. She's your first alien and you're her first Jew."

"Stop calling her *her*," Schwartz hissed.

"But you've been doing it!"

Schwartz closed his eyes. "My grandmother told me never to get mixed up with economists. Their thinking is muddy and their breath is bad, she said. She also warned me against Yale men. Perverts of the intellect, she called them. So here I am cooped up on an interstellar ship with 500 alien creatures and one fellow human, and he has to be an economist from Yale."

"Next trip travel with your grandmother instead."

"Go away," Schwartz said. "Stop lousing up my fantasies. Go peddle your dismal science somewhere else. You see those Delta Aurigans over there? Climb into their bottle and tell them all about the Gross Global Product." Schwartz smiled at the Antarean, who had purchased a drink, something that glittered an iridescent blue, and was approaching them. "Go on," Schwartz murmured.

"Don't worry," Pitkin said. "I wouldn't want to crowd you." He vanished into the motley crowd.

The Antarean said, "The Capellans are dancing, Schwartz."

"I'd like to see that. Too damned noisy in here any-

way." Schwartz stared into the alien's vertical-slitted citreous eyes. Cat's eyes, he thought. Panther's eyes. The Antarean's gaze was focused, as usual, on Schwartz' mouth: other worlds, other customs. He felt a strange, unsettling tremor of desire. Desire for what, though? It was a sensation of pure need, nonspecific, certainly nonsexual. "I think I'll take a look. Will you come with me?"

The Papua rocket has landed. Schwartz, leaning across the narrow table in the skyport's lounge, says to the stewardess in a low, intense tone, "My life was in crisis. All my values were becoming meaningless. I was discovering that my chosen profession was empty, foolish, as useless as—as playing chess."

"How awful," Dawn whispers gently.

"You can see why. You go all over the world, you see a thousand skyports a year. Everything the same everywhere. The same clothes, the same slang, the same magazines, the same styles of architecture and decor."

"Yes."

"International homogeneity. Worldwide uniformity. Can you understand what it's like to be an anthropologist in a world where there are no primitives left, Dawn? Here we sit on the island of Papua—you know, headhunters, animism, body-paint, the drums at sunset, the bone through the nose—and look at the Papuans in their business robes all around us. Listen to them exchanging stock-market tips, talking baseball, recommending restaurants in Paris and barbers in Johannesburg. It's no different anywhere else. In a single century we've transformed the planet into one huge sophisticated plastic western industrial state. The TV relay satellites, the two-hour intercontinental rockets, the breakdown of religious exclusivism and genetic taboo, have mongrelized every culture, don't you see? You visit the Zuni and they have plastic African masks on the wall. You visit the Bushmen and they have Japanese-made Hopi-motif ashtrays. It's all just so much interior decoration, and underneath the carefully selected primitive motifs there's the same universal pseudo-American sensibility, whether you're in the Kala-

hari or the Amazon rain-forest. Do you comprehend what's happened, Dawn?"

"It's such a terrible loss," she says sadly. She is trying very hard to be sympathetic, but he senses she is waiting for him to finish his sermon and invite her to share his hotel room. He *will* invite her; but there is no stopping him once he has launched into his one great theme.

"Cultural diversity is gone from the world," he says. "Religion is dead, true poetry is dead, inventiveness is dead, individuality is dead. Poetry. Listen to this." In a high monotone he chants:

In beauty I walk
With beauty before me I walk
With beauty behind me I walk
With beauty above and about me I walk
It is finished in beauty
It is finished in beauty

He has begun to perspire heavily. His chanting has created an odd sphere of silence in his immediate vicinity; heads are turning, eyes are squinting. "Navaho," he says. "The Night Way, a nine-day chant, a vision, a spell. Where are the Navaho now? Go to Arizona and they'll chant for you, yes, for a price; but they don't know what the words mean, and chances are the singers are only one-fourth Navaho, or one-eighth, or maybe just Hopi hired to dress in Navaho costumes, because the real Navaho, if any are left, are off in Mexico City hired to be Aztecs. So much is gone. Listen." He chants again, more piercingly even than before:

The animal runs, it passes, it dies. And it is the great cold.
It is the great cold of the night, it is the dark.
The bird flies, it passes, it dies. And it is—

"JAL FLIGHT 411 BAGGAGE IS NOW UNLOADING ON CONCOURSE FOUR," a mighty mechanical voice cries.

—the great cold.
It is the great cold of the night, it is the dark.

"JAL FLIGHT 411 BAGGAGE—"

The fish flees, it passes, it dies. And—

"People are staring," Dawn says uncomfortably.
"—ON CONCOURSE FOUR."
"Let them stare. Do them some good. That's a Pygmy chant, from Gabon, in equatorial Africa. Pygmies? There are no more Pygmies. Everybody's two meters tall. And what do we sing? Listen. Listen." He gestures fiercely at the cloud of tiny golden loudspeakers floating near the ceiling. A mush of music comes from them: the current popular favorite. Savagely he mouths words: "*Star . . . far . . . here . . . near.* Playing in every skyport right now, all over the world." She smiles thinly. Her hand reaches toward his, covers it, presses against the knuckles. He is dizzy. The crowd, the eyes, the music, the drink. The plastic. Everything shines. Porcelain. Porcelain. The planet vitrifies. "Tom?" she asks uneasily. "Is anything the matter?" He laughs, blinks, coughs, shivers. He hears her calling for help, and then he feels his soul swooping outward, toward the galactic blackness.

With the Antarean not-male beside him, Schwartz peered through the viewport, staring in awe and fascination at the seductive vision of the Capellans coiling and recoiling outside the ship. Not all the passengers on this voyage had cozy staterooms like his. The Capellans were too big to come on board; and in any case they preferred never to let themselves be enclosed inside metal walls. They traveled just alongside the starship, basking like slippery whales in the piquant radiations of space. So long as they kept within twenty meters of the hull they would be inside the effective field of the Rabinowitz Drive, which swept ship and contents and associated fellow travelers toward Rigel, or the Lesser Magellanic, or was it one of the Pleiades toward which they were bound at a cool nine lights?

He watched the Capellans moving beyond the shadow of the ship in tracks of shining white. Blue, glossy green, and velvet black, they coiled and swam, and every track was a flash of golden fire. "They have a dangerous beauty," Schwartz whispered. "Do you hear them calling? I do."

"What do they say?"

"They say, 'Come to me, come to me, come to me!' "

"Go to them, then," said the Antarean simply. "Step through the hatch."

"And perish?"

"And enter into your next transition. Poor Schwartz! Do you love your present body so?"

"My present body isn't so bad. Do you think I'm likely to get another one some day?"

"No?"

"No," Schwartz said. "This one is all I get. Isn't it that way with you?"

"At the Time of Openings I receive my next housing. That will be fifty years from now. What you see is the fifth form I have been given to wear."

"Will the next be as beautiful as this?"

"All forms are beautiful," the Antarean said. "You find me attractive?"

"Of course."

A slitted wink. A bobbing nod toward the viewport. "As attractive as *those*?"

Schwartz laughed. "Yes. In a different way."

Coquettishly the Antarean said, "If I were out there, you would walk through the hatch into space?"

"I might. If they gave me a spacesuit and taught me how to use it."

"But not otherwise? Suppose I were out there right now. I could live in space five, ten, maybe fifteen minutes. I am there and I say, 'Come to me, Schwartz, come to me!' What do you do?"

"I don't think I'm all that self-destructive."

"To die for love, though! To make a transition for the sake of beauty."

"No. Sorry."

The Antarean pointed toward the undulating Capellans. "If *they* asked you, you would go."

"They are asking me," he said.

"And you refuse the invitation?"

"So far. So far."

The Antarean laughed an Antarean laugh, a thick silvery snort. "Our voyage will last many weeks more. One of these days, I think, you will go to them."

"You were unconscious at least five minutes," Dawn says. "You gave everyone a scare. Are you sure you ought to go through with tonight's lecture?"

Nodding, Schwartz says, "I'll be all right. I'm a little tired, is all. Too many time-zones this week." They stand on the terrace of his hotel room. Night is coming on, already, here in late afternoon; it is midwinter in the Southern Hemisphere, though the fragrance of the tropic blossoms perfumes the air. The first few stars have appeared. He has never really known which star is which. That bright one, he thinks, could be Rigel, and that one Sirius, and perhaps this is Deneb over there. And this? Can this be red Antares, in the heart of the Scorpion, or is it only Mars? Because of his collapse at the skyport he has been able to beg off the customary faculty reception and the formal dinner; pleading the need for rest, he has arranged to have a simple snack at his hotel room, *à deux*. In two hours they will come for him and take him to the University to speak. Dawn watches him closely. Perhaps she is worried about his health, perhaps she is only waiting for him to make his move toward her. There's time for all that later, he figures. He would rather talk now. Warming up for the audience, he seizes his earlier thread:

"For a long time I didn't understand what had taken place. I grew up insular, cut off from reality, a New York boy, bright mind and a library card. I read all the anthropological classics, *Patterns of Culture* and *Coming of Age in Samoa* and *Life of a South African Tribe* and the rest, and I dreamed of field trips, collecting myths and gram-

mars and folkways and artifacts and all that, until when I was twenty-five I finally got out into the field and started to discover I had gone into a dead science. We have only one worldwide culture now, with local variants but no basic divergences: there's nothing primitive left on Earth, *and there are no other planets.* Not inhabited ones. I can't go to Mars or Venus or Saturn and study the natives. What natives? And we can't reach the stars. All I have to work with is Earth. I was thirty years old when the whole thing clicked together for me and I knew I had wasted my life."

She says, "But surely there was something for you to study on Earth."

"One culture, rootless and homogeneous. That's work for a sociologist, not for me. I'm a romantic, I'm an exotic, I want strangeness, difference. Look, we can never have any real perspective on our own times and lives. The sociologists try to attain it, but all they get is a mound of raw indigestible data. Insight comes later—two, five, ten generations later. But one way we've always been able to learn about ourselves is by studying alien cultures, studying them *completely,* and defining ourselves by measuring what they are that we aren't. The cultures have to be isolated, though. The anthropologist himself corrupts that isolation in the Heisenberg sense when he comes around with his camera and scanners and starts asking questions; but we can compensate, more or less, for the inevitable damage a lone observer causes. We can't compensate when our whole culture collides with another and absorbs and obliterates it. Which we technological-mechanical people now have done everywhere. One day I woke up and saw there were no alien cultures left. Hah! Crushing revelation! Schwartz' occupation is gone!"

"What did you do?"

"For years I was in an absolute funk. I taught, I studied, I went through the motions, knowing it was all meaningless. All I was doing was looking at records of vanished cultures left by earlier observers and trying to cudgel new meanings. Secondary sources, stale findings: I was an evaluator of dry bones, not a gatherer of evidence. Paleontology. Dinosaurs are interesting, but what

do they tell you about the contemporary world and the meaning of its patterns? Dry bones, Dawn, dry bones. Despair. And then a clue. I had this Nigerian student, this Ibo—well, basically an Ibo, but she's got some Israeli in her and I think Chinese—and we grew very close, she was as close to me as anybody in my own sixness, and I told her my troubles. I'm going to give it all up, I said, because it isn't what I expected it to be. She laughed at me and said, What right do you have to be upset because the world doesn't live up to your expectations? Reshape your life, Tom: you can't reshape the world. I said, But how? And she said, Look inward, find the primitive in yourself, see what made you what you are, what made today's culture what it is, see how these alien streams have flowed together. Nothing's been lost here, only merged. Which made me think. Which gave me a new way of looking at things. Which sent me on an inward quest. It took me three years to grasp the patterns, to come to an understanding of what our planet has become, and only after I accepted the planet—"

It seems to him that he has been talking forever. Talking. Talking. But he can no longer hear his own voice. There is only a distant buzz.

"After I accepted—"

A distant buzz.

"What was I saying?" he asks.

"After you accepted the planet—"

"After I accepted the planet," he says, "that I could begin—" Buzz. Buzz. "That I could begin to accept myself."

He was drawn toward the Spicans too, not so much for themselves—they were oblique, elliptical characters, self-contained and self-satisfied, hard to approach—as for the apparently psychedelic drug they took in some sacramental way before the beginning of each of their interminable ritual dances. Each time he had watched them take the drug, they had seemingly made a point of extending it toward him, as if inviting him, as if tempting him, before popping it into their mouths. He felt baited; he felt pulled.

There were three Spicans on board, slender creatures two and a half meters long, with flexible cylindrical bodies and small stubby limbs. Their skins were reptilian, dry and smooth, deep green with yellow bands; but their eyes were weirdly human, large liquid brown eyes, sad Levantine eyes, the eyes of unfortunate medieval travelers transformed by enchantment into serpents. Schwartz had spoken with them several times. They understood English well enough—all galactic races did; Schwartz imagined it would become the interstellar *lingua franca* as it had on Earth—but the construction of their vocal organs was such that they had no way of speaking it, and they relied instead on small translating machines hung round their necks that converted their soft whispered hisses into amber words pulsing across a screen.

Cautiously, the third or fourth time he spoke with them, he expressed polite interest in their drug. They told him it enabled them to make contact with the central forces of the universe. He replied that there were such drugs on Earth, too, and that he used them frequently, that they gave him great insight into the workings of the cosmos. They showed some curiosity, perhaps even intense curiosity; reading their eyes was difficult and the tone of their voices gave no clues. He took his elegant leather-bound drug-case from his pouch and showed them what he had: learitonin, psilocerebrin, siddharthin, and acid-57. He described the effects of each and suggested an exchange, any of his for an equivalent dose of the shrivelled orange fungoid they nibbled. They conferred. Yes, they said, we will do this. But not now. Not until the proper moment. Schwartz knew better than to ask them when that would be. He thanked them and put his drugs away.

Pitkin, who had watched the interchange from the far side of the lounge, came striding fiercely toward him as the Spicans glided off. "What are you up to now?" he demanded.

"How about minding your own business?" Schwartz said amiably.

"You're trading pills with those snakes, aren't you?"

"Let's call it field research."

"Research? Research? What are you going to do, trip on that orange stuff of theirs?"

"I might," Schwartz said.

"How do you know what its effects on the human metabolism might be? You could end up blind or paralyzed or crazy or—"

"—or illuminated," Schwartz said. "Those are the risks one takes in the field. The early anthropologists who unhesitatingly sampled peyote and yage and ololiuqui accepted those risks, and—"

"But those were drugs that *humans* were using. You have no way of telling how—oh, what's the use, Schwartz? Research, he calls it. Research." Pitkin sneered. "*Junkie!*"

Schwartz matched him sneer for sneer. "*Economist!*"

The house is a decent one tonight, close to three thousand, every seat in the University's great horseshoe-shaped auditorium taken, and a video relay besides, beaming his lecture to all of Papua and half of Indonesia. Schwartz stands on the dais like a demigod under a brilliant no-glare spotlight. Despite his earlier weariness he is in good form now, gestures broad and forceful, eyes commanding, voice deep and resonant, words flowing freely. "Only one planet," he says, "one small and crowded planet, on which all cultures converge to a drab and depressing sameness. How sad that is! How tiny we make ourselves, when we make ourselves to resemble one another!" He flings his arms upward. "Look to the stars, the unattainable stars! Imagine, if you can, the millions of worlds that orbit those blazing suns beyond the night's darkness! Speculate with me on other peoples, other ways, other gods. Beings of every imaginable form, alien in appearance but not grotesque, not hideous, for all life is beautiful; beings that breathe gases strange to us, beings of immense size, beings of many limbs or of none, beings to whom death is a divine culmination of existence, beings who never die, beings who bring forth their young a thousand at a time, beings who do not reproduce—all the infinite possibilities of the infinite universe!

"Perhaps on each of those worlds it is as it has become here: one intelligent species, one culture, the eternal convergence. But the many worlds together offer a vast spectrum of variety. And now: share this vision with me! I see a ship voyaging from star to star, a spaceliner of the future, and aboard that ship is a sampling of many species, many cultures, a random scoop out of the galaxy's fantastic diversity. That ship is like a little cosmos, a small world, enclosed, sealed. How exciting to be aboard it, to encounter in that little compass such richness of cultural variation! Now our own world was once like that starship, a little cosmos, bearing with it all the thousands of Earthborn cultures, Hopi and Eskimo and Aztec and Kwakiutl and Arapesh and Orokolo and all the rest. In the course of our voyage we have come to resemble one another too much, and it has impoverished the lives of all of us, because—" He falters suddenly. He feels faint, and grasps the sides of the lectern. "Because—" The spotlight, he thinks. In my eyes. Not supposed to glare like that, but it's blinding. Got to have them move it. "In the course ... the course of our voyage—" What's happening? Breaking into a sweat, now. Pain in my chest. My heart? Wait, slow up, catch your breath. That light in my eyes—

"Tell me," Schwartz said earnestly, "what it's like to know you'll have ten successive bodies and live more than a thousand years."

"First tell me," said the Antarean, "what it's like to know you'll live ninety years or less, and perish forever."

Somehow he continues. The pain in his chest grows more intense, he cannot focus his eyes, he believes he will lose consciousness at any moment and may even have lost it already at least once, and yet he continues. Clinging to the lectern, he outlines the program he developed in *The Mask Beneath the Skin*. A rebirth of tribalism without a revival of ugly nationalism. The quest for a renewed sense of kinship with the past. A sharp reduction in nonessential travel, especially tourism. Heavy taxation of exported

artifacts, including films and video shows. An attempt to create independent cultural units on Earth once again while maintaining present levels of economic and political interdependence. Relinquishment of materialistic technological-industrial values. New searches for fundamental meanings. An ethnic revival, before it is too late, among those cultures of mankind that have only recently shed their traditional folkways. (He repeats and embellishes this point particularly, for the benefit of the Papuans before him, the great-grandchildren of cannibals.)

The discomfort and confusion come and go as he unreels his themes. He builds and builds, crying out passionately for an end to the homogenization of Earth, and gradually the physical symptoms leave him, all but a faint vertigo. But a different malaise seizes him as he nears his peroration. His voice becomes, to him, a far-off quacking, meaningless and foolish. He has said all this a thousand times, always to great ovations, but who listens? Who listens? Everything seems hollow tonight, mechanical, absurd. An ethnic revival? Shall these people before him revert to their loincloths and their pig-roasts? His starship is a fantasy; his dream of a diverse Earth is mere silliness. What is, will be. And yet he pushes on toward his conclusion. He takes his audience back to that starship, he creates a horde of fanciful beings for them, he completes the metaphor by sketching the structures of half a dozen vanished "primitive" cultures of Earth, he chants the chants of the Navaho, the Gabon Pygmies, the Ashanti, the Mundugumor. It is over. Cascades of applause engulf him. He holds his place until members of the sponsoring committee come to him and help him down; they have perceived his distress. "It's nothing," he gasps. "The lights—too bright—" Dawn is at his side. She hands him a drink, something cool. Two of the sponsors begin to speak of a reception for him in the Green Room. "Fine," Schwartz says. "Glad to." Dawn murmurs a protest. He shakes her off. "My obligation," he tells her. "Meet community leaders. Faculty people. I'm feeling better now. Honestly." Swaying, trembling, he lets them lead him away.

"A Jew," the Antarean said. "You call yourself a Jew, but what is this exactly? A clan, a sept, a moiety, a tribe, a nation, what? Can you explain?"

"You understand what a religion is?"

"Of course."

"Judaism—Jewishness—it's one of Earth's major religions."

"You are therefore a priest?"

"Not at all. I don't even practice Judaism. But my ancestors did, and therefore I consider myself Jewish, even though—"

"It is an hereditary religion, then," the Antarean said, "that does not require its members to observe its rites?"

"In a sense," said Schwartz desperately. "More an hereditary cultural subgroup, actually, evolving out of a common religious outlook no longer relevant."

"Ah. And the cultural traits of Jewishness that define it and separate you from the majority of humankind are—?"

"Well—" Schwartz hesitated. "There's a complicated dietary code, a rite of circumcision for newborn males, a rite of passage for male adolescents, a language of scripture, a vernacular language that Jews all around the world more or less understand and plenty more, including a certain intangible sense of clannishness and certain attitudes, such as a peculiar self-deprecating style of humor—"

"You observe the dietary code? You understand the language of scripture?"

"Not exactly," Schwartz admitted. "In fact I don't do anything that's specifically Jewish except think of myself as a Jew and adopt many of the characteristically Jewish personality modes, which, however, are not uniquely Jewish any longer—they can be traced among Italians, for example, and to some extent among Greeks. I'm speaking of Italians and Greeks of the late twentieth century, of course. Nowadays—" It was all becoming a terrible muddle. "Nowadays—"

"It would seem," said the Antarean, "that you are a Jew only because your maternal and paternal gene-givers were Jews, and they—"

"No, not quite. Not my mother, just my father, and he

was Jewish only on his father's side, but even my grandfather never observed the customs, and—"

"I think this has grown too confusing," said the Antarean. "I withdraw the entire inquiry. Let us speak instead of my own traditions. The Time of Openings, for example, may be understood as—"

In the Green Room some eighty or a hundred distinguished Papuans press toward him, offering congratulations. "Absolutely right," they say. "A global catastrophe." "Our last chance to save our culture." Their skins are chocolate-tinted but their faces betray the genetic mishmash that is their ancestry—perhaps they call themselves Arapesh, Mundugumor, Tchambuli, Mafulu, in the way that he calls himself a Jew, but they have been liberally larded with chromosomes contributed by Chinese, Japanese, Europeans, Africans, everything. They dress in International Contemporary. They speak slangy, lively English. Schwartz feels seasick. "You look dazed," Dawn whispers. He smiles bravely. Body like dry bone. Mind like dead ashes. He is introduced to a tribal chieftain, tall, gray-haired, who looks and speaks like a professor, a lawyer, a banker. What, will these people return to the hills for the ceremony of the yam harvest? Will newborn girl-children be abandoned, cords uncut, skins unwashed, if their fathers do not need more girls? Will boys entering manhood submit to the expensive services of the initiator who scarifies them with the teeth of crocodiles? The crocodiles are gone. The shamans have become stockbrokers.

