

Nor Iron Bars

THE *Flyaway II*, which was large enough to carry a hundred passengers, seemed twice as large to Gordon Arpe with only the crew on board large and silent, with the silence of its orbit a thousand miles above the Earth.

"When are they due?" Dr. (now Captain) Arpe said, for at least the fourth time. His second officer, Friedrich Oestreicher, looked at the chronometer and away again with boredom.

"The first batch will be on board in five minutes," he said harshly. "Presumably they've all reached SV-One by now. It only remains to ferry them over."

Arpe nibbled at a fingernail. Although he had always been the tall, thin, and jumpy type, nail-biting was a new vice to him.

"I still think it's insane to be carrying passengers on a flight like this," he said.

Oestreicher said nothing. Carrying passengers was no novelty to him. He had been captain of a passenger vessel on the Mars run for ten years, and looked it: a stocky hard-muscled youngster of thirty, whose crew cut was going gray despite the fact that he was five years younger than Arpe. He was second in command of the *Flyaway II* only because he had no knowledge of the new drive. Or, to put it another

way, Arpe was captain only because he was the only man who did understand it, having invented it. Either way you put it didn't sweeten it for Oestreicher, that much was evident.

Well, the first officer would be the acting captain most of the time, anyhow. Arpe admitted that he himself had no knowledge of how to run a space ship. The thought of passengers, furthermore, came close to terrifying him. He hoped to have as little contact with them as possible.

But dammitall, it *was* crazy to be carrying a hundred laymenhalf of them women and children, furthermore on the maiden flight of an untried interstellar drive, solely on the belief of one Dr. Gordon Arpe that his brain child would work. Well, that wasn't the sole reason, of course. The whole Flyaway project, of which Arpe had been head, believed it would work, and so did the government.

And then there was the First Expedition to Centaurus, presumably still in flight after twelve years; they had elected to do it the hard way, on ion drive, despite Garrard's spectacular solo round trip, the Haertel overdrive which, had made that possible being adjudged likely to be damaging to the sanity of a large crew. Arpe's discovery had been a totally unexpected breakthrough, offering the opportunity to rush a new batch of trained specialists to help the First Expedition colonize, arriving only a month or so after the First had landed. And if you are sending help, why not send

families, too the families the First Expedition had left behind?

Which also explained the two crews. One of them consisted of men from the Flyaway project, men who had built various parts of the drive, or designed them, or otherwise knew them intimately. The other was made up of men who had served some time in some cases, as long as two full hitches in the Space Service under Oestreicher. There was some overlapping, of course. The energy that powered the drive field came from a Nernst-effect generator: a compact ball of fusing hydrogen, held together in mid-combustion chamber by a hard magnetic field, which transformed the heat into electricity to be bled off perpendicular to the magnetic lines of force. The same generator powered the ion rockets of ordinary interplanetary flight, and so could be serviced by ordinary crews. On the other hand, Arpe's new attempt to beat the Lorenz-Fitzgerald equation involved giving the whole ship negative mass, a concept utterly foreign to even, the most experienced spaceman. Only a physicist who knew Dirac holes well enough to call them "Pam" would have thought of the notion at all.

But it would work. Arpe was sure of that. A body with negative mass could come very close to the speed of light before the Fitzgerald contraction caught up with it, and without the wild sine-curve variation in subjective time which the

non-Fitzgeraldian Haertel overdrive enforced on the passenger.

If the field could be maintained successfully in spite of the contraction, there was no good reason why the velocity of light could not be passed; under such conditions, the ship would not be a material object at all.

And polarity in mass does not behave like polarity in electromagnetic fields. As gravity shows, where mass *is* concerned like attracts like, and unlikes repel. The very charging of the field should fling the charged object away from the Earth at a considerable speed.

The unmanned models had not been disappointing. They had vanished instantly, with a noise like a thunderclap. And since every atom in the ship was affected evenly, there ought to be no sensible acceleration, either which is a primary requirement for an ideal drive. It looked good . . .

But not for a first test with a hundred passengers!

"Here they come," said Harold Stauffer, the second officer.

Sandy-haired and wiry, he was even younger than Oestreicher, and had the small chin combined with handsome features which is usually called "a weak face." He was, Arpe already knew, about as weak as a Diesel locomotive; so much for physiognomy. He was pointing out the viewplate.

Arpe started and followed the pointing finger. At first he saw nothing but the doughnut with the peg in the middle which was Satellite Vehicle I, as small as a fifty-cent piece at this distance. Then a tiny sliver of flame near it disclosed the

first of the ferries, coming toward them.

"We had better get down to the air lock," Oestreicher said.

"All right," Arpe responded abstractedly. "Go ahead. I still have some checking to do."

"Better delegate it," Oestreicher said. "It's traditional for the captain to meet passengers coming on board. They expect it. And this batch is probably pretty scared, considering what they've undertaken. I wouldn't depart from routine with them if I were you, sir."

"I can run the check," Stauffer said helpfully. "If I get into any trouble on the drive, sir, I can always call your gang chief. He can be the judge of whether or not to call you."

Outgeneraled, Arpe followed Oestreicher down to the air lock.

The first ferry stuck its snub nose into the receiving area; the nose promptly unscrewed and tipped upward. The first passenger out was a staggering two-year-old, as bundled up as though it had been dressed for "the cold of space," so that nobody could have told whether it was a boy or a girl. It fell down promptly, got up again without noticing, and went charging straight ahead, shouting "Bye-bye-see-you, bye-bye-see-you, bye-bye" Then it stopped, transfixed, looking about the huge metal cave with round eyes.

"Judy?" a voice cried from inside the ferry. "Judy! Judy, wait for Mommy!"

After a moment, the voice's owner emerged: a short, fair girl, perhaps eighteen. The baby by this time had spotted the crew member who had the broadest grin, and charged him shouting "Daddy Daddy Daddy Daddy Daddy Daddy" like a machine gun. The woman followed, blushing.

The crewman was not embarrassed. It was obvious that he had been called Daddy before by infants on three planets and five satellites, with what accuracy he might not have been able to guarantee. He picked up the little girl and poked her gently.

"Hi-hi, Judy," he said. "I see you. Where's Judy? / see her."

Judy crowed and covered her face with her hands; but she was peeking.

"Something's wrong here," Arpe murmured to Oestreicher.

"How can a man who's been traveling toward Centaurus for twelve years have a two-year-old daughter?"

"Wouldn't raise the question if I were you, sir," Oestreicher said through motionless lips. "Passengers are never a uniform lot. Best to get used to it."

The aphorism was being amply illustrated. Next to leave the ferry was an old woman who might possibly have been the mother of one of the crewmen of the First Centaunis expedition; by ordinary standards she was in no shape to stand a trip through space, and surely she would be no help to anybody when she arrived. She was followed by a striking brunette girl in close-fitting, close-cut leotards, with a figure

like a dancer. She might have been anywhere between 21 and 41 years old; she wore no ring, and the hard set of her otherwise lovely face did not suggest that she was anybody's wife.

Oddly, she also looked familiar. Arpe nudged Oestreicher and nodded toward her.

"Celia Gopardi," Oestreicher said out of the corner of his mouth. "Three-V comedienne. You've seen her, sir, I'm sure."

And so he had; but he would never have recognized her, for she was not smiling. Her presence here defied any explanation he could imagine.

"Screened, or not, there's something irregular about this,"

Arpe said in a low voice. "Obviously there's been a slip in the interviewing. Maybe we can turn some of this lot back."