Suddenly he cannot breathe.

"Get me out of here," Schwartz mutters hoarsely, choking.

Dawn, with stewardess efficiency, chops a path for him through the mob. The sponsors, concerned, rush to his aid. He is floated swiftly back to the hotel in a glistening little bubble-car. Dawn helps him to bed. Reviving, he reaches for her.

"You don't have to," she says. "You've had a rough day."

He persists. He embraces her and takes her, quickly,

fiercely, and they move together for a few minutes and it ends and he sinks back, exhausted, stupefied. She gets a cool cloth and pats his forehead, and urges him to rest. "Bring me my drugs," he says. He wants siddharthin, but she misunderstands, probably deliberately, and offers him something blue and bulky, a sleeping pill, and, too weary to object, he takes it. Even so, it seems to be hours before sleep comes.

He dreams he is at the skyport, boarding the rocket for Bangkok, and instantly he is debarking at Bangkok—just like Port Moresby, only more humid—and he delivers his speech to a horde of enthusiastic Thais, while rockets flicker about him, carrying him to skyport after skyport, and the Thais blur and become Japanese, who are transformed into Mongols, who become Uighurs, who become Iranians, who become Sudanese, who become Zambians, who become Chileans, and all look alike, all look alike, all look alike.

The Spicans hovered above him, weaving, bobbing, swaying like cobras about to strike. But their eyes, warm and liquid, were sympathetic: loving even. He felt the glow of their compassion. If they had had the sort of musculature that enabled them to smile, they would be smiling tenderly, he knew.

One of the aliens leaned close. The little translating device dangled toward Schwartz like a holy medallion. He narrowed his eyes, concentrating as intently as he could on the amber words flashing quickly across the screen.

". . . has come. We shall . . ."

"Again, please," Schwartz said. "I missed some of what you were saying."

"The moment . . . has come. We shall . . . make the exchange of sacraments now."

"Sacraments?"

"Drugs."

"Drugs, yes. Yes. Of course." Schwartz groped in his pouch. He felt the cool smooth leather skin of his drug-case. Leather? Snakeskin, maybe. Anyway. He drew it forth. "Here," he said. "Siddharthin, learitonin, psilocere-

brin, acid-57. Take your pick." The Spicans selected three small blue siddharthins. "Very good," Schwartz said. "The most transcendental of all. And now—"

The longest of the aliens proffered a ball of dried orange fungus the size of Schwartz' thumbnail.

"It is an equivalent dose. We give it to you."

"Equivalent to all three of my tablets, or to one?"

"Equivalent. It will give you peace."

Schwartz smiled. There was a time for asking questions, and a time for unhesitating action. He took the fungus and reached for a glass of water.

"*Wait!*" Pitkin cried, appearing suddenly. "What are you—"

"Too late," Schwartz said serenely, and swallowed the Spican drug in one joyous gulp.

The nightmares go on and on. He circles the Earth like the Flying Dutchman, like the Wandering Jew, skyport to skyport to skyport, an unending voyage from nowhere to nowhere. Obliging committees meet him and convey him to his hotel. Sometimes the committee members are contemporary types, indistinguishable from one another, with standard faces, standard clothing, the all-purpose new-model hybrid unihuman, and sometimes they are consciously ethnic, elaborately decked out in feathers and paint and tribal emblems, but their faces, too, are standard behind the gaudy regalia, their slang is the slang of Uganda and Tierra del Fuego and Nepal, and it seems to Schwartz that these masqueraders are, if anything, less authentic, less honest, than the other sort, who at least are true representatives of their era. So it is hopeless either way. He lashes at his pillow, he groans, he wakens. Instantly Dawn's arms enfold him. He sobs incoherent phrases into her clavicle and she murmurs soothing sounds against his forehead. He is having some sort of breakdown, he realizes: a new crisis of values, a shattering of the philosophical synthesis that has allowed him to get through the last few years. He is bound to the wheel; he spins, he spins, he spins, traversing the continents, getting nowhere. There is no place to go. No. There is one, just one, a place where he will find peace, where the universe

will be as he needs it to be. Go there, Schwartz. Go and stay as long as you can. "Is there anything I can do?" Dawn asks. He shivers and shakes his head. "Take this," she says, and gives him some sort of pill. Another tranquilizer. All right. All right. It will help him get where he must go. The world has turned to porcelain. His skin feels like a plastic coating. Away, away, to the ship. To the ship! "So long," Schwartz says, and lets himself slip away.

Outside the ship the Capellans twist and spin in their ritual dance as, weightless and without mass, they are swept toward the rim of the galaxy at nine times the velocity of light. They move with a grace that is astonishing for creatures of such tremendous bulk. A dazzling light that emanates from the center of the universe strikes their glossy skin and, rebounding, resonates all up and down the spectrum, splintering into brilliant streamers of ultra-red, infra-violet, exo-yellow. All the cosmos glows and shimmers. A single perfect note of music comes out of the remote distance and, growing closer, swells in an infinite crescendo. Schwartz trembles at the beauty of all he perceives.

Beside him stands the seal-slick Antarean. She—definitely *she*, no doubt of it, *she*—plucks at his arm and whispers, "Will you go to them?"

"Yes. Yes, of course."

"So will I. Wherever you go."

"Now," Schwartz says. He reaches for the lever that opens the hatch. He pulls down. The side of the starship swings open.

The Antarean looks deep into his eyes and says blissfully, "I have never told you my name. My name is Dawn."

Together they float through the hatch into space.

The blackness receives them gently. There is no chill, no pressure at the lungs, no discomfort at all. He is surrounded by luminous surges, by throbbing mantles of pure color, as though he has entered the heart of an aurora. He and Dawn swim toward the Capellans, and the huge beings welcome them with deep glad booming cries.

Dawn joins the dance at once, moving her sinuous limbs with extravagant ease; Schwartz will do the same in a moment, but first he turns to face the starship, hanging in space close by him like a vast coppery needle, and in a voice that could shake universes he calls, "Come, friends! Come, all of you! Come dance with us!" And they come, pouring through the hatch, the Spicans first, then all the rest, the infinite multitude of beings, the travelers from Fomalhaut and Achernar and Acrux and Aldebaran, from Thuban and Arcturus and Altair, from Polaris and Canopus and Sirius and Rigel, hundreds of star-creatures spilling happily out of the vessel, bursting forth, all of them, even Pitkin, poor little Pitkin, everyone joining hands and tentacles and tendrils and whatever, forming a great ring of light across space, everyone locked in a cosmic harmony, everyone dancing. Dancing. Dancing. ☆

Mr. Hamadryad

R. A. Lafferty

1

For some time there had been the feeling of an immediate change in the earthy globe, of a great turning-over that might replace the scatterbrained, petty, irascible and inefficient, though somehow human tone of the world with something that was cool, fastidiously ordered, immeasurably cruel, suave, silky, feline and altogether devilish. But the closeness, the reality of that change didn't sweep over me till I first met Mr. Hamadryad.

(I travel in coconuts, and it is ancillary to such travel that I have the fortune to meet such persons as Hamadryad.)

I believe that Mr. Hamadryad was the oddest-looking person I had ever seen. Surprisingly I regarded him so, for I first became aware of him in The Third Cataract Club in Dongola, and some very odd-looking gentlemen come into The Third Cataract. If you cock an eyebrow at someone in that place, then he's really odd.

There had been two sets of footfalls outside on the earthen corridor: one set were those of a somewhat splay-footed person in soft buckskin boots; the other were those of a barefoot person, but these latter footfalls were blurred by a sort of double step.

Only one of the persons came into the club though, and he was the splayfoot-seeming fellow in the soft skin or pelt boots.

"A Stony Giant," this person ordered from Ukali the barboy, "and the regular for lunch."

"Certainly, Mr. Hamadryad," Ukali said, and he set about building the Stony Giant.

Hamadryad's voice, when he ordered, had been a sort

of muted howl or bark, but not at all unpleasant. The Stony Giant was a large, local drink. It was a huge goblet of palm wine sprinkled with the saline rock-dust of the region. It contained a stork egg, smashed in shell and set afloat in the liquid. And Ukali added a bit of Aladdin's Sesame when the drink was almost ready. The Stony Giant is a specialty of The Third Cataract Club and is found almost nowhere else in the world.

Hamadryad had a long nose. It was so long that it set him apart from the world, whether he wished it or not. After his vision had traveled the length of his nose and had come to the world itself, it had already traveled half the distance that might be expected of anyone's vision.

Hamadryad had brown eyes that seemed not to fix on a person but on a point several feet through and behind that person. Hamadryad gave me this gaze now. Then he smiled pleasantly enough at the point several feet through and beyond me. Hamadryad had a full head of hair though of a peculiar crest and lay. He was a short person and somewhat stooped even in his shortness. But he was lively and quick of motion. His mouth—down there somewhere beneath that very long nose—had a twist of good-natured seriousness. In prospect he seemed a pleasant fellow: and, really, an odd appearance never hurt.

Ukali finished building the Stony Giant, and he gave it to Hamadryad. The barefooted double steps were heard in the corridor outside again, going up and down, but no one entered. Hamadryad had paid for the drink with a *pard d'or*, a very old coin of Somaliland. Ukali gave him no change, but wrote a figure on the air. Hamadryad had set up tab for a week or more at The Third Cataract with the gold piece. Then this odd man came and sat with me.

"Thev have explained it all away in unconvincing words," Hamadryad began with his pleasant howl or bark. "They make it seem like nothing at all. Five-hundred-ton lintel stones, and they say that they were teetered up there either with log ramps or earthen ramps, and that the ramps were removed afterwards. Banana leaves! It's nonsense, I tell you."

"What is your profession?" I asked him.

"Cosmologist," he said.

The barefoot walking was again heard outside, pounding up and down in that earthen-floored corridor, and I was very curious. What was that very heavy, very silky double step?

"Is your friend not coming in?" I asked Hamadryad and nodded towards the corridor.

"He is not my friend. He is my slave," Hamadryad said. "He was in for a moment—you didn't notice him—but now he has gone out again. I prefer that he remain outside." Yes, I thought that I had heard this slave come in and go out again, but I had been unable to see him. I knew now that the double step meant the slave was a four-footed creature and that the powerful, silky tread meant the creature was five times the weight of Hamadryad.

"Really, for even a minor megalithicon, such ramp-building would require the felling of a sizeable forest or else the moving of more dirt than all the earthworms of the world have moved in all time," Hamadryad was saying. "Even if I didn't know how it was done, I wouldn't accept that it was done with either log or earthen ramps. In Peru three-hundred-ton dressed stones are set into cliff faces that are eight thousand feet high, and sheer. At Baalbek there are thousand-ton stones set in the highest course. What sort of ramps might have been built up to raise such stones as those?"

"I don't know. I'm not a ramp man," I said.

"Really? You look very like one. I'm glad that you're not," Hamadryad said. "But I tell you that intensive on-the-site investigation would reveal the impossibility of any sort of ramp in any case. Always there is either a continuity or discontinuity of deposit and soil: nobody can build large ramps and then remove them again without leaving clear traces. Nobody, for that matter, could set very heavy lintel or other stones there on earth preparatory to raising them and not leave trace of them. But on the megalithic sites there are no such traces ever. One would be justified in saying that there have never been such ramps. One would almost be justified in saying that there have never been any such large stones on the sites were they not

there on their high supports for all to see till this very day."

I looked at Ukali the barboy. "Which of the nine kinds of nut is this?" I asked with my eye. Ukali made a jerky motion with his hand, the motion that a user of Arabic script will make when he tries to draw a Roman E in the air.

An E? Hamadryad was an Easter Island nut? He was interested in that small island that drifts always, at slow or at faster speed, towards a foreordained spot. Why, I'd have guessed that eighth or ninth on the list, certainly not first. He just didn't seem like such a one.

Ukali brought Hamadryad his lunch, the stomach of a suckling lamb distended with its original milk.

"You can check it with any fairly old stone structure," Hamadryad was continuing with his pleasant low howl. "Examine Long Barrows, Dolmens, Menhirs, Cromlechs, Henges, Temples, Pyramids and Kifo Pyramids, Sphinxes and Criosphinxes, Sanctums—is it not odd that all megalithic structures are somehow worship buildings and that there are no secular structures among them?—and you will always find the same things: stones that were and are too heavy to be lifted by any human device. The largest modern-day walking crane will hardly lift three hundred tons, but very many of the old buildings have stones weighing from four to eight times that much. Really, there is no device, ancient or modern, that could have lifted them. They simply weren't lifted by machines or devices. All logging or ramping militates against itself very quickly. In no time at all it will become ninety-five percent inefficient. We have the drag, the friction, the longer resolution of angles. The lever-advantage quickly becomes disadvantaged; there is a plain stickiness of all materials that sets early limits. That is why no modern building, say of the last three thousand years, contains really large set stones. The only exceptions are a very few most special buildings built by us initiated ones for our own reasons."

Small flakes, pieces, grains of Aladdin's Sesame were moving about on the tabletop, and there was no breeze. I saw that Hamadryad was moving them by an act of will.

He really seemed unconscious of his act, though it was taking a lot of his energy. He was practicing this thing while he ate and drank and talked, practicing it against the day when it would be required of him. This was a talent he wished to retain and develop.

Hamadryad, while clearly one of the nine kinds of nuts, did not seem like an Easter Island nut. Had I mistaken Ukali's sign?

"How are things on Easter Island?" I asked Hamadryad.

"Still drifting, and with an accelerated drift," he said. A shadow had come over him. For the moment he didn't look to be quite so pleasant a person as before he had. "The home is now about twenty-seven degrees south and a hundred and eight degrees west, but it drifts. I'm very much afraid it will reach the dread point in my own lifetime, even within the next two hundred and fifty years. Oh well, nobody remains top ape forever. There are cycles. There are aeons."

"What *is* the dread point?" I asked him.

"What? What?" Hamadryad barked. Then there was a little business that I missed. Hamadryad had cocked an inquiring eye at or through the barboy Ukali. I felt rather than heard the soundless question: "Which of the nine kinds of nuts is this?" And I flubbed Ukali's quick answer. I caught him just having made a jerky motion with his hand that a user of Arabic script will make when he draws a certain Roman letter in the air. But which? Which of the nine kinds of nut had Ukali signaled to Hamadryad that I was?

I felt very much put down, but that was only for a moment. Neither Ukali nor Hamadryad was boorish. And now Hamadryad answered me with compassion and kindness in his low, howling voice.

"Oh, twenty-nine degrees south and a hundred and eleven degrees west is about the center of it. I thought for a moment you were joking about holy things. But you really didn't know, did you?"

"No, I didn't," I said, and I felt very ignorant. Ignorant, but determined to get whatever kernel there was in this nut. "But what is so special about the point that is

twenty-nine degrees south and a hundred and eleven degrees west?" I asked stubbornly.

Hamadryad looked shocked. Did he still feel that I might be making fun of holy things? Then he answered me as if he were talking to a child:

"That's the only point on the globe that God cannot see," he said then.

"Why not?" I demanded.

"Ah, it is in the shadow of His own thumb," Hamadryad said sadly. "He'll not be able to help us when things reach that point. No one will be able to help us."

I hadn't a lot of business here. No coconuts were grown in the region of The Third Cataract, but we did import a few from the Indian Ocean coasts. And one cannot neglect any odd portion of his territory. Why should I feel like an outsider?

There was still the heavy, silken, double-step sound of bare feet in the dirt-floored corridor, the sound of a powerful animal walking on pads back and forth. I went out to look. There was nothing to be seen there, and the light was good. There was much to be heard there though—and quite a lot to be smelled. There was a little rush now of the feet coming more rapidly, coming at me. There was the stenchy animal signature. There was fear—mine. I bolted back into The Third Cataract Club. The fear didn't follow me there, but a sort of snicker followed. It was an evil, feline chortle. It was a big cat laughing at a lowly human. So I knew what animal was pacing invisible in the corridor.

"Well, how *do* you get the big stones up there?" I asked Mr. Hamadryad in total exasperation.

"Oh, we use panthers," he said simply.

"Panthers? Not leopards?" I asked. For the invisible animal in the corridor was a leopard.

"Panthers," Mr. Hamadryad repeated. "After all, a leopard is only a panther gone to meat." But how can panthers aid in raising five-hundred-ton lintel stones to great heights? I believe that Mr. Caracal came into The Third Cataract Club then.

Mr. Caracal was a suave, silky man with steep ears. Hamadryad didn't like Caracal, that was plain.

"Go back into it," Hamadryad ordered. "You have no right to be out of it."

Caracal showed a fastidious contempt for Mr. Hamadryad. Certain unclear things happened.

"This is rebellion!" Hamadryad shrilled. It may be that Hamadryad left the club then, or that both of them left. Anyhow, something intervened, and I didn't see Hamadryad again for five years.

2

Is the Yin-Yang alternation the same as the Monkey-Cat alternation? Even among the Chinese this is not certain. Just how strong is the compulsion that the dominant member—in the period of its ascendancy—holds over its contrary? Is it strong enough to rupture the Earth? Yes, Paracelsus thought so. Is it strong enough to move mountains? Yes, Mencius was sure that it was. Is it powerful enough to move continents? No, no, that's very unlikely. Powerful enough to move islands, it may be, but not continents. Avicenna believed that even small islands can only be moved a qadam or so a year. A man who sometimes comes into the Geologists' Club here says that islands can seldom be moved more than a foot a year, and that Easter Island is moving at only half that speed. He says that the tension is about the same between the Yin-Yang and the Monkey-Cat alternations—and that these are the two strongest contraries.

One can move grains of sand with a little disk held in the palm of the hand, if it bears either the Yin-Yang or the Monkey-Cat union-contrast. But increasing the size of the disk will not increase the effect.

Who do the Easter Island head-statues look like? What men or ghosts or darksome creatures do these huge, deformed dished faces properly belong to? Seldom in those years did I go to Rapa Nui on Easter Island without wondering about those things, without in fact climbing those slopes again to gaze at the giant stone heads there. I got to Gran Rapa no more than once a year—the coconut business was not really major there—but this question was with me all the time.

Were they cat faces? No, no, cats cringed in fear before those big images. Cats do not do well on Easter Island at all. The really big cats there, they say, are still underground. Were the large images dog faces? Slightly, ever so slightly. Were they monkey faces? Not quite, no, not quite. What monkeys had such long noses as those? And where else might be found such longish, good-naturedly serious faces as here?

Well, there are a few such faces on Egyptian friezes, though not perhaps on any of the better known ones—not on any of those north of Qena anyway. A few such faces were on early Mexican terra-cotta figurines—but the Mexicans did not have either the monkey or the cat, and they had the yin only and not the yang. There were quite a few of the faces in the old comic Chinese drawings that can only be called "Monkey Shines." Some of them found in Gothic carvings ought to be named "Katzenjammern," things that are too late to be honest Gothic, fourteenth-century things. The longish faces are on Irish bronze-work and on Attic pottery, but not on the best of either. Deer sometimes have that long-faced look; colts and dogs have it more often. But these are all glancing coincidences, not the solid things.

Very rarely will a person have that look. And one person in particular had it, he on whose account I began to notice the big faces closely. This person was Mr. Hamadryad, that lank-faced, long-nosed gentle man with the muted howl in his voice. He looked like that. But what was the main thing that the Easter Island heads, and Mr. Hamadryad, and all the other cited oddities looked like? What was it that pulled them all together? For the big Easter Island faces had only half their look; they implied their own intertangled opposites somewhere. One person had told me that those opposites were still sleeping in stone under the ground.

When next I saw Mr. Hamadryad, it was not in bright Africa, but in the dim and little-known interior of the North American continent. This was south of the domain of the Garfield-county wheat-growing tribe; somewhat north of those wide savannas of the bush-wool or cotton

plants; west of the pecan forests and bosky bottoms of the Canadian River wilderness; east of the sunburned grazing range of those short-legged black cattle named Angus. It was some five days' portage—or two hours by motor—from the Alabaster Hills. It was at that dusty, trail-crossing town named Oklahoma City.

Traveling in coconuts, I hadn't much business in that place. I had called on the Cross-Timbers Coconut Candy Manufacturing Company. And then I was in the Sun-Deck Club of that town.

I heard the now-familiar footfalls in the corridor outside: the steps of a splayfooted person in soft buckskin boots; and the powerfully heavy, silky quiet and blurred double steps of a barefoot being. Then Mr. Hamadryad came into the club alone. The other, the slave—if it were he—remained outside.

"A Ring-tailed Rouser, and the regular for lunch," Mr. Hamadryad ordered in that pleasant, muted howl that I would always remember.

"Certainly, Mr. Hamadryad," said Jane the beautiful bartender, and she set about building the Rouser. The Ring-tailed Rouser is composed mostly of clear, uncharred whiskey served in a quart fruit jar. There is added a sprinkle of gypsum dust from the Alabaster Hills and also the egg of the scissor-tail flycatcher, smashed in the shell and afloat in the liquid. And Hamadryad added a sprinkling of the small grains of the broomcorn plant—these grains are very like Aladdin's Sesame—as soon as the drink was set in front of him. The Ring-tailed Rouser is a specialty of the Sun-Deck Club and is found almost nowhere else in the world.