Oestreicher shrugged. "It's your ship, sir," he said. "I advise against it, however."

Arpe scarcely heard him. If some of these passengers were really as unqualified as they looked . . . and there would be no time to send up replacements . . . At random, he started with the little girl's mother.

"Excuse me, ma'am . . ."

The girl turned with surprise, and then with pleasure.

"Yes, Captain!"

"Uh, it occurs to me that there may have been, uh, an error. The *Flyaway II's* passengers are strictly restricted to technical colonists and to, uh, legal relatives of the First

Centaurus Expedition. Since your Judy looks to be no more than two, and since it's been twelve years since . . ."

The girl's eyes had already turned ice-blue; she rescued him, after a fashion, from a speech he had suddenly realized he could never have finished. "Judy," she said levelly, "is the granddaughter of Captain Willoughby of the First Expedition. I am his daughter. I am sorry my husband isn't alive to pin your ears back. Captain. Any further questions?"

Arpe left the field without stopping to collect his wounded. He was stopped in mid-retreat by a thirteen-year-old boy wearing astonishingly thick glasses and a thatch of hair that went in all directions in dirty blond cirri.

"Sir," the boy said, "I understood that this was to be a new kind of ship. It looks like an SC-Forty-seven freighter to me. Isn't it?"

"Yes," Arpe said. "Yes, that's what it is. That is, it's the same hull. I mean, the engines and fittings are new."

"[7/i-huh," the boy said. He turned his back and resumed prowling.

The noise was growing louder as the reception area filled.

Arpe was uncomfortably aware that Oestreicher was watching him with something virtually indistinguishable from contempt, but still he could not get away; a small, compact man in a gray suit had hold of his elbow.

"Captain Arpe, I'm Forrest of the President's Commission, to disembark before departure," he said in a low murmur, so

rapidly that one syllable could hardly be told from another.

"We've checked you out and you seem to be in good shape.

Just want to remind you that your drive is more important than anything else on board. Get the passengers where they want to go by all means if it's feasible, but if it isn't, *the government wants that drive back*. That means jettisoning the passengers without compunction if necessary. Dig?"

"All right." That had been pounded into him almost from the beginning of his commission, but suddenly it didn't seem to be as clear-cut a proposition, not now, not after the passengers were actually arriving in the flesh. Filled with a sudden, unticketable emotion, almost like horror, Arpe shook the government man off. Bidding tradition be damned, he got back to the bridge as fast as he could go, leaving Oestreicher to cope with the remaining newcomers. After all, Oestreicher was supposed to know how.

But the rest of the ordeal still loomed ahead of him. . The ship could not actually take off until "tomorrow," after a twelve-hour period during which the passengers would get used to their quarters, and got enough questions answered to prevent their wandering into restricted areas of the ship. And there was still the traditional Captain's Dinner to be faced up to: a necessary ceremony during which the passengers got used to eating in free fall, got rid of their first awkwardness with the tools of space, and got to know each

other, with the officers to help them. It was an initial step rather than a final one, as was the Captain's Dinner on the seas.

"Stauffer, how did the check-out go?"

"Mr. Stauffer, please, sir," the second officer said politely.

"All tight, sir. I asked your gang chief to sign the log with me, which he did."

"Very good. Thank youuh, Mr. Stauffer. Carry on."

"Yes, sir."

It looked like a long evening. Maybe Oestreicher would be willing to forgo the Captain's Dinner. Somehow, Arpe doubted that he would.

He wasn't willing, of course. He had already arranged for it long ago. Since there was no salon on the converted freighter, the dinner was held in one of the smaller holds, whose cargo had been strapped temporarily in the corridors.

The whole inner surface of the hold was taken up by the saddle-shaped tables, to which the guests hitched themselves by belt hooks; service arrived from way up in the middle of the air.

Arpe's table was populated by the thirteen-year-old boy he had met earlier, a ship's nurse, two technicians from the specialists among the colonist-passengers, a Nemst-generator officer, and Celia Gopardi, who sat next to him. Since she had no children of her own with her, she had not been placed at one of the tables allocated to children and parents; besides,

she was a celebrity.

Arpe was appalled to discover that she was not the only celebrity on board. At the very next table down was Daryon Hammersmith, the man the newscasts called "The Conqueror of Titan." There was no mistaking the huge-shouldered, flamboyant explorer and his heavy voice; he was a natural center of attention, especially among the women. He was bald, but this simply made him look even more like a Prussian officer of the old school, and as overpoweringly, cruelly masculine as a hunting panther.

For several courses Arpe could think of nothing at all to say. He rather hoped that this blankness of mind would last; maybe the passengers would gather that he was aloof by nature, and . . . But the silence at the captain's table was becoming noticeable, especially against the noise the children were making elsewhere. Next door, Hammersmith appeared to be telling stories.

And what stories! Arpe knew very little about the satellites, but he was somehow quite sure that there were no snow tigers on Titan who gnawed away the foundations of buildings, nor any three-eyed natives who relished frozen manmeat warmed just until its fluids changed from Ice IV to Ice III. If there were, it was odd that Hammersmith's own book about the Titan expedition had mentioned neither. But the explorer was making Arpe's silence even more conspicuous;

he *had* to say something.

"Miss Gospardi we're honored to have you with us. You have a husband among the First Expedition, I suppose?"

"Yes, worse luck," she said, gnawing with even white teeth at a drumstick. "My fifth."

"Oh. Well, if at first you don't succeed isn't that how it goes? You're undertaking quite a journey to be with him again. I'm glad you feel so certain now."

"I'm certain," she said calmly. "It's a long trip, all right.

But he made a big mistake when he thought it'd be too long for *me*."

The thirteen-year-old was watching her like an owl. It looked like a humid night for him.

"Of course, Titan's been tamed down considerably since my time," Hammersmith was booming jovially. "I'm told the new dome there is almost cozy, except for the wind. That wind I still dream about it now and then."

"I admire your courage," Arpe said to the 3-V star, beginning to feel faintly courtly. Maybe he had talents he had neglected; he seemed to be doing rather well so far.

"It isn't courage," the woman said, freeing a piece of bread from the clutches of the Lazy Spider. "It's desperation. I hate space flight. I should know, I've had to make that Moon circuit for show dates often enough. But I'm going to get that lousy coward back if it's the last thing I do."

She took a full third out of the bread slice in one precise,

gargantuan nibble.

"I wouldn't have thought of it if I hadn't lost my sixth husband to Peggy Walton. That skirt-chaser; I must have been out of my mind. But Johnny didn't bother to divorce me before he ran off on this Centaurus safari. That was a mistake. I'm going to haul *him* back by his *scruff*."

She folded the rest of the bread and snapped it delicately in two. The thirteen-year-old winced and looked away.

"No, I can't say that I miss Titan much," Hammersmith said, in a meditative tone which nevertheless carried the entire length of the hold. "I like planets where the sky is clear most of the time. My hobby is microastronomy as a matter of fact I have some small reputation in the field, strictly as an amateur. I understand the stars should be unusually clear and brilliant in the Centaurus area, but of course there's nothing like open space for really serious work."

"To tell the truth," Celia went on, although for Arpe's money she had told more than enough truth already, "I'm scared to death of this bloated coffin of yours. But what the hell. I'm dead anyhow. On Earth, everybody knows I can't stay married two years, no matter how many fan letters I get. Or how many proposals, honorable or natural. It's no good to me any more that three million men say they love me. I know what they mean. Every time I take one of them up on it, he vanishes."

The folded snippet of bread vanished without a sound.

"Are you really going to be a colonist?" someone asked Hammersmith.

"Not for a while, anyhow," the explorer said. "I'm taking my fiancée there" at least two score feminine faces fell with an almost audible thud "to establish our home, but I hope I'll be pushing on ahead with a calibration cruiser. I have a theory that our Captain's drive may involve some navigational difficulties. And I'll be riding my hobby the while; the arrangement suits me nicely."

Arpe was sure his ears could be seen to be flapping. He was virtually certain that there was no such discipline as microastronomy, and he was perfectly certain that any collimation-cniising (Hammersmith even had the wrong word) the Arpe drive required was going to be done by one Gordon Arpe, except over his dead body.

"Thisman," Celia Gopardi went on implacably, "I'm going to hold, if I have to chase him all over the galaxy. I'll teach him to run away from *me* without making it legal first."

Her fork stabbed a heart of lettuce out of the Lazy Spider and turned it in the gout of Russian dressing the Spider had shot into the air after it. "What does he think he got himself into, anyhow the Foreign Legion?" she asked nobody in particular. "*Him?* He couldn't find his way out of a super market without a map."

Arpe was gasping like a fish. The girl was smiling warmly at him, from the midst of a cloud of musky perfume against which the ship's ventilators labored in vain. He had never felt less like the captain of a great ship. In another second he would be squirming. He was already blushing.

"Sir..."

It was Oestreicher, bending at his ear. Arpe almost broke his tether with gratitude. "Yes, Mr. Oestreicher?"

"We're ready to start dogging down; SV-One has asked us to clear the area a little early, in view of the heavy traffic involved. If you could excuse yourself, we're needed on the bridge."

"Very good. Ladies and gentlemen, please excuse me; I have duties. I hope you'll see the dinner through, and have a good time."

"Is something wrong?" Celia Gopardi said, looking directly into his eyes. His heart went *boompl* like a form-stamper.

"Nothing wrong," Oestreicher said smoothly from behind him. "There's always work to do in officer's country. Ready, Captain?"

Arpe kicked himself away from the table into the air, avoiding a floating steward only by a few inches. Oestreicher caught up with him in time to prevent his running head-on into the side of a bulkhead.

"We've allowed two hours for the passengers to finish eat-

ing and bed down," Oestreicher reported in the control room.

"Then we'll start building the field. You're sure we don't need any preparations against acceleration?"

Arpe was recovering; now that the questions were technical, he knew where he was. "No, none at all. The field doesn't mean a thing while it's building. It has to reach a threshold before it takes effect. Once it crosses that point on the curve, it takes effect totally, all at once. Nobody should feel a thing."

"Good. Then we can hit the hammocks for a few hours. I suggest, sir, that Mr. Stauffer take the first watch; I'll take the second; that will leave you on deck when the drive actually fires, if it can be delayed that long. I already have us on a slight retrocurve from SV-One."

"It can be delayed as long as we like. It won't cross the threshold till we close that key."

"That was my understanding," Oestreicher said. "Very good, sir. Then let's stand the usual watches and get under way at the fixed time. By then we'll be at apogee so far as the satellite station is concerned. It would be best to observe normal routine, right up to the moment when the voyage itself becomes unavoidably abnormal."

This was wisdom, of course. Arpe could do nothing but nod, though he doubted very much that he would manage to get to sleep before his trick came up. The bridge emptied, except for Stauffer and a j.g. from the Nernst gang, and the

ship quieted.

In the morning, while the passengers were still asleep, Arpe closed the key.

The *Flyaway 11* vanished without a sound.

2

Mommy Mommy Mommy Mommy Mommy

Mommy

I dream I see him Johnny I love you he's going down
the ladder into the pit and I can't follow and he's gone al-
ready and it's time for the next act

Spaceship I'm flying it and Bobby can see me and all the
people

Some kind of emergency but then why not the alarms

Got to ring Stauffer

Daddy? Daddy? Bye-bye-see you? Daddy

Where's the bottle I knew I shouldn't of gotten sucked
into that game

The wind always the wind

Falling falling why can't I stop falling will I die if I
stop

Two point eight three four Two point eight three four I
keep thinking two point eight three four that's what the
meter says two point eight three four

Somebody stop that wind I tell you it talks I tell you I
hear it words in the wind

Johnny don't go. I'm riding an elephant and he's trying
to go down the ladder after you and it's going to break
No alarms. All well. But can't think. Can't Mommy ladder
spaceship think for bye-bye-see-you two windy Daddy bottle
seconds straight. What's the bottle trouble game matter any-
how? Where's that two point eight three four physicist, what's-
his-bye-bye-name, Daddy, Johnny, Arpel
will I die if I stop

I love you

the wind

two point

Mommy

STOP.

STOP. STOP. Arpe. Arpe. Where are you? Everyone else,
stop thinking. STOP. We're reading one another's minds.

Everyone try to stop before we go nuts. Captain Arpe, do
you hear me? Come to the bridge. Arpe, do you hear me?

I hear you. I'm on my way. My God.

You there at the field tension meter

two point eight three four

Yes, you. Concentrate, try not to pay attention to anything
else

Yes, sir. 2.834. 2.834. 2.834.

You people with children, try to soothe them, bed them
down again. Mr. Hammersmith]

The wind . . . Yes?

Wake up. We need your help. Oestreicher here. Star deck on the double please. A hey-rube.

But . . . Right, Mr. Oestreicher. On the way.

As the first officer's powerful personality took hold, the raging storm of emotion and dream subsided gradually to a sort of sullen background sea of fear, marked with fleeting whitecaps of hysteria, and Arpe found himself able to think his own thoughts again. There was no doubt about it: everyone on board the *Flyaway II* had become suddenly and totally telepathic.

But what could be the cause? It couldn't be the field. Not only was there nothing in the theory to account for it, but the field had already been effective for nearly an hour, at this same intensity, without producing any such pandemonium.

"My conclusion also," Oestreicher said as Arpe came onto the bridge. "Also you'll notice that we can now see out of the ship, and that the outside sensing instruments are registering again. Neither of those things was true up to a few minutes ago; we went blind as soon as the threshold was crossed."

"Then what's the alternative?" Arpe said. He found that it helped to speak aloud; it diverted him from the undercurrent of the intimate thoughts of everyone else. "It must be characteristic of the space we're in, then, wherever that is. Any clues?"

"There's a sun outside," Stauffer said, "and it has planets.

I'll have the figures for you in a minute. This I can say right away, though: It isn't Alpha Centauri. Too dim."

Somehow, Arpe hadn't expected it to be. Alpha Centauri was in normal space, and this was obviously anything but normal. He caught the figures as they surfaced in Stauffer's mind: Diameter of primary about a thousand miles (could that possibly be right? Yes, it was correct. But incredible). Number of planets six. Diameter of outermost planet about a thousand miles; distance from primary about 50 million miles.

"What kind of a screwy system is this?" Stauffer protested.

"Six planets inside six astronomical units, and the outermost one as big as its sun? It's dynamically impossible."

It certainly was, and yet it was naggingly familiar. Gradually the truth began to dawn on him; there was only one kind of system in which both primary and planet were consistently $1/50,000$ of the distance of the outermost orbit. He suppressed it temporarily, partly to see whether or not it was possible to conceal a thought from the others under these circumstances.

"Check the orbital distances, Mr. Stauffer. There should be only two figures involved."

"Two, sir? For six planets?"