Mr. Hamadryad paid for the drink with a Jackson, one of those oblong green-paper—or green-skin—coins that were used in the middle barrens of the North American continent. He would have change coming but he let it hang. He was setting up tab at the Sun-Deck Club. He came and sat at my table.

"How did the panthers do it?" I asked him. He looked at me now. The five-year interval seemed to bother him only slightly.

"Oh, for the moment I'd forgotten what we had been

talking about," he said in that bemused, happy howl of his. "I suppose you could say that they did it in the nature of ransom. They had so much agony owing, and besides they are our slaves. But the real explanation will go back to the foundations of the world, and it concerns a partial but perpetual unfounding or moving of those foundations. You didn't think you were the first, did you? You weren't. You were the last."

"Didn't think *who* was the first *what*?" I asked him.

"You, you people of the new line," he said. "You weren't the first, and you sure were not the strongest or the most intense. Your own encounter, well, it would have been a pretty small thing to those who have known real encounters. And your fall, it was hardly what we would call a fall, without laughing. Our own fall, now that was something."

"Tell me about it," I said.

"I may not," he told me. "'Twould blow your mind and your ears. But there were quite a number of races who had covenants, before Abraham, before Adam. These covenants were towering things, and their breakings were of immeasurable depth. There was violence and earthquake and earth-shattering in those abysmal falls. After such horrors, God repented himself and made each succeeding test more gentle. If not, no flesh would have remained anywhere. And yet ourselves were quite near the end of the series. We never knew the real burning and shrieking horror of the early ones.

"We were doomed to be the slaves of slaves. For this, two races—ourselves and another—were chained together. I do not know whether I can explain this relationship to you, the closeness that accompanies an utter alienation, the apposition and the opposition. Our counterparts in this are something like your own shoulder angels?"

"Shoulder angels?" I asked. I had never heard quite that term.

"You know them though you deny them," Hamadryad said. "But your own angels, who are they really? I have heard that you yourselves usually do not see them, but every other race of magus, ghost, animal, creature or being sees them. Most of these folks believe that your refusal to

see your shoulder angels is a most cruel disdain. I've come to the conclusion, though, that it's really blindness and inattention on your part. But are they really a race coupled to you for punishment? Are they even a separate race at all?

"It is suggested that they are your own twins somehow deformed. It is guessed that they are your afterbirths somewhat mutated. Sometimes they are actually attached to you as small, fleshy extensions growing out of the human shoulders; and these, though you often deny it, can be seen by yourselves as well as by others. But these latter are usually covered up, by clothing and by silent conspiracy. But what are they really?

"With us there are two clear races involved. Our enemies serve as our angels and our slaves for an era. Then it all turns over, in a strange way and out of the sight of God. Then we must serve as angels and slaves to our enemies for a long era. We will be forced to move and lift and carry, to hew and to shape. We, the great ones, will become the slaves of the slinking panthers, and we must serve out the ransom."

Jane, the beautiful waitress, brought Hamadryad's lunch and set it before him. It was the stomach of suckling calf distended with its first milk.

"I still don't see how the big, heavy lintel stones may be moved by means of panthers," I said.

"Things much greater than lintel stones," Hamadryad howled softly and dreamily. "Do you know which are the lowest and the highest of all folks who have received the Spirit or the pseudo-spirit? The lowest of all are the gibberish people who misunderstand the old business of 'speaking in tongues.' But even in your scripture the verb used for this speaking is selected carefully from several. It means to *speak clearly*. For God is not the God of gibberish. These are the lowest of all folks, those who say 'Lord, I am holy. I can talk gibberish.' And a short million miles above the gibberish people are the snake-handlers. We, even more than yourselves, have an abhorrence touched with fear concerning snakes. It raises my hackles every time I handle a deadly snake, and I do have hackles."

Yes, Hamadryad did have hackles in the peculiar crest and lay of his lank hair.

"Snake-handlers bring courage to the affair," said Hamadryad, "in contrast to the gibberish people who bring nothing. But greatest of all is the Faith-that-Moves-Mountains. Those who bring most are the mountain-movers, the elite of all the preternaturals, of all those who are under the punishment and the ransom. I tell you that mountain-moving is very hard to fake. Mountain-moving is the most terrible task that has ever been given to man or magus to do."

"What are you doing in the barrens of North America?" I asked Hamadryad. "In particular, what are you doing here in the canton of Oklahoma?"

"I had a report, and I came to observe the Black Mesa out in the corner of this canton," he said. "I really came to observe a new and valid talent which had appeared in the region. It's of the enemy, of the slaves, but it's worth observing. I watched the working of it for three days, and it took a lot out of me. Did you know that the Black Mesa moved nine inches in the three days ending yesterday?"

"I heard that there were earthquake tremors in that region."

"There was a young and untrained puma in that region, an unslaved natural talent," Hamadryad said. "Though I loathe all cats, yet I admired that young puma. By soul-wrenching sacrifice, by towering mentality, by garish ghostliness, by rampant animality that young puma moved that mountain named the Black Mesa nine inches in three days. I saw this. I attest it. Before God, he moved it! And he did it not even for the ransom yet. He was a free puma. His was Faith, pure and undefiled."

"What has that to do with moving lintel stones?" I asked.

"It has to do with the moving of a mountain that is the equivalent of many millions of lintel stones," Hamadryad said. Hamadryad was quite shaken even in the telling of this, and I began to wonder about this person. Hamadryad had changed somewhat in appearance in the five years since I had seen him last. His oddities were all

sharpened. Whatever it was that he represented, he represented it much more strongly now. Hamadryad had once mentioned the Criosphinxes, those ram-headed sphinxes of Greece and Egypt. But he now reminded me of the Man-Drill Sphinx at Baidoa in upper Juba.

Small flakes, pieces, grains of broomcorn were moving about on the tabletop, and there was no breeze. I saw that Hamadryad was moving them by an act of will. He really seemed unconscious of his act, though it was taking a lot of his energy. He was practicing this thing while he ate and drank and talked. It was a talent which he wished to retain and develop. But it would have to be developed many millionfold to equal that of the young enemy puma who had moved the Black Mesa nine inches. Was it mountains to be moved that were overshadowing this likeable man?

"Were there mountains involved in your own original encounter?" I asked.

"Aye, Magic Mountains, Floating Mountains!" he cried with soaring memory. "But it was more than mountains, more than ships, more than islands. It was a Pavilion! Ah, what a Pavilion we did have once! It floated on the water, and it bore mountains and forests and gardens on its back. Did God ever give so magnificent an exile-float to anyone else? This was the tent that had been pitched in the pleasant place, and originally it had been larger than the world. You have heard of 'floats' in parades? Ours was the original of those moving flower-tiered wagons, or the beautiful juggernauts that moved over land and sea or the 'floats' that were floats indeed. You have, perhaps, heard the term 'watercolors' as applied to art? 'The water, like a witch's oils,/Burnt green, and blue and white'—as a poet (I sometimes think he was one of us) has written. Our moving mountain, our floating garden was the primordial watercolor in that it was a pandemonium—and it had recently been a panangelicum—of hues so vivid as to be scandal to the land, so kaleidoscopic as to require exile from that land. Aye, we were expelled from the land; we and our verdant, tiered and terraced mountain that was like a mile-high platter of fruits. We were marooned on our mountain-island-barge,

marooned on the blue and green and scarlet mirroring ocean: for maroon is a color as well as a condition. This was our purple exile on the royal and purple sea."

"It sounds wonderful, but what are you talking about?" I asked him.

"Oh, it was full of wonder, but it wasn't a pleasure-wonder," he said sadly as though he remembered it himself. "The deprivation was starker for us, perhaps, than for any other race. It may be for that reason we were provided with a grander vehicle. All left the garden with pieces of the garden, but some went with mere clods of that holy place. I have heard that you, yourselves, had to walk out."

"Oh, from the garden? Yes, I guess so," I said.

"We floated out of the garden that was in the middle of the waters," Hamadryad recited. "We floated away on an aromatic, many-colored mountain-island that was fruitful beyond description. Oh, by the red dew of Olivet but it was fair! And we were kings yet, though fallen. We forced our slaves for continuing ransom to hew and transport and set up great idols of ourselves.

"But then we drifted. We wanted to go one way. Our slaves, the cats, wanted to go another; and theirs was the agony, but theirs was also the movement. To them had been given, beyond ourselves, the terrible mentality and spirit to move stones and mountains and islands. So we drifted in the direction selected by our slaves, and it wasn't a random direction. Then pieces began to break off our beautiful island of exile."

A feline chill had entered the room. Hamadryad shivered and shriveled, and he seemed unsure of himself.

"Which pieces broke off your exile island?" I asked him.

"Oh, hundreds of pieces until what is now left is quite small and not as green as it might be. Madagascar was the largest of those early pieces to break away, and it drifted back partly toward the direction of our origin. It is still there as a mystery and a sign; it doesn't belong in the contemporary world. You know, of course, that 'Cats and Monkeys Island' is the literal meaning of Madagascar?"

"I know," I said. But Hamadryad had risen full of passion, red and purple of face, shaking and gibbering.

"Get back, get back, go back into it!" Hamadryad howled suddenly and furiously. And what had brought on such a tempest of passion?

Mr. Caracal had come into the room, and the footfalls of the corridor had come with him. Mr. Caracal was the thing that had been in the corridor invisible. And yet he was a highly visible, suave, silky man with steep ears.

"Go back into it," Hamadryad howled. "You have no right to be out of it!"

But Caracal grinned with fastidious contempt. He looked as though he might tear Hamadryad apart. There was a terrible battle being fought somewhere, in doubtful arena, and Caracal was defeating Hamadryad in furious conflict.

"Is Mr. Caracal a club member?" I asked Jane the beautiful bartender. "He is making one of your clients very unhappy."

"I'll not interfere with that one," Jane disclaimed. "You never know who is going to end up top cat."

"This is rebellion!" Hamadryad screeched. "Your time hasn't quite come."

Caracal was advancing on Hamadryad, and it really seemed as if he would eat him alive and complete as he trembled there. Somehow, Hamadryad left the Sun-Deck Club then in a stormy scene. It is likely that both of those odd persons left.

Something intervened anyhow, and I didn't see Mr. Hamadryad again for several years.

3

Madagascar, I had found, didn't really mean "Cats and Monkeys Island." Hamadryad had made that up, and I had agreed with him so as not to seem ignorant. And there are no holy records of earlier expulsions of other races from the Pleasure Place. Well, perhaps somewhere there are earlier and less holy records of such.

Following as I do the coconut trade, I happened again to be at that most unproductive base of it, Rapa Nui on

Easter Island. I was in Drill's Marine Bar. I had been asking about and thinking about a certain shadow that for countless ages has been on the face of the Earth. I was worried that Easter Island, now drifting at the wild speed of more than three hundred feet a year, had begun to enter that shadow or blind spot. And it had begun to. Several pieces of beach were already under the shadow, and they seemed void of life, void of light, void of meaning. Only irrational things could happen in those umbrageous places. But if they happened, they would happen for the whole world.

Could there really be such a blind spot on Earth? And why had it seldom been noted in the past? I asked the proprietor Drill about it, and he stroked his nose as he answered.

"Yes, the spot is indeed there and it has always been there," Drill told me. "And why has it seldom been noted? The reason that it is little noted is simply that there is nothing noteworthy about it. No wind blows there, and no wave moves. Yet there are frozen or motionless waves risen up there in their crests and furrows, and these unmoving waves have a deep meaning.

"The sun and the moon do not shine on the spot, and the stars do not. No birds fly over and no fish swim under. There is no luminescence in the depths there, and no gegenschein in the high air. Compass needles wilt and sag for there is no magnetism. In the area of the spot there is no dry land except, it is said, at the changing of the aeons. No planes fly over, for it would be all blind flight. No ships or boats traverse that shadow, for it is not on the way to anywhere. It is on no way, no route, no current, no wind. Nothing drifts in or out of the region ordinarily, though there is strong rumor that our own island drifts into it now. It is the blind spot on the globe where map-makers often put in notes or scales or explanations of Mercator's projection. So you can see that there is really nothing noteworthy about the spot. Except one thing."

Drill shook a bit of sharkskin pepper onto the back of his hand, and he licked it off with his long and perhaps prehensile tongue. There is no real pepper on Rapa Nui;

but grated sharkskin looks like pepper, and it is much cheaper if one grates it himself.

"What is that one thing?" I asked as was expected of me.

"The furrows and crests of the frozen or motionless waves, they have a design; perhaps it is the original of all designs," Drill said. "As the spot is the shadow of the thumb of God, so these undulative configurations are the shadows of the whorls and loops of God's own thumbprint. These designs have all been recorded, and they are in the old archives and chants. You can see the value of this."

"No. What is the value?" I asked.

"Why, we have positive identification," Drill said. "If ever a false God should come over our earth, we would know the difference."

"The spot is moving over our land now," said Chui, who was Drill's sweep-out boy. There was something about Chui that was too clean, too ordered, too sleek, too suave, too cruel, too efficient. His abilities were plainly beyond those of an ordinary sweep-out boy. "And the land becomes furrowed as the spot moves over it. The furrowing of the land takes the same patterns as that which the motionless waves had shown. And something else is revealed by the furrowing, is literally uncovered by the furrowing—it is the resurrection of the implicit stones."

"What stones are these?" I asked Chui.

"The basalt stones that were implicit in the Earth from the beginning," Chui said. "The stones that will become the idols of the new masters when they are hewed and carried and set up in place by the terrifying, soul-wringing labor of someone, not of ourselves."

How would there be basalt stones on Rapa Nui? How would a sweep-out boy on Rapa Nui use words like "implicit?"

There was the sound of some sort of scuffle outside of Drill's Marine Bar. There were the—now somewhat troubled—two sets of footfalls in the outer corridor: those of a splayfooted person in soft buckskin boots and also the

blurred double footfalls of a barefoot person. And I heard the angry voice of Hamadryad:

"You will wait, beast! You will not take over one instant before the time!" Hamadryad howled. There was a chilling animal chortle—it was insane, and it echoed the terrible, ordered mind-set of the insane. There was a thudding, ripping blow. And there was a quavering scream—Hamadryad's. I felt with an awful sinking that Hamadryad was dead. But presently he came into the Marine Bar. He was somewhat bloodied about the left shoulder and arm, but he was almost serene.

"It is a mistake to treat slaves with too light a hand," he howled softly, "but it is likewise a mistake not to recognize the day when it arrives. I'll not intrude my own troubles on others though, especially since the turn-over will be pretty general. Ah, a Final Catastrophe, Mr. Drill, and the usual for lunch."

"Certainly, Mr. Hamadryad," Drill said, and he began to assemble the Final Catastrophe. A Final Catastrophe is green, still-fermenting palm wine served in a large wooden bowl. It is sprinkled with sharkskin pepper and it has hull-bore worms in it to give it liveliness. It always contains a cormorant egg smashed in its shell and afloat in the liquid. The Final Catastrophe is a specialty of Drill's Marine Bar and is found almost nowhere else in the world.

"We overdramatize ourselves and our affairs," Hamadryad howled easily as the sweep-out boy Chui, a little later, was cauterizing his bleeding arm and shoulder with boiling hot ships' tar, using a big brush. Chui had a new glitter and avidity for this task. He sniffed blood; he sniffed pain. One was tempted to believe that there was a touch of cruelty involved, tempted to suspect that the tar didn't really have to be that hot.

"Actually, a final catastrophe is not as final as all that," Hamadryad added. "We eschatological persons are accused of turning all our tales into end-of-the-world tales. Really they are not. They are merely end-of-the-era tales, or end-of-the-episode tales."

Was it in mere sympathy with Hamadryad that my own left shoulder began to ache and stir and heave? A

great pain there had roots running down to my heart and lungs and liver and up into my head. Something was very wrong about this new pain in my shoulder, this new weirdness, this new desolation. A shoulder should not go to the roots of being like that. And there was something very wrong with the behavior of our island. It gave a great bump and jolt so as to produce sudden seasickness and disorientation. The island must have moved fifteen feet further into that blind spot that is the shadow of God's thumb.

Hamadryad shook kunai-grass seeds into the Final Catastrophe as soon as that drink was set in front of him. Kunai seeds are very like Aladdin's Sesame, very like broomcorn spikes. Hamadryad paid for the drink with a *nui d'argile*, a local clay coin of which five hundred are required to equal one Chilean peso. It was really not enough for the drink, but Drill was some sort of Kindred of Hamadryad—and one always enters a great turnover broke and in debt.

"Our remnant island, our vestigial home comes under the shade almost at once," Hamadryad said. "All the islands of the world—all the mains also—are only pieces broken off and drifting away from the paradise. Yet this our own island was once special among the bright ones."

Chui the sweep-out boy had begun to tear my shirt off me in strips and rippings. This wasn't ordinary behavior even in Drill's Marine Bar, but I was now in too much pain to object. It was as if a sword were going out of my shoulder, and that hurt much more going out than going in. Then, with great delight, Chui was applying boiling hot tar to my disturbed area.

"They love it," this Chui reveled. "It's a joyful malediction to them on their going out to take control. The tar brush is symbol of all such things."

"All *what* such things?" I asked with irritation. My shoulder was on fire, but there was something involved with my shoulder that was enjoying the fire.

The island gave another lurch. Still more of it had come under the somber shadow.

"The scatter-heads, those incontinent dreamers who believe that there is an Astrology, say that the world has

been in the age of Pisces," Hamadryad stated, "and that now it will, or has already, entered into the age of Aquarius. What bubble-headed fools they are! They know neither the constellations in heaven nor the constellations on earth! The world has been, for the last long era, in the glorious age of the Monkey; and now it will—Oh, why must such things be!—enter the tyrannical and meticulous age of the Cat." Hamadryad snuffled, and a tear ran down his long nose.

Drill brought Hamadryad's lunch, the stomach of suckling pig distended with its first milk. Hamadryad sprinkled it with sharkskin pepper and also with kunai seed, spilling much of both from his shaking hand. Then he dined. "—my last meal as a free person," he yowled softly.

Myself, I had that disturbed and bottomless feeling that sometimes accompanies typhoid fever, the feeling that there were two of me—one standing just a little apart from the other. But how should I suddenly have the typhoid? Or was the typhoid itself a mere fragmented premonition of something to come? (Ah, the island gave another jolt and slid still more into the shadow; soon it would be darkness at mid-morning.) Was the typhoid—it might be a collective name for many phenomena—a premonition of a thing that might be in the process of arriving at this very moment?

"All of your theories are cataclysmic, as are the happenings and appearances of this day in this place," I said, "but how are they relevant to the more substantial world in its more reasonable day-light?"

"Is it not shockingly relevant that the Monkeys are out and the Cats are in?" Hamadryad asked sorrowfully. "You will now have over all the world the careful, stalking cruelty and the tufted-eared deceit."

"Is that worse than what we have had?" I asked him. He had now become very nervous.

"Abysmally worse," he croaked. Hamadryad hadn't a good appetite for his last meal as a free person. Painfully, agonizingly, he was moving little flecks of sharkskin pepper and kunai seed about on the table, moving them with mental anguish but not touching them except with his

mind. "Oh, I'll never be able to do it," Hamadryad whimpered. "How then will I be able to move things a billion billion times heavier? Oh, it will be an agony of the spirit to perform such labor, and the doom is for such a long aeon!"

I myself was feeling as torn-up as ever I had in my life. The spooky duality was still on me. I was suffering a sundering identity crisis. There was one me located approximately in my proper body. There was another me situated somewhere behind my left shoulder. Which one was valid was unsettled. Everything in my minds was unsettled for a puzzling while. And the island on which we were staying had now developed the nervous, choppy movements of a small boat caught in a rip tide.

"What is it that those in the ascendant have and that the slaves usually lack?" Hamadryad asked in a tired, analytical howl. "It is presence," he stated.

"Presence?" I asked. "I thought that presence was the one thing that the poorest and most abject slave shared with the rich and mighty. Everyone is present somewhere."

"No, they are not," Hamadryad maintained. "Many species and races seldom show real presence. Your own shoulder-slaves do not. My own slave in the corridor—" Hamadryad shuddered a bit here "—does not. Presence is an attribute of a complete being. Many have not been complete. Now we enter a region and an era when perhaps many of us will regress to incomplete beings. It's frustrating to be incomplete."

"And invisible?" I asked.

"And invisible," he said. "It's a sad state. Many who have not experienced it do not realize that to be invisible is to be in total darkness both objectively and subjectively. In our new, sad state, we will be seen only in our work, in the hewing and transporting and setting, in the homage and ransom."

"What will we hew and transport and set?" I asked Hamadryad. "And to whom will we pay homage and ransom?"

"The great cool cats and the huge idols of them," he said fearfully. "We will be compelled—awl, awl, rawl,

rawl, howl!" and Hamadryad was seized by terrible pain and transformation.

A presence came into the room. And an absence gathered itself whimpering together. Mr. Caracal was the presence that arrived in the room. He was no longer an invisible slave in the corridor; he was a person present—felix and feline—a person of whom great idols would be raised out of the implicit stones. And Mr. Hamadryad was the gathering absence.

And I felt that I also had gathered myself into a weak absence and that that absence was slinking out of my body to skulk and slave invisibly somewhere—and I wasn't much good at moving heavy objects by mental anguish. Oh, the torture that might lie ahead! But at the same time I had become a person of great strength and vitality, and I was about to take over and infuse a body that I found tottering there, an old body of my own.

Hamadryad was now no more than a long-nosed shadow in boots that were not part of him. Then he moved out of his fancy boots, and he had baboon feet. He had stepped out of an old sign of his freedom. He was now a free-booter no longer, but a slave slipping into invisibility.

Odd that I had not noticed before that Hamadryad was a baboon. But he was a baboon, a drill, a man-drill—and a vanishing one. Odd that I had not before noticed that the long-faced statues here on Easter Island were baboon-faced. And that thousands of great-faced carvings elsewhere in the world were baboon-faced. But the baboon is much more manlike in face than are the other monkeys, and the monkeys much more so than any other creatures. And, while the monkey era had still obtained, men and monkeys were pretty much interchangeable.

Something of myself had gone out of my body and now whimpered invisible at my shoulder. But something of a more real me had come in with great strength and poise. Mr. Caracal winked at me. Mr. Chui winked at me, and he was much more than a sweep-out boy now. But Drill had disappeared to be an invisible slave for a long era.

Now I am clear and clean, and cool and cruel. I am in command of myself and of my own sector of the world. I am a cool cat with no more of the monkey resemblance. The statues to be raised by slaves from the implicit stones will resemble me. We have high-handed hatred for our right now. We have so many of such spacious things for our right now.

Have you noticed how much calmer the world is now that we have instituted certain measures of discipline? Have you noticed how much cleaner the world is now that we have made "cruelty" no longer a dirty word? Surely I and mine had once been scatterbrained, petty, inefficient and human. Is there not something intolerably monkeylike in the word *human*? That is all past. Now I am divinely mad, but cool and cruel in my disposition; no longer scatterbrained; all my brains now are neatly in one brain-pan.

Once I traveled in coconuts. In the old way of it, that was to be a monkey traveling in monkey-nuts. The coconut complex—was it not Adam Smith who wrote it so?—had been the last refuge of free enterprise in the world.

Fortunately we have broken up that refuge. We have organized coconuts, the last of the monkey-business. We have organized coconuts into the *World-Wide New Era Great Cat Coconut Cartel.*

Holy cats, we have organized it all!

Singularities Make Me Nervous

Larry Niven

Homecoming. The vast interstellar spaces have brought me back to my starting point, there below me, at the top of Rand's Needle. Three hundred stories of glass windows flash sunset fire at me, and the taxi slants down toward the landing roof.

Homecoming. I should be feeling safe and warm. I do not.

A broad flight of black marble steps leads me down into the lobby. I hail the guard before he notices me. "Hello, Emilio—"

He smiles. "Good morning, Mister Cox." He waits while I use the key—he doesn't have one himself—then holds the elevator door for me. He's noticed nothing unusual.

I hold my apartment key ready. Will he have visitors? But that's silly. I *didn't* have visitors that night.

Twelve floors down. I stand squarely in front of the peephole and ring the bell. A voice I know asks, "Who is it?"

"Can you see me?"

"Yes."

I grin. My face feels tight. My breathing is funny. "Who am I, then?"

Hesitation. "I wish I could take your retina prints."

"They'd match, George. I'm you."

"Sure you are."

He's skeptical. I am not offended. "I am you. And I've got a key to my own apartment. Shall I prove it?"

"Go ahead."

I unlock the door and walk in. The shock of recognition gets me in the pit of the stomach. Tables, chairs, favorite recline chair, couch showing the barely visible stain of a spilled eggnog. The Eddie Jones originals. The gallon brandy bottle on the wet bar. Twenty-six years in space, most of it in frozen sleep, but now it's over. I'm home.

It's all here—all in place—right down to the tenant, George Cox, who is standing well back of me, taking no chances. He's holding an enormous folding knife whose engraved blade is like a broad silver leaf. I say, "I can tell you where you got that."

"So can a lot of my friends." He doesn't relax.

"I didn't expect this to be easy. George, do you remember when you were, oh, eighteen or so? Going to Cal Tech. One night you got so lonely and so horny you called a girl you'd only met once in your life, at one of Glenda's birthday parties. She was a little plump and very sexy, remember? You called her, but you got her parents. You were so nervous and embarrassed that—"

"Shut up. All right, I remember. What was her name?"

I can't remember. I tell him so.

"Right again," he says.

"Okay. Remember that Kansas sunset where the whole sky was split down the middle by one dark blue beam? You could follow it up across the sky and down into the east, almost to the horizon."

"Yah. Unbelievable. I never saw it happen again." He considers, then folds the knife and drops it in a drawer. "You're me. How about a drink?"

"What do you think? Shall I mix?"

"I'll do it," he says.

I let him. I don't want to infringe on his territorial instincts. He goes to the trouble of mixing Navy Grogs—a compliment; he's decided it's a special occasion. I don't remember that detail from the night that I was him. I cut the straws while he's at work, and he gives me a sharp look. Nobody else would have known to do that.

"You're me," he says, when we've settled in chairs and have imbibed some of the life-giving fluid. "How?"

"The black hole. Bauerhaus Four."

"Ah." He was expecting that. "So I made it back. They haven't even picked me to go yet."

"They will."

He sips at his drink and waits.

"Black holes," I say. "Singularities. Stars that have collapsed all the way to a point. They've been there in the general theory of relativity for a hundred years or more. The first black hole was found in nineteen seventy-two, in Cygnus, circling a puffy yellow giant star. But Bauerhaus Four is a lot closer."

He nods. He's heard it before, a couple of weeks ago by his own reckoning, when Doctor Kurt Bauerhaus himself came to lecture at the Spacebranch Authority Training Center.

"But," I tell him, "not even Doctor Bauerhaus wants to talk about what goes on inside the Swartzchild radius of a black hole. Singularities upset people like Bauerhaus."

"It's time travel that does that."

"I don't think so. Forget the time travel aspect and *look* at a black hole. A mass so big that when it collapses it goes all the way to a *point*. Even light red-shifts to zero before it can get out. Would you believe it?"

He shrugs. "It's in the equations. Bauerhaus said so. Relativity's peculiar from square one, and it's checked out every time it's been tested."

"A hole into another universe, maybe, or into another part of this one, maybe. That's in the equations too. And there's a path around a *rotating* black hole that brings you back to your starting point without even going through the singularity. That sounds harmless enough until you realize you're talking about event-points—points in space-time."

He raises his glass. "Skoal."

I raise mine. "Right. I'm back before I started the trip. Most astrophysicists would rather believe there's a hole in the theory. Singularities make them nervous."

"Time travel makes *me* nervous."

"You can see for yourself." I rap my chest. "It's safe."

He doesn't look nervous. We're both relaxing now un-

der the influence of the drinks. It's been a long, weary time since I tasted the cold, brown, sweet power of a Navy Grog.

He says, "I'm only supposed to circle it, you know. And drop the probes."

"I know. But *Ulysses*' autopilot is built to send one of the probes on a round trip, through the Swartzchild radius of the star and back to its starting event-point. You just take *Ulysses* through that path instead of sending the probe. You can't go wrong. You go back in time about twenty-six years, which brings you back to the Moon six months early."

He shifts in his chair. "The Moon? Not Earth orbit?"

"Not yet. I've got *Ulysses* hidden on the back side of the Moon. From there I took a jet platform to within sight of Ley Crater, then hid that. I came back to Miami on a tourist shuttle. A year from now I'll go back to the Moon, pick up *Ulysses* and come home to a cheering mob."

"Six months after takeoff. That'll tell them you *did* go through the Swartzchild radius. Bauerhaus Four is eleven light-years away."

"Well, you can make your own decision on that—"

"The hell. You're *me*, and you've already decided!"

"I've got a year to change my mind. But look at it this way. NASA is *entitled* to know you can use a black hole this way. They're paying for the trip. And what can they do to me?"

"Yeah—"

"And I'll be damned if I'll hide out for twenty-six years."

He nods. "Right. G-george—" He stumbles over our name. "Just what's the point of all this?"

He's guessed that already, I think. "Stocks. Luckily you're already playing the stock market a little. I've memorized the behavior of several stocks for the next six months. In six months we'll be a millionaire. Then we'll go through a stack of newspapers and you'll do the memorizing."

He grins. "What for? We'll already have the money."

"I hope you're putting me on," I say uneasily.

He nods. I'm reassured, partly. But I'm the vulnerable one. If we make one mistake in the program, if the Typewriter of Time writes a different history this time around, *I'm* the one who'll disappear in a puff of smoke. Or will I? The paradoxes are all new, and we have to guess at how they'll work out.

I came back from the Moon under an assumed name: C. Cretemaster. As C. Cretemaster I now rent an apartment across town from the younger George Cox. I don't want to bug him overmuch with my presence.

I certainly bugged *me*, back when I was him. I was afraid the older George Cox would try to take over my life. He didn't—and yet he did. His very existence hemmed me in more than prison bars. I would make these choices, not those. Where the road of life forked I would turn *this* way; all others were barred to me.

He's going through that now. I stay out of his way.

And I'm *still* going through it. I'm the older George Cox now, but it doesn't help. My life is planned out in the minutest detail. My free will—my illusion of free will—will not return to me until *Ulysses* disappears among the stars. I didn't expect this.

We meet rarely during the next five months. He and Frank Curey and Yoki Lee are deeply involved in astronaut training. I'm living off his salary, but that's okay with both of us, because the value of his stocks is building and building. I'm doing all the manipulating, in our name. He doesn't have time.

It's like playing poker with reader cards! I feel no guilt, only a vast elation. The stocks move as I command them—or vice versa. Last time through this I wondered why the money didn't increase even faster. Now that I'm handling it myself, I know. There's a limit to how fast you can move money around, even when you know exactly where it ought to go.

"I feel sorry for Yoki and Frank," he tells me. "They're working just as hard as I am, and for what?"

"Think of it as predestination," I tell him. I wish I could think of a better answer. I remember how disap-

pointed they will be, and how bravely they will try to hide it.

The three of them spend two months in the *Ulysses* itself. The ship is complete now; only the trainee pilots are not ready. I can see it up there at night, a splinter of light cruising slowly across the stars.

And I remember:

Passing the planets, passing through the cometary belt. Months of fiddling with the ram fields, adjusting the flow of interstellar hydrogen into the fusion region, until finally I was in clear space. Climbing into the cold sleep tank.

Waking at midpoint, staring in awe at the way the stars had changed, blazing blue-white before me, glowing dull red behind; then turning to the tricky task of setting the fields to channel the fusion blast forward.

Waking again to find that the stars were back to normal. Using the Forward Mass Indicator to seek out Bauerhaus Four. *There.* Searching that point with the telescope—and *nothing.*

Dropping Probes One and Two. Into the ergosphere, the elliptical region of spin around the Swartzchild radius. The size of the ergosphere would tell me how much of the star's spin the black hole had carried into itself—the dimensions of the path through the singularity.

One was circling the black hole hundreds of times a second before it disappeared. Two followed the same path, fired a jet before it reached the Swartzchild radius and shot away at just less than lightspeed.

I remember plotting the course for Probe Three.

Following it down.

Am I really going to do this foolish thing?

Hell, I've already done it.

I remember the way the stars blurred near that empty Point. Once a star passed directly behind it, and for a moment it was a ring of light. There was no bump as I went through the Swartzchild radius—only the gradually increasing pull of tidal force—but somehow I knew I had left the universe.

Free at last. Free of the older George Cox.

Sure I was.

"We've been moving money around for five months now," I tell him on his return, "and we've passed the million mark. How's it feel to be a millionaire?"

"Pretty good." He smiles in triumph as he looks through the books, but the smile is a bit forced when he turns to face me. He's not used to me yet.

"Okay. Now, your job." I hand him a stack of newspapers. "Memorize these stocks."

"*All* of them?"

"No, just the ones that're going to go up, and when. But I haven't marked them, George. You have to find and mark them and then memorize them."

He grumbles, as I did once. "You've had more free time than me."

"Haven't we got cause and effect screwed up enough? I get this nightmare feeling that if we louse up the natural laws any worse, I'll go out like a candle flame. Will you do this for the best friend you ever had? Please?"

He takes the newspapers.

I don't see him for a week.

One afternoon I answer a ringing telephone. It's him. His eyes are wide, his face is white. Before I can speak he blurts it out. "They picked Frank!"

"What? The hell they did. They picked *me*."

"They picked Frank! George, what'll we do?"

His voice is fading. There's a singing in my head. The room is fading, going blurry. My knees buckle, and I drift toward the floor. I want to scream, but I can't.

I'm cold. There is rough-textured rug under my chin. I feel it with my hands, and it's real, it's really there. I must have fainted.

The other George is yelling out of the phone. "George! George!" I manage to get my face in front of the camera. I tell him, "Sit tight. I'll be right over."

This time we aren't sitting. We're pacing, passing each other, talking in random directions. It would look like low comedy if anyone could see us.

He's saying, "We could just forget it. Share the money. Ignore the paradox."

"I hate that thought. George, get it through your head

that the paradox is me. If this time track doesn't go as it went, I'm gone! We've got to do *something*."

"Like what? Steal the ship?"

"Hum. That's—"

"If I steal *Ulysses*, you get court-martialed! *You!*"

"Hah! They wouldn't even look for me."

"And how are you going to spend our million dollars in my name?"

Dammit. He's right. The effort I've spent, the risks I've taken, all for nothing.

I stop in midstride. "Maybe they won't suspect me."

"Hah. You couldn't get onto the shuttle field without showing your face."

"Hah yourself. Someone must have been impersonating me. I've got an alibi."

"Alibi?" He suddenly starts to laugh. "Hey, I'm going to make drinks. This won't make any sense at all to a sober man."

A month to wait. A month to make plans. But it isn't; they've moved the takeoff date up two weeks. I'm starting to lose faith in any kind of consistent universe. At night I'm afraid to fall asleep. Every morning comes as a joyful surprise. *I'm still here.*

I wish I could talk to Bauerhaus.

We braced him after the lecture. A small, round, voluble man, he was willing to talk at any length about cosmology in general. The Big Bang that may or may not have started the universe, that may have sown the universe with quantum black holes smaller than an atomic nucleus and weighing more than a large asteroid ... the possibility that the universe itself is inside somebody else's black hole ... white holes spewing matter from nowhere ...

But he fought clear of one subject. "Gentlemen, we simply do not know what goes on inside the Swartzchild radius of a black hole. We do not know that the matter actually goes to a point. It may be stopped by a force stronger than any we know of."

What of the paths through a rotating black hole?

He smiled like one sharing a joke. "We expect to find a hole in the theory here. We postulate a Law of Cosmic

Censorship, a process that would prevent anything from ever leaving a black hole. Otherwise we could get black holes with so much spin to them that there is no Swartzchild radius around the singularity. A naked singularity would be very messy. The mathematics is inconsistent—like dividing zero by zero."

If he could see me now, both of me together, surely it would be singularity enough. We do not risk being seen together. The younger George Cox continues his training. Newsmen interview him and Yoki on the need for more Bussard ramjets and scout ships to seek out Earthlike worlds circling other stars. The older George Cox plays the stock market and waits.

Frank Curey has spent as much time in space as I have, up until the *Ulysses* flight, which hasn't happened yet. He stands about five feet zero, stocky and well-muscled. His big square jaw gives him a bulldog look. He masses less than me or Yuri. So do the food and oxygen required to keep him alive for the year and a half he'll be awake.

There's no reason Spacebranch shouldn't have picked him over me; yet I keep wondering. What was different this time? Did the younger George concentrate too much on his stocks, too little on training? Did he stop trying, because I was the proof that he would succeed anyway?

Too late now. We've had one break. They picked me to pilot the ferry ship up and to help Frank with the final checkout of *Ulysses*.

Frank and I go through the check points together. The guards pass us through with no fuss. The shuttle field is bright with artificial lights beneath a gray-black sky.

Frank is nervous, excited. He's talking too much. Muscles flex at the edges of his jaw. "Twenty-six years. What can happen in twenty-six years? They could have immortality by then. Or a world dictatorship. Teleportation. Faster-than-light travel."

"They could get that from you, if Probe Three works out."

"Yeah. Yeah. If Probe Three comes back about the time I leave—but that's not too useful for space travel,

George. There aren't enough black holes. No kidding, George, what do you think I'll find when I come back?"

Yourself. It's on the tip of my tongue, but I swallow it. "Me, waiting at the shuttle field to tell you all about it. Unless you go too far in. Then you might not come out until every star is dead."

He clears his throat. "I know."

I say, "Care to change your mind?" Thinking there's a chance . . .

"Oh, come on," he snaps. That settles that.

We've almost reached the shuttle. It's a lifting body, not large, with a radiation shield around the tailpipe and an escalator ramp leading up into the nose. I'm talking too much myself; I'm as nervous as Frank. Lucky there were two gates. I half-expected the guards to stop us, on grounds that one of us was already inside—but apparently he got through without a hitch. Or else he didn't make it.

Frank is stepping onto the ramp when the other George Cox slides like a shadow from behind it. He's holding a heavy spanner.

And wiry Frank whips around and plants his fist in George's belly, crosses instantly with the right, plenty of class that boy shows. George goes down like a consignment of cooked spaghetti, flat on his back, his face turned up to the harsh lights.

Frank sees his face. He freezes.

I don't have a spanner. I use the stiff edge of my palm against Frank's neck. Frank turns, looking bewildered, and I hit him on the point of the jaw. He goes down.

I take his pulse. It hasn't stopped.

George Cox's heart is beating too, but he's showing no other sign of life. I don't need to take my own pulse; it's thundering in my ears. The other George Cox may need a hospital. He's in poor shape to pilot an interstellar spacecraft.

Which leaves . . . ?

Ulysses hovers before me, enormous. There are attitude jets like nostrils, but no sign of a main thruster—only the hydrogen fusion booster, as big as *Ulysses* itself, that will

run me up to Bussard ramjet speed. From that point on I'll be running on interstellar hydrogen, sweeping it in and compressing it in magnetic pinch fields until it undergoes fusion. I've been through this before. I'm not even nervous.

As the metaphysical complexities grow ever more hideously tangled, my choices grow simpler. I'm going to steal *Ulysses* because I can't possibly turn back. I'll follow the return path again, because it's my only hope of straightening this out.

I could have been killed, that last trip through the singularity. I could be killed this time. But the ghost of the older George Cox is no longer with me.

And the younger George Cox—the man I left tied back to back with Frank Curey, for verisimilitude—has become the real George Cox. There's been no break in his timeline, and no part of his timeline is me. I am fatherless, motherless, a ghost without origin.

If George keeps his head, he'll stay out of prison. He spotted an impostor, his own double, walking toward the shuttle with Frank. He was about to do something about it, with the aid of a handy spanner, when Frank exploded in his face. That's all he knows.

Docking. The whole ship goes *clunk, thot.* Up to now they could have stopped me. Now it's too late. As I cross to *Ulysses'* manlock I feel a prickly awareness of the second *Ulysses* hidden on the back side of the Moon. I've found a way to breed very expensive spacecraft. I ought to patent it.

How did it all get started, anyway? Was there ever a George Cox who followed the flight plan exactly? Yeah, and then a second George Cox watched Probe Three return even before *Ulysses* took off. That gave him an idea. If Probe Three could return before it started, so could he.

Was he the older George Cox who knocked on my apartment door a lifetime ago? Or was he already several cycles gone?

And what will happen if I just follow the flight plan this time? No, I don't dare. It would start the whole thing over again. Or would it?

I wish I could ask Bauerhaus. But people like Bauerhaus don't like singularities in the first place.

I don't blame them.

AUTHOR'S NOTE: The educated reader will have realized that you can't do that trick with a black hole of smaller than galactic mass. For story purposes it was necessary to fudge a little!

—L.N.

The Logical Life

Hal Clement

"Excuse me, Laird." T'Nekku put the helm hard over, and his boat swung about so that her bow was into the wind, the boom trailing aft just above the giant's head.

The human passenger swung the infrared flash in his hand to see what his friend, pilot and guide was up to. The 'Tuinainen was partly hidden by the mast and rigging—Cunningham was riding as far up in the bow as he could get, in the interest of comfort and safety for both of them—but the beam showed fairly clearly the bulky pyramid that was his body. It looked whitish, but color of course was meaningless through the converter goggles. The native had stood up without disturbing the boat's trim—it was merely a matter of straightening the four blocky legs which supported him—and seized a harpoon. Judging by the weapon's position, his attention was directed off to port; Cunningham swung the flash in that direction, but could see only ocean. He pushed up his goggles for a moment, but unaided human eyes did no better. The Orion Nebula covered a quarter of the sky behind him, and several O-type stars lay within a parsec of Omituinen; but starlight is still only starlight and no nebula is much help to Earthly optics.

"What's the trouble, Nek?" he asked. "Anything I can do?"

"Nothing," came the rumbling voice of the native. "It's a kind of fish you haven't seen, or at least we don't have a common word for it. He's hungry too, I judge; just a moment while I settle who eats whom." The harpoon suddenly vanished; the arm holding it had swung too fast for Cunningham's eye to follow. The missile plunged

into a wave with a barely audible *schloop* twenty yards away, and the ocean surface erupted into a cloud of spray. The man was not sure whether to be frightened or not. T'Nekku seemed to be taking the whole matter calmly, but the only emotion Cunningham had ever seen him show was humor. The giant took the serious things of life with a calmness few human beings could even emulate, much less feel. The man wondered whether the fish represented a real menace or not. He could tell from the splashing that it must be quite large, but the boat was over thirty feet long and, in spite of its bone frame and skin covering, solidly built.