"Yes. You'll find two of the bodies occupying the same distance, and the other four at the fifty-million-mile distance."

"Great Scott," Oestreicher said. "Don't tell me we've gotten

ourselves inside an atom, sir!"

"Looks like it. Tell me, Mr. Oestreicher, did you get that from my mind, or derive it from what I said?"

"I doped it out," Oestreicher said, puzzled.

"Good; now we know something else: *It is possible to suppress a thought in this medium. I've been holding the thought 'carbon atom' just below the level of my active consciousness for several minutes.*"

Oestreicher frowned, and thought: *That's good to know, it increases the possibility of controlling panic and . . .* Slowly, like a sinking ship, the rest of the thought went under. The first officer was practicing.

"You're right about the planets, sir," Stauffer reported. "I suppose this means that they'll all turn out to be the same size, and that there'll be no ecliptic, either."

"Necessarily. They're electrons. That 'sun' is the nucleus."

"But how did it happen?" Oestreicher demanded.

"I can only guess. The field gives us negative mass. We've never encountered negative mass in nature anywhere but in the microcosm. Evidently that's the only realm where it *can* exist, as soon as we attained negative mass, we were collapsed into the microcosm."

"Great," Oestreicher grunted. "Can we get out, sir?"

"I don't know. Positive mass is allowable in the microcosm, so if we turned off the field, we might just keep right on

staying here. We'll have to study it out. What interests me more right now is this telepathy; there must be some rationale for it."

He thought about it. Until now, he had never believed in telepathy at all; its reported behavior in the macrocosm had been so contrary to all known physical laws that it had been easier to assume that it didn't exist. But the laws of the macrocosm didn't apply down here; this was the domain of quantum mechanics though telepathy didn't obey that scholium either. Was it possible that the "parapsychological" fields were a part of the fine structure of this universe, as the electromagnetic fields of this universe itself were the fine structure of the macrocosm? If so, any telepathic effects that turned up in the macrocosm would be traces only, a leakage or residuum, fleeting and wayward, beyond all hope of control. . . .

Oestreicher, he noticed, was following his reasoning with considerable interest. "I'm not used to thinking of electrons as having any fine structure," he said.

"Well, all the atomic particles have spin, and to measure that, you have to have some kind of point *on* the particle being translated from one position in space to another at least by analogy. I would say that the analogy's established now; all we have to do is look out the port."

"You mean we might land on one of those things, sir?"

Stauffer asked.

"I should think so," Arpe said, "if we think there's something to be gained by it. I'll leave that up to Mr. Oestreicher."

"Why not?" Oestreicher said, adding, to Arpe's surprise,

"The research chance alone oughtn't to be passed up."

Suddenly, the background of fear, which Arpe had more and more become able to ignore, began to swell ominously; huge combers of pure panic were beginning to race over it.

"Oof," Oestreicher said. "We weren't covering enough we forgot that they could pick up every unguarded word we said. And they don't like the idea."

They didn't. Individual thoughts were hard to catch, but the main tenor was plain. These people had signed up to go to Centaunis, and that was where they wanted to go. The good possibility that they were trapped on the atomic-size level was terrifying enough, but talong the further risk of landing on an electron . . .

Abruptly Arpe felt, almost without any words to go with it, the raw strength of Hammersmith throwing itself Canute-like against the tide. The explorer's mind had not been in evidence at all since the first shock; evidently he had quickly discovered for himself the trick of masking. For a moment the sheer militancy of Hammersmith's counterstroke seemed to have a calming effect. . . .

One thread of pure terror lifted above the mass. It was Celia Gospari; she had just awakened, and her shell of

bravado had been stripped completely. Following that soundless scream, the combers of panic became higher, more rapid....

"We'll have to do something about that woman," Oestreicher said tensely. Arpe noted with interest that he was masking the thought he was speaking, quite a difficult technical trick; he tried to mask it also in the reception. "She's going to throw the whole ship into an uproar. You were talking to her at some length last night, sir; maybe you'd better try."

"All right," Arpe said reluctantly, taking a step toward the door. "I gather she's still in her"

Flupl

Celia Gopardi *was* in her stateroom.

So was Captain Arpe.

She stifled a small vocal scream as she recognized him.

"Don't be alarmed," he said quickly, though he was almost as alarmed as she was. "Listen, Mr. Oestreicher and everybody else: be careful about making any sudden movements with some definite destination in mind. You're likely to arrive there without having crossed the intervening distance. It's a characteristic of the space we're in."

/ read you, sir. So teleportation is an energy-level jump?

That could be nasty, all right.

"It's nice of you to try to quiet me," the girl said

timidly. Arpe noticed covertly that she could not mask worth

a damn. He would have to be careful in what he said, for she would effectively make every word known throughout the ship. It was too bad, in a way. Attractive as she was in her public role, she was downright beautiful when frightened.

"Please do try to keep a hold on yourself, Miss Gopardi," he said. "There really doesn't seem to be any immediate danger. The ship is sound and her mechanisms are all operating as they should. We have supplies for a full year, and unlimited power; we ought to be able to get away. There's nothing to be frightened about."

"I can't help it," she said desperately. "I can't even think straight. My thoughts keep getting all mixed up with everybody else's."

"We're all having that trouble to some extent," Arpe said.

"If you concentrate, you'll find that you can filter the other thoughts out about ninety per cent. And you'll have to try, because if you remain frightened you'll panic other people especially the children. They're defenseless against adult emotions even *without* telepathy."

"I'll try."

"Good for you." With a slight smile, he added, "After all, if you think as little of your fifth husband as you say, you should welcome a little delay en route."

It was entirely the wrong thing to say. At once, way down at the bottom of her mind, a voice cried out in soundless

anguish: *But I love him!*

Tears were running down her cheeks. Helplessly, Arpe left.

He walked carefully, in no hurry to repeat the unnerving teleportation jump. In the main companionway he was way-laid by a junior officer almost at once.

"Excuse me, sir. I have a report here from the ship's surgeon. Dr. Hoyle said it might be urgent and that I'd better bring it to you personally."

"Oh. All right, what is it?"

"Dr. Hoyle's compliments, sir, and he suggests that oxygen tension be checked. He has an acute surgical emergency a passenger which suggests that we may be running close to nine thousand."

Arpe tried to think about this, but it did not convey very much to him, and what it did convey was confusing. He knew that space ships, following a tradition laid down long ago in atmospheric flight, customarily expressed oxygen tension in terms of feet of altitude on Earth; but 9000 feet though it would doubtless cause some discomfort-did not seem to represent a dangerously low concentration. And he could, see no connection at all between a slightly depleted oxygen level and an acute surgical emergency. Besides, he was too flustered over Celia Gopardi.

The interview had not ended at all the way he had hoped.

But perhaps it was better to have left her grief-stricken than panic-stricken. Of course, if she broadcast her grief all over

the ship, there were plenty of other people to receive it, people who had causes for grief as real as hers.

"Grief inactivates," Oestreicher said as Arpe re-entered the bridge. "Even at its worst, it doesn't create riots. Cheer up, sir. I couldn't have done any better, I'm sure of that."

"Thank you, Mr. Oestreicher," Arpe said, flushing. Evidently he had forgotten to mask; "thinking out loud" was more than a cliché down here. To cover, he proffered Hoyle's confusing message.

"Oh?" Oestreicher strode to the mixing board and scanned the big Bourdon gages with a single sweeping glance. "He's right. We're pushing eight-seven hundred right now. Once we cross ten thousand we'll have to order everybody into masks. I *thought* I was feeling a little light-headed. Mr. Stauffer, order an increase in pressure, and get the bubble crew going, on double."

"Right." Stauffer shot out.

"Mr. Oestreicher, what's this all about?"

"We've sprung a major leak, siror, more likely, quite a few major leaks. We've got to find out where all this air is going. We may have killed Hoyle's patient already."

Arpe groaned. Surprisingly, Oestreicher grinned.

"Everything leaks," he said in a conversational tone. "That's the first law of space. On the Mars run, when we disliked a captain, we used to wish him an interesting trip. This one is

interesting."

"You're a psychologist, Mr. Oestreicher," Arpe said, but he managed to grin back. "Very well; what's the program now? I feel some weight."

"We were making a rocket approach to the nearest electron, sir, and we seem to be moving. I see no reason why we should suspend that. Evidently the Third Law of Motion isn't invalid down here."

"Which is a break," Stauffer said gloomily from the door.

"I've got the bubble crew moving, Mr. Oestreicher, but it'll take a while. Captain, what are we seeing by? Gamma waves? Space itself doesn't seem to be dark here."

"Gamma waves are too long," Arpe said. "Probably de Broglie waves. The illuminated sky is probably a demonstration of Obler's Paradox: it's how *our* space would look if the stars were evenly scattered throughout. That makes me think we must be inside a fairly large body of matter. And the nearest one was SV-One."

"Oh-ho," Stauffer said. "And what happens to us when a cosmic ray primary comes charging through here and disrupts our atom?"

Arpe smiled. "You've got the answer to that already. Have you detected any motion in this electron we're approaching?"

"Not much—just normal planetary motion. About fourteen miles a second—expectable for the orbit."

"Which wouldn't be expectable at all unless we were living

on an enormously accelerated time scale. By our home time scale we haven't been here a billionth of a second yet. We could spend the rest of our lives here without seeing a free neutron or a cosmic primary."

"That's a relief," Stauffer said; but he sounded a little dubious.

They fell silent as the little world grew gradually in the ports. There was no visible surface detail on it, and the albedo was high. As they came closer, the reasons for both effects became evident, for with each passing moment the outlines of the body grew fuzzier. It seemed to be imbedded in a sort of thick haze.

"Close enough," Oestreicher ruled. "We can't land the Flyawayanyhow; we'll have to put a couple of people off in a tender. Any suggestions, sir?"

"I'm going," Arpe said immediately. "I wouldn't miss an opportunity like this for anything."

"Can't blame you, sir," Oestreicher said. "But that body doesn't look like it has any solid core. What if you just sank right through to the center?"

"That's not likely," Arpe said. "I've got a small increment of negative mass, and I'll retain it by picking up the ship's field with an antenna. The electron's light, but what mass it has is positive; in other words, it will repel me slightly. I won't sink far."

"Well then, who's to go with you?" Oestreicher said, masking every word with great care. "One trained observer should be enough, but you'll need an anchor man. I'm astonished that we haven't heard from Hammersmith already have you noticed how tightly he shut down as soon as this subject came up?"

"So he did," Arpe said, baffled. "I haven't heard a peep out of him for the last hour. Well, that's his problem; maybe he had enough after Titan."

"How about Miss Gopardi?" Stauffer suggested. "It seems to reassure her to be with you. Captain, and it'll give her something new to think about. And it'll take an incipient panic center out of the ship long enough to let the other people calm down."

"Good enough," Arpe said. "Mr. Stauffer, order the gig broken out."

3

The little world had a solid surface, after all, though it blended so gradually into the glittering haze of its atmosphere that it was very hard to see. Arpe and the girl seemed to be walking waist-deep in some swirling, opalescent substance that was bearing a colloidal metallic dust, like minute sequins.

The faint repulsions against their space suits could not be felt as such; it seemed instead that they were walking in a gravitational field about a tenth that of the Earth.

"It's terribly quiet," Celia said.

The suit radios, Arpe noted, were not working. Luckily, the thought-carrying properties of the medium around them were unchanged.

"I'm not at all sure that this stuff would carry sound," he answered. "It isn't a gas as we know it, anyhow. It's simply a manifestation of indefiniteness. The electron never knows exactly where it is; it just trails off at its boundaries into not being anywhere in particular."

"Well, it's eerie. How long do we have to stay here?"

"Not long. I just want to get some idea of what it's like."

He bent over. The surface, he saw, was covered with fine detail, though again he was unable to make much sense of it. Here and there he saw tiny, crooked rills of some brilliantly shiny substance, rather like mercury, and yes, there was an irregular puddle of it, and it showed a definite meniscus. When he pushed his finger into it, the puddle dented deeply, but it did not break and wet his glove. Its surface tension must be enormous; he wondered if it were made entirely of identical subfundamental particles. The whole globe seemed to be covered by a network of these shiny threads.

Now that his eyes were becoming acclimated, he saw that the "air," too, was full of these shining veins, making it look distinctly marbled. The veins offered no impediment to their walking; somehow, there never seemed to be any in their immediate vicinity, though there were always many of them

just ahead. As the two moved, their progress seemed to be accompanied by vagrant, small emotional currents, without visible cause or source, too fugitive to identify.

"What is that silvery stuff?" Celia demanded fearfully.

"Celia, I haven't the faintest idea. What kind of particle could possibly be submicroscopic to an electron? It'd take a century of research right here on the spot to work up even an educated guess. This is all strange and new, utterly outside any experience man has ever had. I doubt that any words exist to describe it accurately."

The ground, too, seemed to vary in color. In the weak light it was hard to tell what the colors were. The variations appeared as shades of gray, with a bluish or greenish tinge here and there.

The emotional waves became a little stronger, and suddenly Arpe recognized the dominant one.

It was pain.

On a hunch, he turned suddenly and looked behind him. A twin set of broad black bootprints, as solid and sharply defined as if they had been painted, were marked out on the colored patches.

"I don't like the look of that," he said. "Our ship itself is almost of planetary mass in this system, and we're far too big for this planet. How do we know what all this fine detail means? But we're destroying it wherever we step, all the same. Forests, cities, the cells of some organism, something

unguessable we've got to go back right now."

"Believe me, I'm willing," the girl said.

The oldest footprints, those that they had made getting out of the tender, were beginning to grow silvery at the edges, as though with hoarfrost, or with whatever fungus might attack a shadow. Or was it seepage of the same substance that made up the rills? Conjecture multiplied endlessly without answer here. Arpe hated to think of the long oval blot the tender itself would leave behind on the landscape. He could only hope that the damage would be self-repairing; there was something about this place that was peculiarly . . . organic.

He lifted the tender quickly and took it out of the opalescent atmosphere with a minimum of ceremony, casting ahead for guidance to pick up the multifarious murmur of the minds on board the *Flyaway II*.

Only when he noticed that he was searching the sky visually for the ship did he realize that he was not getting anything.

"Celia? You can hear me all right telepathically, can't you?"

"Clear as a bell. It makes me feel much better, Captain."

"Then what's wrong with the ship? I don't pick up a soul."

She frowned. "Why, neither do I. Where . . ."

Arpe pointed ahead. "There she is, right where we left

her. We could hear them all well enough at this distance when we were on the way down. Why can't we now?"

He gunned the tender, all caution forgotten. His arrival in the *Flyaway II's* air lock was noisy, and he lost several minutes jockeying the little boat into proper seal. They both fell out of it in an inelegant scramble.