The 'Tuinainen was playing the harpoon line, hauling in when he could, letting out when he had to. Evidently the fish was trying to escape rather than attack, which was some relief. Judging by the sound, it was leaping out of the water repeatedly. Cunningham wished he could see it. Several times the boat heeled several degrees toward the scene of the struggle, but presently the splashing became less violent, the hull righted itself and T'Nekku began to haul in steadily, coiling the line beside him as he had not had time to do before.

At last his quarry was alongside. With the aid of a noose that he slung outboard and maneuvered briefly, the native hauled into view something which might have come straight from a Gulf Stream marlin contest. Cunningham was not too surprised. Omituinen had some weird-looking land life, his guide being far from the least remarkable; but there is such a thing as parallel evolution, and a fish does have the engineering requirements of a fish.

T'Nekku did something, Cunningham could not see just what, and the creature stopped struggling. The rumbling voice came again.

"Do you want to examine this before I eat it?" The words were in well-enunciated Lingua Terra. The man hesitated a moment before answering.

"Not unless the ocean is a lot warmer here than around your islands," he finally said. "Have you felt it, or should I check by instrument?"

"It is a little warmer than at home, but still comfort-

able. With your strong feeling for numbers, you should probably use your thermometer. I can wait a few minutes even though the fish is here, but please waste no time."

Cunningham knew better than to waste time. Like men, the 'Tuinainen had two kinds of appetite—the habit-and-memory-controlled intellectual one and the more emotional one triggered by the actual presence of food. However, they had less control than an adult human being over the latter, and Cunningham was acutely aware that T'Nekku outweighed him five to one and was correspondingly strong. His instruments were small and light, since he was planning to carry the kit for long distances on foot under Omituinen's fifty-percent-over gravity. He whipped out a thermometer, made sure his airsuit glove was tight at the wrist, and reached overside into the ammonia ocean. Waiting a second or two for the instrument to equilibrate, he pressed the lock button and brought it up to his flash to read.

"Six degrees up. Maybe you'd better let me have a small slice. Be sure it includes some skin, please." The 'Tuinainen made some more obscure motions and boomed, "Ready to catch? Or should I toss it on the deck beside you?"

"On the deck, please. I can't see well enough to trust myself for a catch, even if I were sure of my reflexes in your gravity. Good eating." There was a thud beside him, and he picked up the sliver of tissue and slipped it into the freezer installed in the bow. Detailed examination would have to come later, under much more suitable conditions.

T'Nekku in the meantime was using a couple of hands to devour his catch and the others to bring his vessel once more onto course. The first operation took longer, but even that was completed in a very few minutes. He left nothing of the fish, though the man knew it had bones—he heard them crunch as the native ate.

The wind, dead astern, was the only way Cunningham could tell they were on course, though keeping the nebula to his left also meant something. The island the man wanted to visit was a heat source according to the long-wave maps from space—that was why he wanted to

go there. Omituinen was a sunless planet. It had condensed from cosmic dust, just as the solar system had, but lacked the mass or the hydrogen content to be a star. Its parent cloud, in the Orion area, had been rich—by astronomical standards—in heavy elements; there was enough K-40 and uranium-series matter to have warmed the planet hundreds of degrees over the billions of years it had existed. It seemed that the radioactives had concentrated, presumably through zone-melting phenomena, so that some restricted areas of the world were actually volcanic. Indeed, Omituinen must have been much hotter at some time in the past, though radioactivity might not have been responsible—somehow it had gotten rid of most of its hydrogen, which was hardly more common than on Earth.

To a human explorer, the main problem was the planet's lack of light. Cunningham would have been much happier if a spotlight or even a hand flash had not been a death ray to Omituinan life. He trusted his native friend, but still wished he could see where he was going. It was a frightening ride.

Of course, clouds could be seen, silhouetted against the nebula or glimmering faintly in the starlight. Perhaps, like Columbus or Maui, he could use a thunderhead to find his goal, but the chances were poor.

Sauvala, at the trading post on Uhittelava, had claimed he was crazy, the trader being well below retirement age and quite satisfied with ordinary dangers. The explorer had made no effort to explain to him what a few decades without meaningful work would do to a normal human mind—that a man has to do *something*. Competitive sports seem futile after a while, win or lose. The gratifying of physical appetites palls even sooner and is never a full-time satisfaction anyway. Aside from artistic expression, which is not open to all minds, only active research—any bit of which may suddenly turn out to be of life-and-death importance to mankind or even to all intelligence—can provide both the satisfaction of accomplishment and the necessary feeling of usefulness. So, at least, Cunningham felt.

Sauvala was far too young to think so. He had helped,

though. He had found the Terran-speaking T'Nekku, had supplied the maps Cunningham needed and had argued the pros and cons of the explorer's driving theory. The trader was a fairly good biologist himself, since Omituinen's principal export was enzymes, produced by its hydrazine-and-nitrate-using animal life. All the youngster had asked in return for his help was specimens to check for commercial value.

This fitted nicely with Cunningham's own goal, which was to find something analogous to plant life, not yet known on Omituinen. The animals got their nitrates, hydrazine and, of course, ammonia from the sea; logically, since the planet was at least half as old as Earth, something must be replacing these compounds just as something was constantly replacing Earth's oxygen. Presumably, something anabolic was fixing the planet's atmospheric nitrogen, but no one had found the organism yet.

So Laird Cunningham, driven by curiosity and by the human urge to accomplish something—and supported by confidence in a perfectly logical theory of his own—was sailing blindly across an almost unmapped ocean in a thirty-foot sailboat piloted by a being he had known for less than two Earthly months. T'Nekku understood the situation completely and had spent much of the trip discussing the matter with his passenger. Now, once more running steadily before the wind, he resumed the talk.

"Laird, if your idea is right, we should be finding more and more fish as we approach the island and the sea becomes richer in food chemicals. So far I have seen no real change."

"Are you sure? What I really expect is a larger quantity of the very small animals, to which you don't usually pay much attention. Actually I don't expect a really great change until we come fairly close to land—perhaps close enough to see the cloud which I expect will be above it."

"I suppose the little net you cast from time to time is to check for these small creatures. I am surprised, with your strong feeling for numbers, that you don't measure in some way how much sea the net has traversed each time you use it."

"I do time each cast."

"But we are not always sailing at the same speed."

"Surely it doesn't change very much. I hadn't been worrying about that at all. Can you tell how fast we are going at any given time?"

"Not in numbers. I know whether we are going fast or slow."

"Hmph. I should have brought some sort of log." The 'Tuinainen asked for an explanation and agreed with the man when he had received it.

"I have nothing of the sort, I fear. I know where we are, well enough to find my way home, but I could not tell you in numbers anything about it. I judge that this would not help you with this net measurement."

"I guess not," sighed Cunningham through his breathing mask. "I'll just have to do my best. Anyway, if we do start netting a lot of plankton it will suggest that I'm not too far wrong."

"That seems sensible," agreed T'Nekku. "Your idea is that these things you call plants make the chemicals that fishes, and therefore people, need for food; that they live in hot places, so the nearer we get to a hot place, the more of these chemicals there should be in the sea. It seems logical enough. I know the world is big, but these things would have been used up long ago if there were not some way of making more."

"Precisely. And making them takes energy, as I explained to you long ago."

"If all this is of such great interest to you and your people, why has not one of them tried to find out about it sooner? The traders have been here for over ten days, and it did not take them even one to learn that there were things here they wanted."

Cunningham smiled, not really cynically. "I doubt that I could tell you enough about star-traveling people to make clear the difference between those who have useful jobs and those who don't, since your people are still in the state where you do useful work or starve. Actually, the principal answer to your question is that there are many, many more unsolved problems in the Universe than there are beings interested in solving them—I am thankful to be able to say. It might easily have been a

hundred or more of your days before anyone happened to hear about this particular one and get interested in it. It might not have been one of my species, for that matter."

The debate went on until Cunningham had to sleep. The native was familiar with this human peculiarity and fell silent, while he guided the boat on under the glow of the nebula. He was quite willing to think silently, without disturbing his passenger.

It was T'Nekku's voice, however, that wakened the man.

"Laird! Look ahead! You said there might be a cloud shaped like that over your island, but you did not warn me of the light!"

The human being stretched, straightened up and looked over the bow. It took only a moment for him to grasp what he saw.

"Sorry, Nek. My fault. I should have foreseen it, though I must say this is a livelier thunderhead than I ever ran into on my own world or on any other."

Actually, the view was still impressive only to someone who could fill in from reason or experience the portion still below the horizon—or to someone as vulnerable to high-energy quanta as the 'Tuinainen. The top of what was obviously a very large cumulonimbus cloud could be seen, partly silhouetted against wisps of nebula, partly showing dimly in the starlight and mostly illuminated by a continuous flicker of its own lightning.

Continuous. For minutes they watched, and there was never a split second when the cloud went dark.

It was obvious enough. The hot spot—presumably an island—was heated steadily by the radioactives that made Omituinen habitable, concentrated as usual by zone-melting phenomena. The convection current had violent up (and no doubt down) drafts, intense rain, maybe hail—Cunningham wasn't sure about ammonia hail, but it seemed likely—and finally, predictably even though he hadn't predicted it, lightning.

But that created a problem. So far, the cloud was little brighter than the nebula and was causing T'Nekku no real inconvenience; but how much closer could they get? Cunningham had expected the limit to be set by the na-

tive's heat tolerance, which was surprisingly high considering the ammonia in his body. How much closer could they get? Maybe he should have used his ship—no, the arguments against that were still sound. Divided attention, since completely automatic operation on a world so little known would be suicidal, was the worst but not the only one. However, if T'Nekku could get no closer than this, the whole expedition would have to be reconsidered.

But that was not ascertained yet. Surely he could take more light than this.

But that was up to him, especially since it was his boat.

"Nek, I feel silly for not foreseeing this. I've seen lots of thunderheads before, and should have. I'll start taking water samples for later analysis—excuse me, I mean ammonia samples—and can only ask that you bring us as close to that place as you can. It's up to you when we back off."

"All right, Laird. I can get much closer than this, though. If we approach with the cloud over the port bow instead of straight in, the sail will shield me from the light."

"But what will happen when we start to tack out again?"

There was silence for a moment—just long enough to let Cunningham wonder whether the native had actually forgotten that point or was merely testing his passenger. Then, the rumbling voice came back:

"I could shelter myself with the spare sail—make a tent or just drape it over me."

"Are you willing to take the chance?"

"Sure. I am as interested as you are in finding out where our food comes from in the beginning."

"All right, I won't fight it. You work us on in as best you can, doing everything you can think of to protect yourself, and I'll get to it with bucket and thermometer. Thanks."

Conversation ceased, but not activity. The boat shifted heading a point to starboard and held it there. The man in the bow reached overside with instruments, tossed things into the sea with lines attached, examined items with his infrared flash, made copious notes and

froze occasional specimens. The cloud rose higher ahead of them as the minutes passed, and the flicker of lightning grew ever brighter.

The sea grew noticeably warmer, though it was still well below boiling; but the net brought up nothing very different from the creatures the man had already seen. The man listened for thunder but heard nothing but liquid rushing along the skin sides of the vessel.

Once more T'Nekku spotted a large fish and with the aid of his harpoon indulged in what he insisted on translating as a snack. The native seemed to be taking everything with his usual perfect calm—of course, nothing had happened so far which either being could consider funny. His unconcern was infectious, but finally Cunningham began to wonder why their approach to the base of the cloud was so slow. He had formed an idea of their distance and the speed of the boat. Finally he mentioned the matter.

"I was noticing that too," the native replied. "It seems a current is setting against us. This will be helpful in getting away, if we need it; I could lower all sail and cover up completely, then let it carry us out of reach of the light."

"Of course. I should have expected this," replied Cunningham. "The heat wouldn't be coming up in just one spot. Thousands of square miles of ocean bottom must be hotter than the rest of the crust—the whole slope of this mountain whose top must be the island. Ammonia would be rising along its whole surface and spreading out in all directions—there would be this current fighting us no matter which direction we came from. Do you see?"

"Of course. It is quite logical," boomed T'Nekku. For just a moment, the man wondered whether a quaver of humor were in his voice, but he did not pursue the thought.

He might have done so, but the cloud ahead suddenly distracted him. For the hour or two since they had first seen it, the lightning—or at least, the flickering illumination which the man was attributing to lightning—had been incessant. Now, abruptly, the cloud went dark. Cunningham had been facing the stern as he spoke to

T'Nekku, but the drop in light showed plainly on the sail which was in his field of view. He whirled about to see what was happening. There was little to see; the cloud remained, silhouetted against the stars, but after a few dying flickers its own light was gone.

"I thought you said that would be a permanent display—that it had been going on for millions of days and would go on for millions more," remarked T'Nekku. "You implied that the death-light coming from it was the energy source for our food."

"So I said. So I thought. I seem to have been at least partly wrong. Are you willing to sail straight in toward the cloud, now that the light is gone, to make sure whether there really is an island? I admit I can't even guess, now, when or whether the light is apt to start up again; and there is no doubt that it will get hotter as we approach."

"Your life is here with mine," replied the giant calmly. "If I die, you could not get back to the trading post—you could neither handle the rigging nor find the place. If you want to take the risk, I am ready."

"All right, then. Straight in toward the cloud. I am wondering whether it will dissipate, now that the lightning has ended."

"I should think not. The heat is still there, as I can feel and as your thermometer has reported," the other pointed out. "There should still be vapor rising, even though whatever made the light has failed."

"Hmph. Maybe. I'm beginning to doubt all my reasoning. There's obviously something I'm not allowing for." T'Nekku's cultural background included a recognizable form of courtesy, so he did not make the obvious answer to this. He changed the subject.

"I have seen numbers of small swimming things near us in the past few minutes. Shouldn't you cast your net again?"

"I should." He did so. Unfortunately, the small swimmers had no difficulty in avoiding the net. T'Nekku, mounting it on a harpoon shaft and using it as a dip net, was a little more successful; but mere gross inspection of the resulting specimens did nothing either way for Cun-

ningham's theory. They seemed to be as much animals as T'Nekku himself, equipped to catch and eat other animals. They were not, as far as the man could tell, even plankton feeders. And there was still no visible plankton in the net.

About this time, though, Cunningham managed to restore T'Nekku's sagging faith in human logic by making a prediction before the event.

"With a warm water—excuse me, ammonia—current flowing out, and cold wind coming in, I should think we'd hit surface fog before long," the man remarked thoughtfully. "I hope you'll still be able to see. I wish I knew what wave lengths your eyes, if they are eyes, use."

"If those waves pierced the fog you fear, would I be able to see that cloud we have been watching?" asked T'Nekku. Cunningham frowned thoughtfully and raised his converter goggles for a moment. He was then able to answer.

"It would seem that you can. The fog is here. My flash goes through it all right, and you didn't even know it was there, but the cloud scatters light you can see. I wonder what's up there—maybe snowflakes? Or full-sized raindrops? I'll have to make a pass through it later with my own ship. Maybe I should have done that first." He shrugged and made another temperature check.

"Warmer than ever. I'm surprised you can stand it."

The native dipped a hand overside and hastily snatched it back. "I can't. The wind is what's keeping me comfortable now, I guess, unless you have a more logical explanation."

"Do you think we should go any farther in?"

T'Nekku rose suddenly to his feet. Cunningham tried to see where his harpoon was pointing, then realized that the giant was not holding his weapon. There was no way to tell where he was looking, and the man swung his flash around wildly in hopes of seeing for himself whatever had caught the pilot's attention. He saw nothing, of course—the beam lacked any real range—but T'Nekku spoke.

"It won't be possible to go farther. I can see waves breaking on each side of us; we're practically aground now!" The rumbling voice was calm, but its owner was

active. The sail came down; the helm went over. "I don't want to get farther in, and tacking out would take us too near those breakers. We'll use the current." Cunningham stared but could still see nothing—even the nebula and stars were hidden by the fog now. The cloud had been distant when he last saw it; the island must be big. At least, it was now established that there was an island; he had been starting to doubt even that. Would there be any way for T'Nekku to set him ashore, in accordance with the original plan and agreement? The native had started to sheer off without any consultation. Had he seen something he was really afraid of?

"If there are no waves ahead, Nek, maybe we can land. Couldn't you show just a little sail and just creep in here?" asked the man.

"We are going in anyway," was the rumbling reply. "The current has changed, and it has carried us through the gap in the breakers. Do you have a reasonable explanation?"

"A river mouth—no, that would take us out. Rivers don't flow inland on small islands, and there's no tide on this planet. A deep bay, I suppose, but why the current—maybe it will get us closer to the center; the stuff must be going somewhere, and then—oh, blast, can you—"

Cunningham didn't finish organizing his thoughts. He heard the grating sound as the keel struck bottom, but even if he had interpreted it correctly he could not have reacted in time. Inertia swept him gently but firmly over the bow. He made a snatch at the sprit and felt his glove touch some part of the rigging, but he got no grip. Bone-chilling liquid closed over his head. He wondered as he sank why he had never even thought of wearing flotation gear on this trip. No one could swim in liquid ammonia—even if he were protected from the temperature; its density was too low—one might as well try to swim in gasoline.

At Omituinen's surface pressure, ammonia boils at about ten below zero, and the sea at this point was almost boiling, fortunately for Laird Cunningham. As it was, even through his airsuit's insulation he was shocked

by the sudden chill. There was no breathing problem, of course, but—

He struck bottom. Even counting the keel, the draft of T'Nekku's sailboat was small, and the water was shallow. The man got his feet under him and sprang upward as hard as he could, almost stunning himself on the bottom of the boat. He was helpless for a second or two; then he rose more carefully, hands above his head. He touched the hull before his knees were straight, this time; it must be sliding forward, so he was under the midship section rather than the bow—no, it was pressing down on him! It must be sinking! He had dropped his flash and could see nothing, but he could feel. With frantic haste he groped his way, following the sharpest upward curve he could find. It took perhaps half a minute to get out from underneath, but it seemed much longer. He stood up and found his head above the surface.

It had been deeper than that where he fell—or had it? He had fallen in an awkward, crumpled position—but he had not struck his head on the hull until his feet were off the bottom, on that leap—what was happening, anyway? He heard T'Nekku's voice thundering his name and tried to answer, but the speaking diaphragms of his face mask were not clear yet, and only an inarticulate sputtering emerged.

The liquid was down to his shoulders. To his armpits. His chest. He reached around, found the hull, and felt it move slowly away from him—it was tipping.

That oriented him. The keel had struck bottom, hurling him overboard, because the ocean had started to withdraw. The boat was right where it had struck but was heeling over as the supporting ammonia disappeared from under it. Thoughts of tsunamis flashed across Cunningham's mind—they were too close to land to survive the high side of such a wave. It would break over them—would T'Nekku know what to do? Could he do anything? Or was this something other than a tsunami—something strictly native to Omituinen, beyond the man's experience?

He was only waist-deep now. His speakers should have drained. "Nek! Are you all right?" he called.

"Somewhat upset, but not hurt," was the calm answer. "How is it that you are alive? I saw you go overboard and assumed you would die at once."

"Your ocean isn't all that different from your air, as far as my suit and I are concerned," Cunningham pointed out. "The real worry is how long either of us can stay alive. The water—excuse me, ammonia—is draining away somewhere, and even you won't last long around here with your boat high and dry."

"True. We must think. At least, this draining away explains the onshore current that caught us."

"I suppose so, but I'd like to know what explains the draining. Even if there's some sort of crater in the island that isn't full, which is hard to believe, why isn't ocean still coming in after us?" The man was only knee-deep in ammonia by this time, and he began to splash his way around to the low side of the hull. As he passed the bow his foot struck something he recognized, and with great relief he picked up his flash, sweeping its beam along the tilted vessel to see what had happened.

T'Nekku was just stepping out over the submerged port gunwale. The boat had, of course, filled the moment this side had gone under. As far as the man could tell neither T'Nekku's personal supplies nor his own equipment had shifted seriously, but the fact remained that the vessel was not only solidly aground but also, for the moment at least, an unknown distance inland.

Its owner remained calm, of course, and Cunningham tried to imitate him. He had always known, naturally, that his retirement would in some drastic fashion come sooner or later; everyone's did. He was not, however, prepared to resign himself to the notion that this must be the time.

"We'd better find out how far away the ocean is now, if you want to take the chance," he suggested.

"What chance?" asked the native. "I see no risk in walking back toward the ocean."

"What has just happened reminds me of a huge wave I have known of on other worlds, whose low side comes first. If that is what is happening here, the high side will

be along shortly, and you might be caught away from the boat."

"What good would the boat do me now?" asked T'Nekku practically.

"Hmph. That's a point. Well, if we could get it righted and emptied, there's a chance it would float when the wave comes in."

The giant pondered this for a moment.

"Righting it should not take long," he said at length. "This sand feels firm but should dig easily." One of his broad feet demonstrated briefly. "If we dig it away under the keel, which is all that is holding the hull tipped, she should settle back on her bottom easily enough."

"All right; but maybe we'd better do that before you go exploring."

"Frankly, I am very curious. Also, the walk may show that digging would be a waste of time—that something else would be more advisable. I suggest that I go to find the sea while you start the digging. I should be back quickly."

It never occurred to Cunningham to suspect his companion of laziness, so he took the suggestion at face value. "All right, I guess. What do you have that I can use for digging?"