There was nobody on board the *Flyaway II*. Nobody but themselves.

The telepathic silence left no doubt in Arpe's or Celia's mind, but they searched the huge vessel thoroughly to make sure. It was deserted.

"Captain!" Celia cried. Her panic was coming back full force. "What happened? Where could they have gone? There isn't any place"

"I know there isn't. I don't know. Calm down a minute, Celia, and let me think." He sat down on a stanchion and stared blindly at the hull for a moment. Breathing the thinning air was a labor in itself; he found himself wishing they had not shucked their suits. Finally he got up and went back to the bridge, with the girl clinging desperately to his elbow.

Everything was in order. It was as if the whole ship had been deserted simultaneously in an instant. Oestreicher's pipe sat snugly in its clip by the chart board; though it was empty of any trace of the self-oxygenating mixture Oestreicher's juniors had dubbed "Old Gunpowder," the bowl was still hot.

"It can't have happened more than half an hour ago," he whispered. "As if they all did a jump at once like the one that put me into your stateroom. But where to?"

Suddenly it dawned on him. There was only one answer. Of course they had gone nowhere.

"What is it?" Celia cried. "I can see what you're thinking, but it doesn't make sense!"

"It makes perfect sense in *this* universe," he said grimly.

"Celia, we're going to have to work fast, before Oestreicher makes some stab in the dark that might be irrevocable.

Luckily everything's running as though the crew were still here to tend it which in fact happens to be true so maybe two of us will be enough to do what we have to do. But you're going to have to follow instructions fast, accurately, and without stopping for an instant to ask questions."

"What are you going to do?"

"Shut down the field. No, don't protest, you haven't the faintest idea what that means, so you've no grounds for protest. Sit down at that board over there and watch my mind every instant. The moment I think of what you're to do next, do it. Understand?"

"No, but"

"You understand well enough. All right, let's go."

Rapidly he began to step down the Nernst current going into the field generators, mentally directing Celia in the deli-

cate job of holding the fusion sphere steady against the diminished drain. Within a minute he had the field down to just above the threshold level; the servos functioned without a hitch, and so, not very much to his surprise, did those aspects of the task which were supposed to be manned at all times.

"All right, now I'm going to cut it entirely. There'll be a big backlash on your board. See that master meter right in front of you at the head of the board? The black knob marked 'Back BMP' is cued to it. When I pull this switch, the meter will kick over to some reading above the red line. At the same instant, you roll the knob down to *exactly* the same calibration. If you back it down too far, the Nernst will die and we'll have no power at all. If you don't go down far enough, the Nernst will detonate. You've got to catch it on the nose. Understand?"

"I think so."

"Good," he said. He hoped it would be good. Normally the rolloff was handled wholly automatically, but by expending the energy evenly into the dying field; they did not dare to chance that here. He could only pray that Celia's first try would be fast. "Here we go. Five seconds, four, three, two, one, *cut.*"

Celia twisted the dial.

For an instant, nothing happened. Then

Pandemonium.

"Nernst crew chief, report! What are you doing? No orders were"

"Captain! Miss Gopardil Where did you spring from?"

This was Oestreicher. He was standing right at Arpe's elbow.

"Stars! Stars!" Stauffer was shouting simultaneously. "Hey, look! Stars! We're *back!*"

There was a confused noise of many people shouting in the belly of the *Flyaway II*. But in Arpe's brain there was blessed silence; the red foaming of raw thoughts by the hundreds was no more. His mind was his own again.

"Good for you, Celia," he said. It was a sort of prayer.

"We were in time."

"How did you do it, sir?" Oestreicher was saying. "We couldn't figure it out. We were following your exploration of the electron from here, and suddenly the whole planet just vanished. So did the whole system. We were floating in another atom entirely. We thought we'd lost you for good."

Arpe grinned weakly. "Did you know that you'd left the ship behind when you jumped?"

"But impossible, sir. It was right here all the time."

"Yes, that too. It was exercising its privilege to be in two places at the same time. As a body with negative mass, it had some of the properties of a Dirac hole; as such, it had to be echoed somewhere else in the universe by an electron, like a sink and a source in calculus. Did you wind up in one of

the shells of the second atom?"

"We did," Stauffer said. "We couldn't move out of it, either."

"That's why I killed the field," Arpe explained. "I couldn't know what you would do under the circumstances, but I *was* pretty sure that the ship would resume its normal mass when the field went down. A mass that size, of course, can't exist in the microcosm, so the ship had to snap back. And in the macrocosm it isn't possible for a body to be in two places at the same time. So here we are, gentlemen reunited."

"Very good, sir," Stauffer said; but the second officer's voice seemed to be a little deficient in hero worship. "But where is here?"

"Eh? Excuse me, Mr. Stauffer, but don't you know?"

"No, sir," Stauffer said. "All I can tell you is that we're nowhere near home, and nowhere near the Centauri stars, either. We appear to be lost, sir."

His glance flicked over to the Bourdon gages.

"Also," he added quietly, "we're still losing air."

The general alarm had alarmed nobody but the crew, who alone knew how rarely it was sounded. As for the bubble gang, the passengers who knew what that meant mercifully kept their mouths shut perhaps Hammersmith had blustered them into silence and the rest, reassured at seeing the stars again, were only amused to watch full-grown, grim-looking men stalking the corridors blowing soap bubbles into the air.

After a while, the bubble gang vanished; they were working between the hulls.

Arpe was baffled and restive. "Look here," he said suddenly. "This surgical emergency of Hoyle's I'd forgotten about it, but it seems to have some bearing on this air situation. Let's"

"He's on his way, sir," Oestreicher said. "I put a call on the bells for him as soon asah, here he is now."

Hoyle was a plump, smooth-faced man with a pursed mouth and an expression of perpetual reproof. He looked absurd in his naval whites. He was also four times a Haber medal winner for advances in space medicine.

"It was a ruptured spleen," he said primly. "A dead giveaway that we were losing oxygen. I was operating when I had the captain called, or I'd have been more explicit."

"Aha," Oestreicher said. "Your patient's a Negro, then."

"A female Negroan eighteen-year-old girl, and incidentally one of the most beautiful women I've seen in many, many years."

"What has her color got to do with it?" Arpe demanded, feeling somewhat petulant at Oestreicher's obvious instant comprehension of the situation.

"Everything," Hoyle said. "Like many people of African extraction, she has sickle cell anemia, a hereditary condition in which some of the red blood cells take on a characteristic sicklelike

shape. In Africa it was pro-survival, because sickle cell people are not so susceptible to malaria as are people with normal erythrocytes. But it makes them less able to take air that's poor in oxygen that was discovered back in the 1940s, during the era of unpressurized high altitude airplane flight. It's nothing that can't be dealt with by keeping sufficient oxygen in the ambient air, but . . ."

"How is she?" Arpe said.

"Dying," Hoyle said bluntly. "What else? I've got her in a tent but we can't keep that up forever. I need normal pressure in my recovery room or if we can't do that, get her back to Earth *fast*."

He saluted sloppily and left. Arpe looked helplessly at Stauffer, who was taking spectra as fast as he could get them onto film, which was far from fast enough for Arpe, let alone the computer. The first attempt at orientation Schmidt spherical films of the apparent sky, in the hope of identifying at least one constellation, however distorted had come to nothing. Neither the computer nor any of the officers had been able to find a single meaningful relationship.

"Is it going to do us any good if we do find the Sun?"

Oestreicher said. "If we make another jump, aren't we going to face the same situation?"