"Why, your hand—but you have only two, of course. I hadn't thought of that. How about one of my spare harpoons?"

Cunningham sighed again. "If that's what you have, it will have to do. Let's have it—and please find that ocean as soon as you can."

Work in even the most flexible and pressure-balanced airsuits, under extra gravity, would not be easy. Cunningham knew this before he started. But he did hope it would be possible. With the native out of sight, he made his way back around to the starboard side with the uncomfortably heavy harpoon, set his light on the ground so that it would illuminate the work area and began scraping sand from under the keel.

It was not too difficult, at that. Within a few minutes the keel settled half an inch into the groove he had made under it. Of course, as he went deeper there would be

more sand to move—the third-power law was against him. However, T'Nekku should be back before long. Also, as he recalled from similar beach-digging experience during his childhood, he would probably reach the liquid table quickly, and the saturated sand should practically flow out from under the pressure of the keel. It was hardly possible for a granular surface which had been submerged only minutes before to be anything but saturated at any real distance below its surface.

But this idea did not work out. Another inch, and yet another, the keel settled. Each inch brought the hull a little closer to upright, but the firm dampness of the sand did not change. As an experiment, Cunningham left the job long enough to dig a cylindrical hole straight down for about two feet. The sand was firm enough to permit vertical sides to the little well, but its bottom showed no signs of filling. Curious now, he shuffled around to the other side of the hull and scooped a specimen-bucket of the ammonia it contained out onto the sand. It disappeared with surprising speed. He carried another bucketful around to his hole and poured it in; here, too, it soaked in instantly.

He was really puzzled now, but worked and thought simultaneously. Once he stopped as an idea struck him; he returned to his equipment supply, found a length of flexible tubing and rigged a siphon to start emptying the hull. Unfortunately, the hose was not long enough to let him use the stream as a digging tool where it was needed. He continued to dig and puzzle. This sand was firmly packed, and he had never heard that ammonia was very much less viscous than water; how did the liquid soak in so fast? And where did it go?

He did not hear T'Nekku approach, but the giant was suddenly looming beside him.

"It is not one of your waves," the native boomed. "The bottom seems to have risen just enough to cut the sea off from this bay—just barely enough—some waves are splashing over, but they sink in before getting this far. If it had only happened a few minutes earlier, we would be safe outside."

"I hate to sound paranoid," said Cunningham thought-

fully, "but usually in the past when the timing has been that good it has been deliberate. I've seen no other sign of life here, though."

"Could it be something that happens at regular intervals, rather than just once, or randomly? I would find the whole matter less surprising."

"I don't know. With neither a sun nor a moon, you don't have tides here. Wait, though, maybe it could. I've just remembered something—let's see. Heat from below, which we're taking for granted; regular water—ammonia—supply; liquid flows down, very rapidly in this case, gets heated but can't boil at first because of pressure due to depth—yes. It could be. This would be the biggest geyser I've ever seen or heard of, but that doesn't make it impossible. I don't see why the shore should rise, though—maybe gas pressure as heat accumulates—I don't know. It's a good idea, and we can work out details later. The real question, if it's basically right, is what period we can expect? Also, if the dam behind us does go down again, what will keep us from being washed downstream toward whatever reservoir this geyser uses? We'd have to claw your boat out against quite a current and against the wind."

"We could leave and build another, supposing there are animals on this island big enough to provide bone and skin. Or we could take this one apart, get the pieces to safety and rebuild it at our leisure."

"Would that be possible? What if the river came in while we had it too far apart to float but not carried to safety?"

He paused in thought for a moment. "How about getting it upright and floatable and then waiting through a cycle of this thing—or at least long enough to suggest the cycle will be too long for us. If the river comes in, we can't fight it, but I should think you could guide us to one side and ground there, or anchor. Then we'd know we were close to a safe spot, and we'd know about how long we'd have to do the dismantling and rebuilding. Can you stand the heat here, just waiting?"

"As long as the wind blows, yes. The sand is uncomfortable, but once the boat is level I can stay in that. I

can't say your plan really satisfies me, but I can think of nothing better. Let's get on with the digging. What's this hole you made, with liquid in the bottom? Wasn't there enough in the boat already?"

Cunningham was slow to react. "I noticed how quickly the liquid soaked into the sand and was trying to find how far down the table was. I still don't see how it disappears so fast. I wish I knew the viscosity of ammonia—but even if it's ten or a hundred times that of water, where did—What? Did you say there *is* liquid in the hole?"

"Yes. Look." Cunningham shone his flash downward. The well had mushroomed at the bottom, like the holes he had dug in an Earthly beach so long ago, as sand from the walls settled into the liquid to form a loose slurry. As he watched, another lump fell and lost its identity. He reached down with his gloved hand and scooped up some of the sand-and-liquid mixture, bringing it and his face both toward the light. "It's warm, even for me!" he exclaimed.

T'Nekku extended a hand toward it, then withdrew the member in startled haste, ejaculating an indescribable sound.

"What a stink! That's not sea-ammonia! What do you have there, anyway?"

The man looked up, frowning. "It's not? You're sure?"

"I never dipped a finger into a smell like that in my life, and I will never willingly do it again!"

Cunningham thought for half a minute. Then he got to his feet as quickly as the gravity permitted and shuffled hastily around the bow toward his specimen containers, still cupping the offensive stuff in his hand. He called back over his shoulder, "Dig like mad! Get this boat upright! And when we've managed that, keep on digging—I want to see what's under this sand!"

Two hours later and a mile offshore, with the beginning flickers of lightning playing on the looming cloud, Cunningham spoke more calmly.

"It all makes perfectly good sense, though I wish we'd had more time to dig. I'm sure I know what we would

have found. I was just being trapped by my own prejudices, as usual. I was looking for microscopic life which could fix Omituinen's atmospheric nitrogen and produce the basic food compounds which you find so distasteful in concentrated form. I'd be surprised at that if I hadn't had to live on straight amino acids for a while, once. When I saw the lightning, I was sure its high-energy quanta must be the key. But I didn't stop to think how little of the total available energy was going into that lightning, and what a big advantage would be possessed by a life form able to use the heat directly, for anabolism. I just never thought of the possibility of a single huge plant underlying—practically *forming*—the island. I had to be slammed on the nose—and underfoot—by it. The geyser idea was good but left out some facts that needed explaining."

"I suppose you know what you're talking about, and that awful-smelling stuff is what I basically live on," rumbled T'Nekku, "but I'll keep taking it in meat, I think. I still don't see, though, what led you to think of a single big creature, even when the food appeared in that well. I can see now how it must have got there. The creature must be only a little way down, to take in ammonia from the river so fast and get the waste products back so quickly—but why a single creature? Why not millions of the little things you expected, living among the sand grains?"

The man smiled. "It wasn't the stuff in the hole. There is a process carried out by many organisms—though not, in my experience, by plants—which you would have no way of knowing about. You get all your food chemicals by eating and drinking. It was the changing height of the ground, alternately raising and lowering the sandbar which shut us off from the sea, which was the real clue. I'm afraid I never explained *breathing* to you."

He did.

"It does make sense," the 'Tuinainen admitted. "This would mean, then, that every hot place in the world is surrounded by a creature of this sort, living on the heat

and putting out chemicals which are food for real people."

"Possibly." Cunningham was hesitant as a new thought struck him. "I can't tell, or more than guess, whether the others would be just like this one. Maybe—hmmm. It's hard to say whether the word *species* would mean anything in this connection. Maybe each one developed individually—or from cells shed by others—but modified as it developed. Plants differ in individual characteristics more than animals, at least on worlds I know . . ." His voice trailed off, and he thought silently for a minute or two.

"Nek, are you willing to go back to your island, lay in a really huge supply for me and then go on a *long* journey? Would more of your people get in on the act, if I told what I've found and some other off-worlder came to investigate?"

"I will be quite willing to listen to reason," the giant assured him. ☆

Twig

Gordon R. Dickson

For four hours Twig had been working up her courage to approach the supply post. Now in the pumpkin-colored afternoon light of the big, orange-yellow sun, she stood right beside one of the heavy rammed-earth walls. From the slice of dark interior seen through the partial opening of the door not two meters from her, came the sound of a raucous and drunken tenor—not a young tenor, but a tenor which cracked now and then on the dryness of a middle-aged throat—singing.

> . . . *'As game as Ned Kelly,' the people would say;*
> *'As game as Ned Kelly,' they say it today . . .*

It would have been something, at least, if the accent of the singing voice had been as Australian as the ballad of the old down-under outlaw who, wearing his own version of armor, had finally shot it out with the police and been slain. But Hacker Illions had never seen the planet Earth, let alone Australia; and his only claims to that part of Sol III were an Australian-born mother and father, both over twenty years dead and buried here on Jinson's Planet. Even Twig knew that Hacker had no strong connection with Ned Kelly and Australia, only a thread of one. But she accepted his playing the Aussie, just as she accepted his foolishness when drunk, his bravery when sober and his wobbly but unceasing devotion to the Plant-Grandfather.

Hacker had been drinking for at least the four hours since Twig had arrived at the supply post. He would be in no shape to talk sense to now. Silent as a shadow,

light as a flicker of sunlight between two clouds, Twig pressed against the coarse-grained earth wall, listening and trying to summon up the courage to go inside, into that dark, noisome, hutchlike trap her own kind called a building. There would be others in there beside Hacker—even if only the Factor of the supply post itself. There might even be others as drunk as Hacker, but worse-minded, men who might try to catch and hold her with their hands. She shivered. Not only at the feel in her imagination of the large, rough hands; but with the knowledge that if they did seize her, she would hurt them. She would not be able to help herself; she would have to hurt them to make them let her go.

Sinking down into a squatting position beside the earth wall, Twig rocked unhappily on her heels, silently mourning inside herself. If only Hacker would come out, so that she would not have to go in after him. But for four hours now, he had not left the building. There must be some place inside there where he could relieve himself; and that meant he would not have to leave the building until he ran out of money or was thrown out—and the posse must now be less than an hour from here.

"Hacker!" she called. "*Come out!*"

But the call was only a whisper. Even alone with Hacker, she had never been able to raise her voice above that whisper level. Normally, it did not matter. Before she had met Hacker, when she had only the Plant-Grandfather to talk to, she had not needed to make sounds at all. But now, if she could only shout, like other humans. Just once, shout like the human she actually was . . .

But her aching throat gave forth nothing but a hiss of air. The physical machinery for shouting was there, but something in her mind after all those years of growing up with only the Plant-Grandfather to talk to would not let it work. There was no time left and no choice. She pulled taut the threads that bound the suit of bark tightly about her body. Hacker had always wanted her to wear human clothes; they would give her more protection against ordinary men, he said. But anywhere except in a closed box like this building, no other human could catch her anyway; and she could not stand the dead feel of the

materials with which other humans covered their bodies. She took a deep breath and darted in through the half-open door.

She was almost at Hacker's side before anyone noticed her, so light and swift had been her dash across the floor. None of them there saw her passage. Hacker stood, one of his elbows on a waist-high shelf called a bar. It was a long bar that ran along the inside wall of the room with space for the Factor to stand behind it and pass out glasses and bottles. The Factor was standing there now; almost, but not quite, opposite Hacker. Facing Hacker, on Hacker's side of the shelf, was a man as tall as Hacker, but much heavier, with a long, black beard.

This man saw her first, as she stole up beside Hacker and tugged at his jacket.

"Hey!" shouted the black-bearded man; and his voice was a deep and growling bass. "Hacker, look! Don't tell me it's that wild kid, the one the Plant raised! It is! I'll be damned, but it is! Where've you been keeping her hid all this time?"

And just as Twig had known he would, the black-bearded man reached out a thick hand for her. She ducked behind Hacker.

"Leave her alone!" said Hacker thickly. "Twig—Twig, you get out of here. Wait for me outside."

"Now, hold it a minute." The black-bearded man tried to come around Hacker to get to her. A miner's ion drill dragged heavily down on a holster fastened to the belt at his waist. Hacker, unarmed, got in the way. "Get out, Hacker! I just want to look at the kid!"

"Leave her, Berg," said Hacker. "I mean it."

"You?" Berg snorted. "Who're you but a bum I've been feeding drinks to all afternoon?"

"Hacker! Come!" whispered Twig in his ear.

"Right. All right!" said Hacker with drunken dignity. "That the way you feel, Berg . . . Let's go, Twig."

He turned and started toward the door. Berg caught him by the looseness of his leather jacket and hauled him to a stop. Beyond the black beard, Twig could see the Factor, a fat, white man, leaning on his elbows on the

shelf of the bar and smiling, saying nothing, doing nothing.

"No, you don't," said Berg, grinning. "You're staying, Hack. So's the kid, if I've got to tie you both up. There's some people coming to see you."

"See me?" Hacker turned to face the black beard and stood, swaying a little, peering at the other, stupidly.

"Why, sure," said Berg. "Your term as Congressman from this district ran out yesterday, Hacker. You got no immunity now."

Twig's heart lurched. It was worse than she had thought. Hacker drunk was bad enough; but someone deliberately put here to feed him drinks and keep him until the posse caught up, was deadly.

"Hacker!" she whispered desperately in his ear. "Run *now!*"

She ducked around him, under the arm with which Berg was still holding him, and came up between the two men, facing Berg. The big man stared at her stupidly for a moment and then her right hand whipped in a backhand blow across his face, each finger like the end of a bending slender branch, each nail like a razor.

"What?" bellowed Berg jovially, for her nails were so sharp that he had not immediately felt the cuts. "You want to play too—"

Then the blood came pouring down into his eyes, and he roared wordlessly, letting go of Hacker and stumbling backward, wiping at his eyes.

"What are you trying to do? Blind me?" he shouted. He got his eyes clear, looked down at his hands and saw them running with his own blood. He roared again, a wild animal furious and in pain.

"Run, Hacker!" called Twig desperately. She ducked in under Berg's arms as he made another clutch on her, lifted his drill from its holster and shoved it into Hacker's belt. "Run!"

Berg was after her now, but even without the blood running into his eyes, he was like a bear chasing a hummingbird. Twig was all around him, within reach one moment, gone the next. He lumbered after her, a madman with a head of black and red.

Hacker, woken at last to his danger and sobered, was backing out the door, Berg's drill in his hand, now covering both the Factor and Berg.

"Leave off, Twig!" Hacker cried, his voice thin on the high note of the last word. "Come on!"

Twig ducked once more out of the grasping hands of Berg and flew to join Hacker in the doorway.

"Get back, Berg!" snarled Hacker, pointing the drill. "I'll hole you if you come any farther!"

Berg halted, swaying. His mouth gapped with a flicker of white teeth in his black and crimson mask.

"Kill you . . ." he grunted hoarsely. "Both. Kill you . . ."

"Don't try it," said Hacker. "Less you want to die yourself first—from now on. Now, stay, and that means both of you, Factor. Don't try to follow. —Twig!"

He slipped out the door. Twig followed. Together they ran for the forest.

Twig touched with her hands the first trees they came to, and the trunks and branches ahead of them leaned out of the way to let them pass, then swayed back together again behind them. They ran for perhaps a couple of kilometers before Hacker's breath began to labor hoarsely in his lungs and he slowed to a walk. Twig, who could have run all day at the speed they had been keeping, fell into a walk beside him. For a little while he only struggled to get his breath back as he went.

"What is it?" he asked at last, stopping so that he would be able to hear Twig's whispered reply.

"A posse, they call it," she said. "Ten men, three women, all with drills or lasers. They say they'll set up a citizen's court and hang you."

"Do they?" grunted Hacker. He stank mightily of alcohol and ugly anger. But he was most of the way back toward being reasonably sober now; and Twig, who loved him even more than she loved the Plant-Grandfather nowadays, had long since gotten used to his smells. He sat down with a thump, his back against a tree trunk, waving Twig down to sit also.

"Let's sit and think a bit," he said. "Plain running's not going to do any good. Where are they now?"

Twig, who was already sitting on her heels, got up and

stepped forward to the tree against which Hacker was sitting. She put her arms around the trunk as far as they would reach, laid her cheek against its dear, rough bark, closed her eyes and put her mind into the tree. Her mind went into darkness and along many kilometers of root and by way of many children of the Plant-Grandfather, until she came to the littlest brothers, whom other humans said were like a plant called "grass" back on Earth. Less than forty minutes walk from where she and Hacker were, some of the littlest brothers were feeling the hard, grim metal treads of human vehicles, pressing down to tear and destroy them.

"Peace, littlest brothers, peace," soothed Twig's mind, trying to comfort them through the roots. The littlest brothers did not feel pain as the variform Earth animals and humans like Twig felt it; but in a different way they felt and suffered the terrible wrongness that was making them not to be in this useless, wasteful fashion. Those being destroyed wept that they had been born to no better purpose than this; and, down below all living plants on the surface of Jinson's Planet, the Plant-Grandfather echoed their despair in his own special way. He was weary of such destruction at the hands of alien men, women and beasts.

"Peace, Grandfather, peace," sent Twig. But the Plant-Grandfather did not answer her. She let go of the tree, stepped back from it and opened her eyes, returning to Hacker.

"They're riding in carriers," she told him. From the grass, the trees looking down on the passing carriers, she could now describe the open, tracked vehicles and the people in them as well as if her human eyes had actually seen them. "When they first started, there were eight of them, and they were only walking. Now there are five more who brought the carriers. They can catch up to us in half an hour if we stay here. And the carriers will kill many trees and other children of the Grandfather before they come to us."

"I'll head for the High Rocks district, then," said Hacker. The frown line was puckered deep between the blue eyes in his stubbled, bony face. "They'll have to

leave their vehicles to follow me on foot; and there's little for them to tear up and hurt. Besides, there they'll chase me a month or weeks and never catch me. Actually, you're the one they really want to catch so they can make you tell where they can find the Grandfather; but they daren't try that while I'm alive to tell the law. We've still got some law here on Jinson's Planet; and supraplanetary law beyond that. That reminds me—"

He fished with two fingers in a shirt pocket under his jacket and came out with a small slip of writing cellulose. He passed it over to Twig.

"While I was still down at Capital City with the Legislature," he said, "I got the Governor-general to send for an ecology expert from the Paraplanetary Government, someone with full investigative powers, legal and all. That's his name."

Twig squatted down once more and unfolded the cellulose strip which had been bent double to fit the small shirt pocket. She was proud of her reading ability and other schooling, which Hacker had gotten for her with a teaching machine he had carried upcountry himself; but the original printing on this sheet had been in blue marker and Hacker's sweat had dimmed it to near unreadability.

"John . . . Stone," she read off aloud finally.

"That's the man." Hacker said. "I had it fixed so the whole business of sending for him was secret. But he was supposed to land two days ago and be on his way upcountry here to meet me now. He shouldn't be more than a day's walk south of here on the downcountry trail. He's been told about you. You go meet him and show him that piece of paper. Bring him up to date about what's going on with the posse and all. Meanwhile I'll lead that crew around the High Rocks and down to Rusty Springs by late noon tomorrow. You and Stone meet me there, and we'll be waiting for the posse when they catch up."

"But there's only going to be two of you, even then," protested Twig.

"Don't you worry." Hacker reached out, patted the bark covering her shoulder and stood up. "I tell you he's a supraplanetary official—like someone from the police.

They won't risk breaking the law with him there. Once they know he's around, none of these croppers that want to burn out new farming fields from the Grandfather's woods will dare try anything."

"But when he goes again—" Twig also rose to her feet.

"By the time he goes," said Hacker, "he'll have recommended a set of laws for the legislature that'll stop those forest-burners for all time. Go south now, Twig; and when you find him stay with him. If that posse's out after me, it's out after you, too, if it can just find you."

He patted her shoulder again, turned and went off through the trees, moving at a fast walk that was a good cross-country pace—for anyone but Twig.

Twig watched him go, wanting badly to go with him, to stay with him. But Hacker would be right, of course. If what was needed was this John Stone from another world, then he was the one she must go and find. But the unhappiness of everything—of everything all around here and to all the things she loved—was overwhelming. When Hacker was gone, she dropped face down on the ground, hiding her face against it, spreading her arms as if she could hold it.

"Plant-Grandfather!" she called, letting her mind only cry it forth, for it was not necessary to touch one of the plant children when she called the Grandfather. But there was no answer.

"Plant-Grandfather!" she called again. "Plant-Grandfather, why don't you answer?" Fear shook her. "What's the matter? Where have you gone?"

"Peace, little running sister," came the heavy, slow thought of the Grandfather. "I have gone nowhere."

"I thought maybe people had found you there under the ground," said Twig. "I thought maybe they had hurt you—killed you—when you didn't answer."

"Peace, peace, little runner," said the Grandfather. "I am tired, very tired of these people of yours; and maybe sometime soon I may actually sleep. If so, whether I will wake again, I do not know. But do not believe I can be killed. I am not sure anything can be killed, only changed for a while, made silent until it is remembered by the universe and regrown to speak once more. I am not like

your people who must be one form only. Whether I am root or branch or flower makes no difference to me. I am always here for you, little runner, whether I answer you or not."

Twig's tears ran down her nose and dampened the earth against her face.

"You don't understand!" she said. "You *can* die. You *can* be killed. You don't understand. You think it's all just sleeping!"

"But I do understand," said the Plant-Grandfather, "I understand much more than any little runner, who has lived only a moment or two, while I have lived long enough to see mountain ranges rise and fall again. How can I die when I am more than just the thing of woody roots these people would find and destroy? If that is gone, I am still part of every plant thing on this world, and of my little runner as well. And if these things should someday be gone, I am still part of the earth and stone that is this planet; and after that, part of its brother and sister planets, and after that even all worlds. Here, alone, I taught myself to speak to all my plant brothers and sisters from the largest to the smallest. And all the while, on a world so far away it is lost even to my view, your people were teaching themselves to speak. So that now I and you speak together. How could that happen if we were not all one, all part of each other?"

"But you'll still be dead as far as I'm concerned!" sobbed Twig. "And I can't stand it! I can't stand to have you dead!"

"What can I say to you, little running sister?" said the Grandfather. "If you will make it that I am dead, then I will be dead. But if you will let it be that I cannot be killed, then I cannot be killed. You will feel me with you forever, unless and only if you shut out the feeling of me."

"But you won't help yourself!" wept Twig. "You can do anything. You took care of me when I was a baby, alone. There was only you. I don't even remember my mother and father, what they looked like! You kept me alive and grew me up and took care of me. Now you want to take yourself away, and I'm not to care. And you don't have to give up, just like that. You could open the

ground in front of these people and let the hot rock out. You could empty the rivers they drink from. You could send seeds against them with pollen to make them sick. But you won't do anything—nothing but lie there until they find and kill you!"

"Doing what you say is not the way," said the Plant-Grandfather. "It is hard to explain to a little runner who has only lived a moment, but the universe does not grow that way. Along that way of damage and destruction, all things fail and their growth is lost—and so would mine be. You would not want me to be sick and no longer growing, would you, little running one?"

"Better that than dead."

"Again, that thought which is no thought. I cannot make you unsad, small runner, if you insist on sadness. I have put to use many of our brothers and sisters, from the littlest to the largest, to keep and care for you as you grew, alone and away from your own people, because I wished that you should come to run through this world and be happy. But you are not happy; and I, who know so much more than a small runner, know so little of a greater knowledge which I have yet to learn, that I do not know what to do about this. Follow your own sadness, then, if you must. I am with you in any case, though you will not believe it—with you, now and forever."

Twig felt the Plant-Grandfather turning his attention away from her. She lay sobbing her loneliness to the earth under her for a little while; but in time her tears slowed and she remembered the errand on which Hacker had sent her. She got to her feet slowly and began to run toward the south, letting the wind of her passage dry the wetness upon her face.

It did not come at once, but slowly the poetry of her own motion began to warm the cold lump of fear and sorrow inside her. If Hacker was right about what the man John Stone could do, then everything could be all right after all. Suddenly remembering that it would be well to check on the posse, she turned sharply from her original route to angle back toward the supply post. She came right up to the edge of the trees surrounding the

clearing in which the post stood, and sure enough, the vehicles and the men and women were there. She looked out at them without fear, for like most of her people they saw and heard poorly in comparison to herself; and, in addition, the trees and bushes had bent around her to screen her from any discovery.

She was close enough so that she could hear clearly what they were saying. Apparently one of the vehicles had broken a tread and needed fixing. Some of the men there were working on its left tread, now like a huge metal watchband come uncoiled from around the drive wheels on that side beneath the open box of the vehicle body. Meanwhile those not working stood about arguing in the now westering, late afternoon sunlight.

"... bitch!" Berg was saying. He was talking about her. The blood from his facial cuts had stopped flowing some time since, and what had leaked out had been cleaned away. But he was flushed about the forehead and eyes where the cuts had parted the flesh. "I'll hang her in front of Hacker himself, first, before we hang him when we get them!"

"You'll not," said one of the women, a tall, middle-aged, bony female in a short, brown leather jacket and country leather pants showing a laser in a black holster over her right buttock. "First she's got to talk. It's that Grandfather plant-devil that really needs killing. But then she comes into a proper home somewhere."

"Proper home—" shouted Berg, who might have gone on if another woman—shorter and heavier, but wearing a dress under her once-white, knee-length weathercoat and boots—had not snapped him off short. This one wore no visible weapon, but her voice was harsher and more belligerent even than that of the taller woman.

"Shut it, right there, Berg!" said this woman. "Before you say something you'll be sorry you ever thought of. There's plans been made for that girl among the decent croppers' families. She's been let run wild all these years, but she's a child of man and she'll come to be a good grown woman with loving rules and proper training. And don't go getting ideas about getting your hands on her after we catch her, either. It's us wives along on this posse

who'll be making her tell where that Grandfather devil hides, not none of you men."

"If you can . . ." growled Berg.

The heavier woman laughed, and Twig shivered through all her body at the kind of laughter it was.

"Think we couldn't make you talk?" the heavy woman said. "And if you, why not a kid like her?"

Twig drew back until the leaves and the bushes before her hid the vehicles and their passengers from sight. She had learned all she needed to know anyway. The vehicles were now held up; so there was no danger of their catching up with Hacker before he reached the High Rocks—a hill region peppered with rounded chunks and blocks of stone where the vehicles would not be useable. Not that there had been much chance of their catching Hacker anyway—but now, at least, she was sure.

She turned and began to run once more southward in search of the man John Stone, as the sun lost itself among the trees and began to descend into twilight.

Once more, she ran. And once more the intoxication of her own running began to warm away the shivers that had come on her from the overheard conversation. Now, running, no one could catch and hold her, let alone do terrible things to her to make her say where the root-body of the Plant-Grandfather rested in the earth.

The sun was down now; and the big white moon of Jinson was already in the sky. It was full, now, and seemed—once her eyes were adjusted to it—to throw almost as much light as the twilight sun; only this was a magic, two-tone light of white and gray without color. In this light the trees and bushes leaned aside to let her pass, and the littlest brothers underfoot stretched like a soft gray carpet before her, making a corridor of moonlight and shadow along which she fled so lightly it was as if she went without touching the earth at all.

There was no effort to her going. She put on speed and earth, bushes, trees and moonlight swam about her. Together, they made up the great, silent music of her passage; and the music swept her away with it. There was nothing but this—her running, the forest and the moonlight. For a moment she was again only a little runner—

even the Grandfather and Hacker were forgotten, as was the posse with its other humans. It was as if they had never existed. She danced with her world in the white-and-black dance of her limitless running; and it was she and the world alone, alone and forever.

Twig had run the moon high up into the night sky, now, and he rode there, made smaller by his isolation in the arch of the star-cap that fitted over the world when the sun had gone; and she began to hear through her mind, which was now fine-tuned to the plant brothers and sisters whom she passed and who made way for her, that the individual she ran to find was close. The brothers and sisters turned the corridor they were making ahead of her to lead her to him. Shortly beyond the far moonlight and shadow she saw a different yellow light that brightened and dimmed. She smelled on the night wind the scent of dead branches burning, the odor of an animal and a human man.

So she came to him. He was camped in a small clearing, where a stream Twig could easily jump across curled around the base of a large moss-patched boulder before going off among the trees again. A small fire was on the far side of the stream; the man was seated on the other side of it, staring into the flames, so still and large with his dark outdoor clothing and clean-shaven face that he seemed for a moment only another mossy boulder. Beyond him was one of the large hooved riding beasts that her people called a horse. This smelled or heard Twig and lifted its head and snorted in her direction.

The man lifted his head then, looked at the horse and away from the animal toward Twig.

"Hello," he said. "Come in and sit down."

His gaze was right on her, but Twig was not fooled. In no way could he see her. She was among the trees, a good four meters from him; and his eyes would be blinded by the light of his fire. He was simply going on what his animal had told him.

"Are you John Stone?" she asked, forgetting that only Hacker could understand her whisper at this distance. But the man surprised her.

"Yes," he said. "Are you Twig?"

Astonished, now, she came forward into the light.

"How do you know?" she asked.

He laughed. His voice was deep-toned, and his laugh even deeper—but it was a soft, friendly laugh.

"There ought to be only two people know my name up here," he said. "One would be a man named Hacker Illions; and the other might be a girl named Twig. You sound more like a Twig than a Hacker Illions." He sobered. "And now that I see you, you look more like Twig."

She came closer, to the very edge of the stream, hardly a jump away from him, and peered down into his large, white, handsome face. His blond hair was not long, but thick and wavy upon his head, and under light eyebrows his eyes were as blue as a summer lake. He had not moved. Behind him, his horse snorted and stamped.

"Why do you just sit there?" Twig asked. "Are you hiding something?"

He shook his head.

"I didn't want to frighten you," he said. "Hacker Illions left word not to move suddenly or try to touch you. If I stand up, will that scare you?"

"Of course not," said Twig.

But she was wrong. He stood up then, slowly, and she took a step backwards instinctively; because he was by far the biggest man she had ever seen. Bigger than she had imagined a man could be, and wider. At his full height, he seemed to loom over everything—over her, and the fire and the boulder, even over the horse behind him that she had thought was so large. Her heart began to beat fast, as if she was still running. But then she saw that he was merely standing still, waiting; and there was no feel of menace or evil in him, as she had felt in Berg, in the Factor of the supply post, the women of the posse and others like them. Her heart slowed. She felt ashamed of herself and came forward to jump the stream and stand right before him.

"I'm not frightened," she said. "You can sit down again."

She sat down cross-legged herself on the ground facing him, and he settled back to earth like a mountain sinking

into the sea. Even now that they were seated, he towered above her still; but it was a friendly towering, as a tree-brother might loom over her when she nestled against the trunk below his branches.

"Does my horse bother you?" John Stone asked.

She looked at the big beast and sniffed.

"He has metal on his feet, to cut and kill the little living things, just like vehicles do," she said.

"True," said John Stone, "but he did not put that metal on by his own choice. And he likes you."

It was true. The animal was lowering its huge hammer-shaped head in her direction and bobbing it as if to reach out and touch her, although it was far out of reach. Twig's feelings toward it softened. She held out an arm to it, thinking kind thoughts, and the beast quieted.

"Where is Hacker Illions?" John Stone asked.

All her anxiety came flooding back into Twig in a rush.

"At the High Rocks," she said. "There are people after him . . ."

She told John Stone about it, trying to do the telling in such a way that he would understand. So often when she talked to people other than Hacker they seemed to understand only the words as words, not the meaning behind them. But John Stone nodded as she talked, and he looked thoughtful and concerned, as if understanding was honestly growing in him.

"This Rusty Springs," John said at last when she was done. "How far is it? How long will it take us to reach it from here?"

"For an ordinary human walking, six hours," she said.

"Then if we leave just before sunrise, we should be there when Hacker gets there?"

"Yes," she said, "but we ought to start right now and wait there for him."

John looked up at the moon and down at the woods.

"In the dark," he said, "I'd have to travel slowly. Hacker left word for me you didn't like to travel slowly. Besides, there are many things you can tell me that are easier to hear sitting here than traveling. Don't worry. Nothing's going to stop us from getting to the Rusty Springs on time."

He said the last words in a calm, final way that reminded her of the Plant-Grandfather speaking. Twig sat back, somehow reassured without being convinced.

"Have you eaten?" John Stone asked. "Or don't you like the same sort of food as the rest of us?"

He was smiling a little. For a second Twig thought he might be laughing at her.

"Of course I eat people-food," she said. "Hacker and I always eat together. I don't have to have it; but it's all right."

He nodded gravely. She wondered uneasily if he could tell what she was not saying. The truth was that for all his knowledge, the Plant-Grandfather had no real understanding of a human sense of taste. The fruits and nuts and green things on which he had nourished her as a child had been all right—and still were, she thought to herself—but the people-foods to which Hacker had introduced her were much more interesting to the tongue.

John began opening some small packages and preparing food for them, asking questions as he worked. Twig tried to answer him as well as she could. But even for a person as special as John, she thought, it must be hard to understand what it had been like for her.

She could not even remember what her parents had looked like. She knew, because the Plant-Grandfather had told her, that they had both died of sickness in their cabin when she was barely old enough to walk. She herself had wandered out of the cabin and had been touched, mind-to-mind, by the Plant-Grandfather; and because she was young enough then that nothing was impossible, she had heard, understood and believed him.

He had directed her away from the cabin and the burned-over fields her parents had intended to plant, into the woods, where trees and branches wove themselves into a shelter for her from the rain and wind, and where she could always find something to eat growing within arm's reach. He had kept her away from the cabin until she was much older. When she had finally gone back there she had only glimpsed white bones on the cots in the cabin, hidden under a thick matting of growing green vine the Grandfather had advised her not to disturb. With those

bones she had felt no kinship, and she had not been back to the cabin since.

Hacker was something else. By the time she had encountered Hacker, three years ago, she had already become the small runner the Grandfather had named her. Hacker had originally been a cropper like the ones now hunting him. A cropper—as opposed to a farmer who had homesteaded his acres of originally open land and had fertilized, ploughed and planted them year after year in a regular cycle—was someone who made a living by farming no more than two years in a row in any one place.

Most of the good land, the open land, on the world's one continent had been taken over by the first wave of emigrants to Jinson's Planet. Those who came after found that the soil covered by the plant-children of the Grandfather (the existence of whom they never suspected) was a thin layer over rock, and relatively unfertile—unless it was burned over. Then the ashes were rich in what was needed to make the soil bear. But two succeeding years of planting sucked all those nutrients from what had been the bodies of plant sisters and brothers into produce, which was then carried downcountry and away from the wooded areas forever. To the cropper, however, this was no matter. He only moved on to burn out a new farm someplace else.

Just before the spring rains, three years ago, Hacker had moved into the territory where Twig ran. An ideal time for burning over an area, so that the coming showers would wash the nutrients from the ashes into the soil below. But Hacker came, pitched his camp and let the days go by. He did not burn, and he did not burn. Finally it was summer and too late to crop that year. Twig, who had watched him many times, unseen from a distance, drew closer and closer in her watching. Here was a cropper who was not a cropper. He helped himself to the fruits and nuts the Grandfather had made the plant-children put forth for Twig, but other than that he did not take from the woods. She could not understand him.

Later she came to understand. Hacker was a drunk. A cropper who might never have been any different from other croppers except that, following one fall's sale of

produce, he got into a card game and won heavily. Following which, in one sober moment he was to appreciate all his life, he took the advice of a local banker and put his money away at interest, drawing only enough for supplies to go upcountry and burn out a new cropping area.

But when he had gone upcountry once more, he had taken along a luxury of supplies in the way of drinkables. He had pitched his camp; but instead of setting to work to burn land clear immediately, he had delayed, enjoying his bottles and his peace.

Here in the woods, alone, he did not need to pour the drink down in the quantities he required in civilization. A nip now and then to blur his surroundings pleasantly was all it took. And besides, there was plenty of money still down there in the bank, waiting for him, even if he did not bring in a cash crop this year.

In the end, he did not.

In the end, he began to change. Among the woods, he needed alcohol less and less, for here there were none of the sharp and brittle corners of the laws that normally poked and pricked him, driving him into rebellion. He was not an observing man; but little by little, he began to notice how the seasons came and went and how every day the woods responded to the changes of those seasons in a thousand ways. He became aware of leaf and bush and plant stem as individuals—not as some large, green blur. And in the end, after two years without cropping brought him to the point where he had to get to work, he could not bring himself to burn this place where he had lived and been content. He blazed the trees there to claim the area for himself and to keep other croppers away, and he moved on.

But the next place he chose made him part of it also; and he found he could not burn it either. He moved again, this time to Twig's territory; and there, unconsciously fishing with a hook baited with his own differentness, he caught Twig's curiosity and hauled her in.

The day came when she walked boldly into his camp and stopped a few feet in front of him, no longer shy or fearful of him after months of observation.

"Who are you?'" she whispered.

He stared at her.

"My God, kid," he said. "Don't you know you aren't supposed to run around without any clothes on?"

The wearing of clothes was only the first of many things they found they needed to reach an understanding upon. Twig's point was not that she was unaware of clothes and the fact that other people wore them; rather she did not like the feel of them on her body. Twig, in fact, was not ignorant. The Grandfather had seen to it that as she grew she learned as much about her own people as her maturity allowed her to absorb. He had also seen to it that she visited the woods fringing nearby croppers' farms and had a chance to watch her own people at work and hear them talk. He had even decided that she must practice talking as much out loud as she could, in her own tongue; and Twig, who did what he suggested most of the time without thinking, had obeyed.

But along with the human knowledge she had picked up through the Grandfather's prodding, she had also picked up a great deal of other, wordless wisdom and many skills belonging more to the Grandfather's environment than to her own. Also, the human knowledge she acquired through the Grandfather had been affected in transmission by the fact that the Grandfather was not human and did not think in human terms.

For example, while other humans wore clothes and the Grandfather knew it, such coverings were an alien concept to him; and in any case he forced nothing and no one. When Twig did not want to wear clothes, he taught her how to control her skin temperatures for comfort; then he let the matter go. And there were other ways in which he let Twig be herself, and different from her own kind.

So when Twig and Hacker met at last, it was something like an encounter between two aliens having an only limited amount of language and experience in common. They found each other fascinating in their differences; and from that first meeting their partnership began.

"You wear clothes now," said John Stone at this point

in Twig's story, glancing at the soft bark bound about her body.

"That was Hacker's idea. He's right, of course," said Twig. "I don't mind the bark. It was living once, and real. It rubbed a little at first when I wore it, but I taught my body not to be bothered where it touched me."

"Yes," said John Stone, nodding his great head with the wavy, light-colored hair glinting in the firelight. "But how did Hacker get involved in the planetary government here, so that he could arrange to have me called? And why are his own constituents out to murder him now?"

"Hacker got a teaching machine and taught me a lot of things," said Twig. "But he learned a lot too. About the Grandfather and everything. He can't talk to the Grandfather, but Hacker knows he's there, now."

"Downcountry, your people seem to think the Plant-Grandfather is a superstition," said John.

"The Grandfather never paid much attention to them downcountry," said Twig. "But the other croppers up here know about him. That's why they want to find and kill him, just like they want to kill Hacker."

"Why?" asked John patiently.

"Hacker ran for the Legislature two years ago," said Twig. "And at first the other croppers thought it was a great thing, one of their own people trying for the delegate-at-large post. So they all voted for him. But then he stood up in the Legislature-House and talked about the Grandfather and why the woods-burning should be stopped. Then the other croppers hated him because the downcountry people laughed and because they didn't want to give up cropping and burning. But as long as he was a delegate, the eye of downcountry law was on him to protect him. But his two-year term ran out yesterday; and now they think no one cares."

"Easy. Be easy . . ." said John, for Twig was becoming frightened and unhappy again. "There are people on other worlds who care—for all Hackers, and for all beings like your Plant-Grandfather. I care. Nothing's going to happen to either of them. I promise you."

But Twig sat rocking on her heels, now that she had remembered, refusing to let herself be comforted for fear

that in some strange way to do so would bring down disaster.

In the dark morning, after they both had slept for some four hours, they rose and John packed his things, then mounted his horse. With Twig leading the animal through the woods, they started off for Rusty Springs.

Dawn began to join them before they were more than halfway there. As they rode into the growing sunlight, the horse could see where to place his large hooves and they began to pick up speed. But by this time, Twig hardly noticed—though she had fretted at the slowness of their going earlier—because she was becoming more and more fascinated with John Stone. Just as he was big in body, he was big in mind as well—so big that Twig walked around and around the way he thought with questions. But in spite of the fact that he answered willingly enough, she could not seem to see all at one time what he was by his answers.

"What are you?" she kept asking.

"An ecologist," said John.

"But what are you really?"

"Something like an advisor," said John. "An advisor to the social authorities on new worlds."

"Hacker said you were something like a policeman."

"That, too, I suppose," said John.

"But I still don't know what you are!"

"What are you?" asked John.

She was surprised.

"I'm Twig," she said. "A small runner." Then she thought and added. "A human ... a girl ..." She fell silent.

"There; you see?" said John Stone. "Every one is many things. That is why we have to go cautiously about the universe, not moving and changing things until we know for sure what moving or changing will do to the universe as a result, and eventually, therefore, to ourselves."

"You sound like the Plant-Grandfather," Twig said. "Only he won't even fight back when things are done to him and his children, like the woods-burning of the croppers."

"Perhaps he's wise."

"Of course he's wise!" said Twig. "But he's wrong!"

John Stone looked from his big horse down at her where she ran alongside them. He was riding with his head a little cocked on one side to catch the faint sound of her whispered words.

"Are you sure?" asked John.

Twig opened her mouth and then closed it again. She ran along, looking straight ahead, saying nothing.

"All things that do not die, grow," said John. "All who grow, change. Your Plant-Grandfather is growing and changing—and so are you, Twig."

She tried to shut the sound of his voice out of her ears, telling herself he had nothing to say that she needed to hear.

They came to Rusty Springs just before noon. The place was named for a small waterfall that came directly out of a small cliff about a quarter of the way down from its top. The stream fell into a wide, shallow basin of rock streaked with reddish color, and the water had a strong taste of iron. When they got there, Hacker was sitting waiting for them on a boulder beside the pool.

"You just made it," he greeted them as they came up. "Another couple of minutes and I'd have had to move on without waiting for you any longer. Hear up a ways, there?"

He tilted his head toward the woods at the opposite side of the basin of spring water. Twig did not have to reach out to one of the Grandfather's children for information this time. Like the others, in fact much more clearly than the two men with her, she could hear the distant smashing of undergrowth as a body of people moved toward them.

"Hacker!" whispered Twig. "Run!"

"No," said Hacker.

"No," said John Stone from high on his horse. "We'll wait here and have a word with them."

They stood together, silent and waiting, while the noise increased; and after a while it came right into the clearing along with the ten men and three women of the posse. They emerged from the woods, but stopped when they

saw Hacker and Twig together with John Stone on his big horse.