"Here's S Doradus," Stauffer announced. "That's a beginning, anyhow. But it sure as hell isn't in any position I can recognize."

"We're hoping to find the source of the leak," Arpe reminded the first officer. "But if we don't, I think I can calculate a fast jumpin-again-out-again. I hope we won't have to do it, though. It would involve shooting for a very heavy atomheavy enough to be unstable"

"Looking for the Sun?" a booming, unpleasantly familiar voice broke in from the bulkhead. It was Hammersmith, of course. Dogging his footsteps was Dr. Hoyle, looking even more disapproving than ever.

"See here, Mr. Hammersmith," Arpe said. "This is an emergency. You've got no business being on the bridge at all."

"You don't seem to be getting very far with the job," Hammersmith observed, with a disparaging glance at Stauffer.

"And it's my life as much as it's anybody else's. It's high time I gave you a hand."

"We'll get along," Oestreicher said, his face red. "Your stake in the matter is no greater than any other passenger's"

"Ah, that's not quite true," Dr. Hoyle said, almost regretfully. "The emergency is medically about half Mr. Hammersmith's."

"Nonsense," Arpe said sharply. "If there's any urgency beyond what affects us all, it affects your patient primarily."

"Yes, quite so," **Dr.** Hoyle said, spreading his hands. "She is Mr. Hammersmith's fiancée."

After a moment, Arpe discovered that he was angry not with Hammersmith, but with himself, for being stunned by the announcement. There was nothing in the least unlikely about s u *ch*an engagement, and yet it had never entered his head even as a possibility. Evidently his unconscious still had prejudices he had extirpated from his conscious mind thirty-five years ago.

"Why have you been keeping it a secret?" he asked slowly.

"For Helen's protection," Hammersmith said, with considerable bitterness. "On Centaurus we may get a chance at a reasonable degree of privacy and acceptance. But if I'd kept her with me on the ship, she'd have been stared at and whispered over for the entire trip. She preferred to stay below."

An ensign came in, wearing a space suit minus the helmet, and saluted clumsily. After he got the space suit arm up, he just left it there, resting his arm inside it. He looked like a small doll some child had managed to stuff inside a larger one.

"Bubble team reporting, sir," he said. "We were unable to find any leaks, sir."

"You're out of your mind," Oestreicher said sharply. "The pressure is still dropping. There's a hole somewhere you could put your head through."

"No, sir," the ensign said wearily. "There are no such holes. The entire ship is leaking. The air is going right out

through the metal. The rate of loss is perfectly even, no matter where you test it."

"Osmosis!" Arpe exclaimed.

"What do you mean, sir?" Oestreicher said.

"I'm not sure, Mr. Oestreicher. But I've been wondering all along I guess we all have just how this whole business would affect the ship structurally. Evidently it weakened the molecular bonds of everything on board and now we have good structural titanium behaving like a semipermeable membrane! I'll bet it's specific for oxygen, furthermore; a 20 per cent drop in pressure is just about what we're getting here."

"What about the effect on people?" Oestreicher said.

"That's Dr. Royle's department," Arpe said. "But I rather doubt that it affects living matter. That's in an opposite state of entropy. But when we get back, I want to have the ship measured. I'll bet it's several meters bigger in both length and girth than it was when it was built."

"// we get back," Oestreicher said, his brow dark.

"Is this going to put the kibosh on your drive?" Stauffer asked gloomily.

"It's going to make interstellar flight pretty expensive,"

Arpe admitted. "It looks like we'll have to junk a ship after one round trip."

"Well, we effectively junked the *Flyaway I* after one one-way trip," Oestreicher said reflectively. "That's progress, of a

sort."

"Look here, all this jabber isn't getting us anywhere," Hammersmith said. "Do you want me to bail you out, or not? If not, I'd rather be with Helen than standing around listening to you."

"What do you propose to do," Arpe said, finding it impossible not to be frosty, "that we aren't doing already?"

"Teach you your business," Hammersmith said. "I presume you've established our distance from S Doradus for a starter. Once I have that, I can use the star as a beacon, to collimate my next measurements. Then I want the use of an image amplifier, with a direct-reading microvoltmeter tied into the circuit; you ought to have such a thing, as a routine instrument."

Stauffer pointed it out silently.

"Good." Hammersmith sat down and began to scan the stars with the amplifier. The meter silently reported the light output of each, as minute pulses of electricity. Hammersmith watched it with a furious intensity. At last he took off his wrist chronometer and began to time the movements of the needle with the stop watch.

"Bull's-eye," he said suddenly.

"The Sun?" Arpe asked, unable to keep his tone from dripping with disbelief.

"No. That one is DQ Herculis an old nova. It's a micro-variable. It varies by four hundredths of a magnitude every

sixty-four seconds. Now we have two stars to fill our parameters; maybe the computer could give us the Sun from those? Let's try it, anyhow."

Stauffer tried it. The computer had decided to be obtuse today. It did, however, narrow the region of search to a small sector of sky, containing approximately sixty stars.

"Does the Sun do something like that?" Oestreicher said.

"I knew it was a variable star in the radio frequencies, but what about visible light?"

"If we could mount an RF antenna big enough, we'd have the Sun in a moment," Hammersmith said in a preoccupied voice. "But with light it's more complicated. . . . Um. If *thafs* the Sun, we must be even farther away from it than I thought.

Dr. Hoyle, will you take my watch, please, and take my pulse?"

"Your pulse?" Hoyle said, startled. "Are you feeling ill?"

The air is"

"I feel fine, I've breathed thinner air than this and lived,"

HammersmftH said irritably. "Just take my pulse for a starter, then take everyone else's here and give me the average. I'd use the whole shipload if I had the time, but I don't. If none of you experts knows what I'm doing I'm not going to waste what time I've got explaining it to you now. Goddam it, there are lives involved, remember?"

His lips thinned, Arpe nodded silently to Hoyle; he did not

trust himself to speak. The physician shrugged his shoulders and began collecting pulse rates, starting with the big explorer. After a while he had an average and passed it to Hammersmith on a slip of paper torn from his report book.

"Good," Hammersmith said. "Mr. Stauffer, please feed this into Bessie there. Allow for a permitted range of variation of two per cent, and bleed the figure out into a hundred and six increments and decrements each; then tell me what the percentage is now. Can do?"

"Simple enough." Stauffer programmed the tape. The computer jammered out the answer almost before the second officer had stopped typing; Stauffer handed the strip of paper over to Hammersmith.

Arpe watched with reluctant fascination. He had no idea what Hammersmith was doing, but he was beginning to believe that there was such a science as microastronomy after all.

Thereafter, there was a long silence while Hammersmith scanned one star after another. At last he sighed and said:

"There you are. This ninth magnitude job I'm lined up on now. That's the Sun. Incidentally we are a little closer to Alpha Centauri than we are from homethough God knows we're a long way from either."

"How can you be sure?" Arpe said.

"I'm not sure. But I'm as sure as I can be at this distance. Pick the one you want to go to, make the jump, and I'll

explain afterwards. We can't afford to kill any more time with lectures."

"No," Arpe said. "I will do no such thing. I'm not going to throw away what will probably be our only chance the ship isn't likely to stand more than one more jump on a calculation that I don't even know the rationale of."

"And what's the alternative?" Hammersmith demanded, sneering slightly. "Sit here and die of anoxia and just sheer damn stubbornness?"

"I am the captain of this vessel," Arpe said, flushing. "We do not move until I get a satisfactory explanation of your pretensions. Do you understand me? That's my order; it's final."