"Looking for somebody?" said Hacker derisively.

"You know damn well we are," said Berg. He had gotten himself another ion drill, and he pulled it from his belt as he started toward Hacker. "We're going to take care of you now, Hacker—you and that kid and that friend of yours, whoever he is."

The other members of the posse started to move behind him, and they all flowed forward toward the three.

"No," said John Stone. His deep voice made them all look up at him. "No."

Slowly, he dismounted and stood on the ground beside his horse. There was something unstoppable in the way he first stood up in his stirrups, then swung one long leg over the hindquarters of the beast and finally stepped down to the ground. The posse halted again; and John spoke to the people.

"I'm a Paraplanetary Government ecologist," he said, "assigned to this planet to investigate a possibly dangerous misuse of natural resources. As such, I've got certain areas of authority; and one of them is to subpoena individuals for my official Hearing on the situation."

He lifted his left wrist to his lips, and something on that wrist glinted into the sunlight. He spoke to it.

"Hacker Illions, I charge you to appear as a witness at my Hearing, when called. Twig, I charge you to appear as a witness at my Hearing when called," he said. "The expenses of your appearance will be borne by my authority; and your duty to appear takes precedence over any other duty, obligation or restraint laid upon you by any other local law, source or individual."

John dropped his wrist gently on to the curved neck of the horse beside him; and it looked like nothing more than some large dog that he petted.

"These witnesses," he said to the posse, "must not be interfered with in any way. You understand?"

"Oh, we understand, all right," said the thick-bodied woman in the white raincoat.

"Understand? What do you mean, understand?" raged

Berg. "He's not armed, this ecologist. There's only one of him. Are we going to let him stop us?"

Berg started forward toward John, who stood still. But as Berg got closer he began to look smaller, until at a few steps from John, who had not moved, it became plain that his head would not reach to John's shoulder and he was like a half-grown boy facing a full-grown man. He stopped and looked back, then, and saw none of the others in the posse had moved to follow him.

As his head turned around to look, the woman in the white raincoat burst into a jeering laugh.

"You, Berg!" she crowed. "Your guts always were in your muscles!"

She came forward herself, elbowing Berg aside, stepping in front of him and staring fiercely at John.

"You don't scare me, Mr. Ecologist!" she said. "I been looking up at people all my life. You don't scare me, your supraplanetary government doesn't scare me, nothing scares me! You want to know why we don't take and hang Hacker right now and carry this kid home to grow up decently, right now? It's not because of you—it's because we don't need to. Hacker isn't the only one who's got connections down at Capital City. It happens we heard on our belt phones just two hours ago you were on your way up here."

John nodded.

"I'm not surprised," he said. "But that doesn't change anything."

"Doesn't it?" the tone of her voice hit a high note of triumph. "All we wanted Hacker and the girl for was to find out where that plant-devil lives. Hacker sent for you, but we sent for equipment to help us find it. Two days ago, we put that equipment in an aircraft and began mapping the root systems in this area. We figured it was probably in this area because here was where it brought up the girl—"

"That's got nothing to do with it!" cried Twig in her loudest whisper. "The Grandfather reaches everywhere. All over the continent. All over the world."

But the woman did not hear her and probably would have paid no attention if she had.

"Yesterday, we found it. Protect Hacker and the girl all you want to, Mr. Ecologist. How're you going to stop us from digging in our own earth, and setting fire to what we find there?"

"Intelligent life, wantonly destroyed—" began John, but she cut him short.

"What life? How do you know it's intelligent until you find it? And if you find it, what can you do—subpoena some roots?"

She laughed.

"Hey," said Berg, turning to her. She went on laughing. "Hey," he said, "what's all this? Why didn't you tell me about it?"

"Tell you?" She leaned toward him as if she would spit into his black beard. "Tell you? Trust you? *You?*"

"I got the same rights—"

But she walked around him, leaving him with the protest half-made, and went back to the rest of the posse.

"Come on," she said. "Let's get out of here. We can pick up these two after that Hearing's over. They won't be going any place we can't find them."

The rest of the posse stirred like an animal awakening and put itself in motion. She led them past the basin and forward, right past Twig, Hacker and John Stone with his horse. She passed so close by Twig that she was able to lean out and pat the back of Twig's right shoulder in passing—or, rather, where Twig's right shoulder would have been, except for the covering bark that protected it. Twig shrank from the touch; but Lucy Arodet only grinned at her and went on, leading her posse off into the woods, headed back the way John Stone and Twig had just come. Berg ran after them; and in a few moments the sound of their going was silenced by distance.

"Is that right?" Hacker asked John into the new quiet. "Is there equipment that can find a root mass like the Grandfather's?"

John's blue eyes in his massive face were narrowed by a frown.

"Yes," he said. "It's a variety of heat-seeking equipment—capable of very delicate distinctions, because all it has to go on is the minimal heat changes from liquid flow

in the root. I didn't think anyone out here on your planet would know about it, much less—" he broke off. "And I can't believe anything like that could be sent here by anyone without my hearing of it. But in the commercial area there are always some who'll take chances."

"Arrest them!" whispered Twig. "Make it illegal for them to use it!"

John shook his head.

"I've no sure evidence yet that your Grandfather is a sentient being," he said. "Until I do, I've got no legal power to protect him."

"You don't believe us?" Hacker's lean face was all bones under the beard stubble.

"Yes. I believe, personally," said John. "Before man even left the world he started on, it was discovered that if you thought of cutting or burning a plant it would show a reaction on a picoammeter. Mental reaction of and by plants has been established for a long time. A community intelligence evolving from this, like the Grandfather you talk about, is only logical. But I have to contact it myself to know, or have some hard evidence of its existence."

"In another day or two, according to what that Lucy Arodet said just now," Hacker added, "perhaps there will not be anything to contact."

"Yes," said John. He turned to Twig. "Do you know where the Grandfather-Plant is?"

"He's everywhere," said Twig.

"Twig, you know what he means," said Hacker. "Yes, Stone, she knows."

Twig glared at the stubble-faced man.

"You must tell me," said John Stone. "The sooner I can get to the Grandfather, the sooner I'll be able to protect him."

"No!" whispered Twig.

"Honey, be sensible!" said Hacker. "You heard Lucy Arodet say they'd found the Grandfather. If they know, why keep it a secret from John Stone, here?"

"I don't believe it!" said Twig. "She was lying. She doesn't know!"

"If she does," said John, "you're taking a very long chance. If they can dig down to your Grandfather-Plant

and destroy him before I can get to him, won't you have lost what you most want to save?"

"None of the Grandfather's children would tell where he is, even if they could," Twig whispered, "and I won't."

"Don't tell me then," said John. "Just take me to him."

Twig shook her head.

"Twig," said Hacker, and she looked at him. "Twig, listen. You've got to do what Stone says."

She shook her head again.

"Then, ask the Grandfather himself," Hacker said. "Let him decide."

She started to shake her head a third time, then went over to a tree and put her arms around it; not because she needed the tree to help her talk with the Grandfather, but to be able to hide her face from the two men.

"Grandfather!" she thought. "Grandfather, have you been listening? What should I do?"

There was no answer.

"Grandfather!" she called with her mind.

Still no answer. For one panic-filled moment she thought that she could not feel him there at all, that he had either been killed or gone to sleep. Then, reaching out as far as she could, she felt him, still there but not noticing her call.

"Grandfather!"

But it was no use. It was as if with her whisper-limited voice she tried to shout to someone far off on the top of a high mountain. The Grandfather had gone back into his own thoughts. She could not reach him. She fought down the surge of fear and hurt that leaped inside her. Once, the Grandfather had always been there. Only in these last couple of years, since the burnings by the croppers had been so widespread, had he started to draw into himself and talk of going to sleep.

Slowly, she let go of the tree and turned back to face the other two humans.

"He won't answer," she said.

There was a moment's silence.

"Then it's up to you to decide, isn't it?" Hacker said, gently.

She nodded, feeling all torn apart inside. Then an idea came to her.

"I won't take you to him," she said, raising her eyes to John Stone's face. "But I'll go by myself and see if it's true, if the croppers have found him. You wait here."

"No," said John. "I came up here to see some of the burned-over areas for myself; and I should look at those now while I have time. If I have to make it a court matter without waiting to protect your Plant-Grandfather, I need as much evidence as possible."

"I'll show you places," said Hacker to him.

"No," John said again. "You go straight south to the first town or village you can get to and report yourself to the authorities there as being under my subpoena. That will make your protection under law a matter of public record. Can you go straight there without that gang that just left here catching you?"

Hacker snorted in disgust.

"All right," said John. "I had to ask to make sure. You go to the closest community center, then—what's its name?"

"Fireville," said Hacker. "About twelve klicks southwest."

"Fireville. I'll meet you there after I've seen a couple of burned-over areas. I've got a map with a number of them marked. And Twig," John turned toward her, "you'll go check on the Plant-Grandfather to see if there's any sign he's been located. Then you better find me again as soon as you can. Do you think you can do that?"

"Of course," said Twig contemptuously. "The plant brothers and sisters will always tell me where you are."

But instead of turning to leave, she hesitated, looking at Hacker with the sharp teeth of worry nibbling at her.

"Don't you drink, now," she said. "If you get drunk, they might find some way to do something to you."

"Not a drop," said Hacker. "I promise."

Still she hesitated, until it came to her that if she stood here much longer she would not go at all; so she

turned and ran, the forest opening before her and the other two left swallowed up from sight behind.

She went swiftly. She was not about to lose herself in the pleasure of her running now; for worry, like an invisible posse, followed right at her heels. From time to time she called to the Grandfather with her mind; but he did not answer and she settled down to getting to his root-mass as soon as possible.

In the woods, growing and changing every day, she had never had any means of measuring how fast she could go when the need was really upon her. She was only human, after all; so probably her top speed was not really much faster than that of a winning marathon runner back in the years when man was just beginning to go forth into space, before the Earth had died. But the difference was that she could run at that speed—or at very nearly that speed—all day long if she had to. Now, she did not know her speed; but she went fast, fast, her legs flashing in and out of the early afternoon sunlight and shadow as she raced down the corridor among the trees and bushes that opened before her as she went.

It was midafternoon before she came to the edge of the place where the great root-mass belonging to the Grandfather lay fifteen to forty meters below the ground and the forest above it. All the way here, the plant sisters and brothers of this area had showed her an empty woods with no sign of croppers anywhere about. But none of them could tell her about an earlier moment until she could actually reach and touch them. Now, arrived, she put her arms around one tall tree-sister and held her, forcing the slow-thinking leaves to remember daylight and dark, dark and daylight, through the past week.

But, other than the wind, the leaves remembered only silence. No humans had passed by them, even at a distance. No mechanical sounds had sounded near them. In the sky over them, only the clouds and an occasional spurt of rain had mingled with the regular march of sun and moon and stars.

The woman Lucy Arodet had lied. The croppers either had no special equipment as claimed, or if they had it, they had not used it here where they could find the

Grandfather. Sighing with relief, Twig fell face down on the ground, spreading out her arms amongst the littlest brothers to hug and hold her world.

The Grandfather was safe—still safe. For a little while Twig simply closed her eyes to let herself ride off on the wave of her relief. And so sleep took her without warning, for in fact she had done a great deal of running and worrying in past hours.

When she woke, it was night. The moon was already high in the sky and the Grandfather was thinking—not at her, but around her, as if he mused over her, under the impression she did not hear.

"... I have never reached beyond the atmosphere that envelopes this one world," he was thinking. "But now, my little runner will run to the ends of the universe. Beyond are the stars, and beyond them more stars, and beyond and beyond ... to depths beyond depths, where the great galaxies float like clouds or scatter like a whole crowd of little runners, pushing against each other, scattering out from one common point to the ultimate edges of time and distance. And in all that distance there are many lives. My little runner will come to know them, and the beginning and the end, and all that goes between. She will know them in their birth and their growing and whether it is chance or purpose that makes a path for all life in all time and space. So out of destruction will have come creation, out of sleep an awakening, and out of defeat a conquest, just as even at the poles of this world warm summer succeeds the harsh winter. All they have done to destroy me will only bring about the birth of my little runner into a Great Runner between the stars—"

"Grandfather!" called Twig; and the thoughts flowing about her broke off suddenly.

"Are you awake, little sister?" asked the Grandfather. "If you are, it's time for you to go now."

"Go?" demanded Twig, still stupid with sleep. "Go ... why? Where? What for?"

"Your old friend Hacker is dying now, and your friend-to-be John Stone rides toward him," said the thought of the Plant-Grandfather. "Those who wished to destroy

him and me have tricked Hacker to death, and soon they will be here to kill me also. It is time for you to go."

Twig was awake and on her feet in one reflexive movement.

"What happened?" she demanded. "Where is Hacker?"

"In a gully north of Fireville, where he has been pushed to fall and die, as if he had drunkenly wandered there and slipped. Those who are our enemies made him drunk and brought him there to fall, and he has fallen."

"Why didn't you wake me and tell me before?" Twig cried.

"It would have made no difference," said the Grandfather. "Hacker's death was beyond the stopping, even as those who come now to destroy me are beyond stopping."

"Come?" raged Twig. "How can anyone be coming? They don't even know where you are!"

"They do now," said the Grandfather. "When you came to me this time, you carried pinned to the bark behind your shoulder something placed there by the woman called Lucy Arodet. A small thing which cried out in a voice only another such thing could hear to tell her where you were at any moment. When you reached me and stopped traveling in this place, they knew you had found me and they knew where I was."

Twig threw a hand around to feel behind her shoulder. Her fingers closed on something small, round and hard. She pulled it loose from the bark and brought it around where she could see it. In the moonlight, it looked like a dulled pearl with small, sharp points on its underside where it had clung to the bark of her clothing.

"I'll take it away!" she said. "I'll take it someplace else—"

"That would make no difference either," said the Grandfather. "Do not suffer. Before they come I will have gone to sleep in a sleep without waking, and they can only destroy roots that mean nothing."

"No!" said Twig. "Wait . . . no! I'll run and find John Stone. He can get here before they can do your roots much damage. Then you won't have to sleep—"

"Little runner, little runner," said the Grandfather.

"Even if your John Stone could save me this coming day, he would only put off the inevitable for a little while. From the day your people set foot on this world, it was certain that sooner or later I would have to sleep forever. If you understand that I go now to sleep gladly, you would not mourn as you do. What is of value in me goes forward in you, and goes where I could not, further and deeper, beyond all distance and imagination."

"No!" cried Twig. "I won't let you die. I'll run to where Hacker is and meet John Stone. He'll come and save you. Wait for me, Grandfather! Wait . . ."

Even as she continued talking with her mind to the Grandfather, she had spun about and begun to run toward Fireville. The little brothers opened a path before her, marking the way, and the bushes and trees leaned aside. But she was scarcely conscious that they did so. All her mind was on the fact that the Grandfather must not die . . . must not die . . .

She ran faster than she had ever run before. But still it was nearly dawn when she came near to Fireville, to the dark gully where the path of the little brothers led her. On the far side of the gully, silhouetted blackly against the paling sky between the trees, was the figure of a gigantic man on a gigantic horse. But down in the blackness of the gully itself was a little patch of something light that was Hacker. At the sight of that patch even the Grandfather went out of Twig's mind for a moment. She plunged recklessly down the side of the gully. Anyone else would have tripped and fallen a dozen times, but she felt the uneven ground and the presence of bush and sapling with her mind and kept her feet. She reached the shape of Hacker and dropped on her knees beside it.

"Hacker!" she cried. The tears ran down her face.

There was a great noise of tearing and plunging—the descent of a heavy body down the far side of the gully—and then John Stone, on foot, appeared on the far side of Hacker. He squatted and reached out to touch his fingers gently to Hacker's throat, under the sharp, bony line of Hacker's jaw.

"He's gone, Twig," John said, looking from Hacker to her.

Grief burst inside her like a world exploding. She lifted Hacker's head to her lap and rocked with it, weeping.

"I told you not to drink, Hacker!" she choked. "You promised me! You promised you wouldn't drink . . ."

She was aware that John Stone had moved around to squat beside her. He loomed over her like some huge cliff in the darkness. He put a hand on her back and shoulder, and the hand was so big that it was like an arch around her.

"It had to happen, Twig," the deep voice rumbled and rolled in her ear. "Some things have to happen . . ."

It was so like what the Grandfather had said that she was suddenly reminded of him. She lifted her head sharply, listening, but there was nothing.

"*Grandfather!*" she cried, and for the first time in her life, it was not only her mind that called. Her voice rang clear and wild under the brightening sky.

But there was no answer. For the first time not even the echo came back that said the Grandfather was there but not listening. The unimaginable network of the plant-children still stood connected, listening, waiting, carrying her call to the furthest limits of the world. But there was no response. The voice of the planet had fallen silent.

"He's gone!" she cried. And the words flew among the leaves and the branches, from grass-blade to grass-blade and along the roots under hill and valley and plain and mountain. "Gone . . ."

She slumped where she sat, even the head of Hacker forgotten on her knees.

"The Plant-Grandfather?" Stone asked her. She nodded numbly.

"It's over," she said, aloud, her new voice dead and dull. "He's gone . . . gone. It's all finished, forever."

"No," said the deep voice of John Stone. "It's never finished."

He stood up beside her, looking at her.

"Twig," he said again, gently but insistently, "it's never finished."

"Yes it is. Listen . . ." she said, forgetting that he, like

all the others, had never been able to hear the Grandfather. "The world's dead now. There is no one else."

"Yes, there is," said John Stone. "There's you. And for you, there's everything. Not only what's on this world but on many others that never knew a Plant-Grandfather. They're out there, waiting for you to speak to them."

"I can't speak to anyone," she said, still kneeling, slumped by the dead body of Hacker. "It's all over, I tell you. All over."

John Stone reached down and picked her up. Holding her, he walked up the dark side of the gully to his horse and mounted it. She struggled for a second, then gave up. His strength overpowered hers easily.

"Time moves," he said. She hid her face against the darkness of his broad chest and heard his voice rumbling through the wall of bone and flesh. "Things change, and there's no stopping them. Even if the Grandfather and Hacker had stayed alive here, even if Jinson's Planet had stayed just as it was—still you, by yourself, would have grown and changed. What doesn't die has to grow. What grows, changes. Our decisions get bigger and bigger, whether we want them to or not—our jobs get larger and larger, whether we plan them to or not—and in the end the choice has to be to love all or to love none. There may be others like Hacker on other worlds, and perhaps somewhere there may be another Jinson's world. But there's never been another Plant-Grandfather that we've been able to find, and not another Twig. That means you're going to have to love all the worlds and all the growing things on them as the Grandfather would have, if he could have gone to them the way you're going to be able to. That's your job, Twig."

She neither spoke nor stirred.

"Try," he said. "The Grandfather's left it all to you. Take up the duty he left to you. Speak to the growing things on Jinson's Planet and tell them that losing the Grandfather wasn't the end."

She shook her head slightly against his chest.

"I can't," she said. "It's no use. I can't."

"Speak to them," he said. "Don't leave them alone.

Tell them they've got you now. Wasn't that what the Grandfather wanted?"

Again she shook her head.

"I can't . . ." she whimpered. "If I speak to them, then he *will* be gone, really gone, forever. I can't do that. I can't put him away forever. I can't!"

"Then everything the Grandfather counted on is lost," said John Stone. "Everything Hacker did is wasted. What about Hacker?"

She thought of Hacker then, what was left of Hacker, being left farther behind them with every stride of the horse's long legs. Hacker, going down now into forgottenness too.

"I can't, Hacker!" she said to the memory of him in her mind.

"Can't . . .?" the image of Hacker looked back at her, cocked one eyebrow at her and began to sing:

"As game as Ned Kelly," the people would say.
"As game as Ned Kelly," they say it today . . .

The familiar words in his cracked, hoarse voice went through her like a sword-sharp shaft of sunlight, and through the dark, hard wall of grief that had swelled up within her at the loss of the Grandfather. All at once, she remembered all the flowers that also were alone now, left voiceless and in darkness of silence; and contrition overflowed within her. From now on, she would be gone, too!

"It's all right!" she called out to them, with her voice and her mind together. "It's all right, *I'm* still here. Me, Twig. You'll never be alone, I promise! Even if I have to go someplace else, I'll always reach out and touch you from wherever I am . . ."

And from valley and hill, from plain and forest, from all over, the words of her mind were picked up and passed along, tossing joyously from smallest brother to largest sister, on and on to the ends of the world.

Twig closed her eyes and let herself lie at last against the wide chest of John Stone. Where he was taking her, she did not know. No doubt it would be very far away from Jinson's world. But no world was too far, she knew

that now; and also, out there in the great distances of which the Grandfather had dreamed and to which he could never go, there were other brothers and sisters, waiting for the sound of a voice, waiting for her.

Grandfather was gone beyond returning, and so was Hacker. But maybe it was not the end of things, after all; maybe it was only a beginning. Maybe ... at least she had spoken to all the others who had lived through the Grandfather, and they now knew they would never be alone again. Letting go of her grief a little, just a little, Twig rocked off to sleep on the steady rhythm of the pacing horse. ☆

About the Editor

Judy-Lynn del Rey, editor of the *Stellar* series, was the managing editor of *Galaxy* and *IF* science-fiction magazines for eight and a half years. She has been a contributor to the *World Book Encyclopedia* on science fiction and is currently an editor at Ballantine Books, where among other things she is responsible for—what else?—the sf list. Mrs. del Rey lives in New York City with her husband Lester, who has written memorable science fiction over the last thirty-five years.

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