For a few moments the two men glared at each other, stiff-necked as idols, each the god of his own pillbox-universe. Hammersmith's eyelids drooped. All at once, he seemed too tired to care.

"You're wasting time," he said. "Surely it would be faster to check the spectrum."

"Excuse me, Captain," Stauffer said excitedly. "I just did that. And I think that star *is* the Sun. It's about eight hundred light-years away"

"Eight *hundred light-years!*"

"Yes, sir, at least that. The spectral lines are about half missing, but all the ones that are definite enough to measure

match nicely with the Sun's. I'm not so sure about the star
Mr. Hammersmith identifies as A Centaurus, but at the very
least it's a spectroscopic double, and it *is* about fifty light~earss
closer."

"My God," Arpe muttered. "Eight hundred."

Hammersmith looked up again, his expression curiously
like that of a St. Bernard whose cask of brandy has been
spurned. "Isn't that sufficient?" he said hoarsely. "In God's
name, let's get going. She's dying while we stand around
here nit-picking I"

"No rationale, no jump," Arpe said stonily. Oestreicher
shot him a peculiar glance out of the corners of his eyes.

In that moment, Arpe felt his painfully accumulated status
with the first officer shatter like a Prince Rupert's drop; but
he would not yield.

"Very well," Hammersmith said gently. "It goes like this.
The Sun is a variable star. With a few exceptions, the pulses
don't exceed the total average emissionthe solar constant
by more than two per cent. The over-all period is 273
months. Inside that, there are at least sixty-three subordinate
cycles. There's one of 212 days. Another one .lasts only a
fraction over six and a half days1 forget the exact period,
but it's 1/1250 of the main cycle, if you want to work it
out on Bessie there."

"I guessed something like that," Arpe said. "But what
good does it do us? We have no tables for it"

"These cycles have effects," Hammersmith said. "The six-and-a-half-day cycle strongly influences the weather on Earth, for instance. And the 212-day cycle is reflected one-for-one in *the human pulse rate*."

"Oho," Oestreicher said. "Now I see. It's Captain, this means that we can *never* be lost! Not so long as the Sun is detectable at all, whether we can identify it or not! We're carrying the only beacon we need right in our blood!"

"Yes," Hammersmith said. "That's how it goes. It's better to take an average of all the pulses available, since one man might be too excited to give you an accurate figure. I'm that overwrought myself. I wonder if it's patentable? No, a law of nature, I suppose; besides, too easily infringed, almost like a patent on shaving. . . . But it's true, Mr. Oestreicher. You may go as far afield as you please, but your Sun stays in your blood. You never really leave home."

He lifted his head and looked at Arpe with hooded, blood-shot eyes.

"Now can we go, please?" he said, almost in a whisper.

"And, Captain if this delay has killed Helen, you will answer to me for it, if I have to chase you to the smallest, most remote star that God ever made."

Arpe swallowed. "Mr. Stauffer," he said, "prepare for jump."

"Where to, sir?" the second officer said. "Back home-"-or

to destination?"

And there was the crux. After the next jump the *Fly-*
away *II* would not be spaceworthy any more. If they used
it up making Centaurus, they would be marooned; they would
have made their one round trip one-way. Besides . . . *your*
drive is more important than anything else on board. Get the
passengers where they want to go by all means if it's feasible,
but if it isn't, the government wants that drive back. . . .

Understand?

"We contracted with the passengers to go to Centaurus,"
Arpe said, sitting down before the computer. "That's where
we'll go."

"Very good, sir," Oestreicher said. They were the finest
three words Arpe had ever heard in his life.

The Negro girl, exquisite even in her still and terrible
coma, was first off the ship into the big ship-to-shore ferry.

Hammersmith went with her, his big face contorted with
anguish.

Then the massive job of evacuating everybody else began.

Everyone passengers and ship's complement alike was
wearing a mask now. After the jump through the heavy
cosmic-ray primary that Arpe had picked, a stripped nucleus
which happened to be going toward Centaurus anyhow, the
Flyaway II was leaking air as though she were made of some-
thing not much better than surgical gauze. She was through.

Oestreicher turned to Arpe and held out his hand. "A

great achievement, sir," the first officer said. "It'll be cut and dried into a routine after it's collimated but they won't even know that back home until the radio word comes through, better than four years from now. I'm glad I was along while it was still new."

"Thank you, Mr. Oestreicher. You won't miss the Mars run?"

"They'll need interplanetary captains here too, sir." He paused. "I'd better go help Mr. Stauffer with the exodus."

"Right. Thank you, Mr. Oestreicher."

Then he was alone. He meant to be last off the ship; after living with Oestreicher and his staff for so long, he had come to see that traditions do not grow from nothing. After a while, however, the bulkhead lock swung heavily open, and Dr. Hoyle came in.

"Skipper, you're hushed. Better knock it off."

"No," Arpe said in a husky voice, not turning away from watching through the viewplate the flaming departure of the ferry for the green and brown planet, so wholly Earthlike except for the strange shapes of its continents, a thousand miles below. "Hoyle, what do you think? Has she still got a chance?"

"I don't know. It will be nip and tuck. Maybe. Wilson he was ship's surgeon on the *Flyaway* I will pick her up as she lands. He's not young any more, but he was as good

as they came; and with a surgeon it isn't age that matters, it's how frequently you operate. But . . . she was on the way out for a long time. She may be a little . . ."

He stopped.

"Go on," Arpe said. "Give it to me straight. I know I was wrong."

"She was low on oxygen for a long time," Hoyle said, without looking at Arpe. "It may be that she'll be a little simple-minded when she recovers. Or it may not; there's no predicting these things. But one thing's for sure; she'll never dare go into space again. Not even back to Earth. The next slight drop in oxygen tension will kill her. I even advised against airplanes for her, and Wilson concurs."

Arpe swallowed. "Does Hammersmith know that?"

"Yes," Hoyle said, "he knows it. But he'll stick with her.

He loves her."

- The ferry carrying the explorer and his fiancée, and Captain Willoughby's daughter and her Judy, and many others, was no longer visible. Sick at heart, Arpe watched Centaurus III turn below him.

That planet was the gateway to the stars for everyone on it but Daryon and Helen Hammersmith. The door that had closed behind them when they had boarded the ferry was for them no gateway to any place. It was only the door to a prison.

But it was also, Arpe realized suddenly, a prison which

would hold a great teacher not of the humanities, but of Humanity. Arpe, not so imprisoned, had no such thing to teach.

It was true that he knew how to do a great thing how to travel to the stars. It was true that he had taken Celia Gospari and the others where they had wanted to go. It was true that he was now a small sort of hero to his crew; and it was true that he Dr. Gordon Arpe, sometime laboratory recluse, sometime *ersatz* space-ship captain, sometime petty hero, had been kissed good-bye by a 3-V star.

But it was also over. From now on he could do no more than sit back and watch others refine the Arpe drive; the four-year communication gap between Centaurus and home would shut him out of those experiments as though he were a Cro-Magnon Manor Daryon Hammersmith. When next Arpe saw an Earth physicist, he wouldn't have the smallest chance of understanding a word the man said.

That was a prison, too; a prison Capt. Gordon Arpe had fashioned himself, and then had thrown away the key.

"Beg pardon. Captain?"

"Oh. Sorry, Dr. Hoyle. Didn't realize you were still here."

Arpe looked down for the last time on the green-and-brown planet, and drew a long breath. "I said, 'So be it.' "

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