



Sand Doom
Leinster, Murray

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About Leinster:

Murray Leinster (June 16, 1896 - June 8, 1975) was the nom de plume of William Fitzgerald Jenkins, an American science fiction and alternate history writer. He was born in Norfolk, Virginia. During World War I, he served with the Committee of Public Information and the United States Army (1917-1918). Following the war, Leinster became a free-lance writer. In 1921, he married Mary Mandola. They had four daughters. During World War II, he served in the Office of War Information. He won the Liberty Award in 1937 for "A Very Nice Family," the 1956 Hugo Award for Best Novelette for "Exploration Team," a retro-Hugo in 1996 for Best Novelette for "First Contact." Leinster was the Guest of Honor at the 21st Worldcon in 1963. In 1995, the Sidewise Award for Alternate History was established, named after Leinster's story "Sidewise in Time." Leinster wrote and published over 1,500 short stories and articles over the course of his career. He wrote 14 movie and hundreds of radio scripts and television plays, inspiring several series including "Land of the Giants" and "The Time Tunnel". Leinster first began appearing in the late 1910s in pulp magazines like Argosy and then sold to Astounding Stories in the 1930s on a regular basis. After World War II, when both his name and the pulps had achieved a wider acceptance, he would use either "William Fitzgerald" or "Will F. Jenkins" as names on stories when "Leinster" had already sold a piece to a particular issue. He was very prolific and successful in the fields of western, mystery, horror, and especially science fiction. His novel *Miners in the Sky* transfers the lawless atmosphere of the California Gold Rush, a common theme of Westerns, into an asteroid environment. He is credited with the invention of parallel universe stories. Four years before Jack Williamson's *The Legion of Time* came out, Leinster wrote his "Sidewise in Time", which was first published in *Astounding* in June 1934. This was probably the first time that the strange concept of alternate worlds appeared in modern science-fiction. In a sidewise path of time some cities never happened to be built. Leinster's vision of nature's extraordinary oscillations in time ('sidewise in time') had long-term effect on other authors, e.g., Isaac Asimov's "Living Space", "The Red Queen's Race", or his famous *The End of Eternity*. Murray Leinster's 1946 short story "A Logic Named Joe" describes Joe, a "logic", that is to say, a computer. This is one of the first descriptions of a computer in fiction. In this story Leinster was decades ahead of his time in imagining the Internet. He envisioned logics in every home, linked to provide communications, data access, and commerce. In fact, one character said that "logics are civilization." In 2000, Leinster's heirs

sued Paramount Pictures over the film *Star Trek: First Contact*, claiming that as the owners of the rights to Leinster's short story "First Contact", it infringed their trademark in the term. The U.S. District Court for the Eastern District of Virginia granted Paramount's motion for summary judgment and dismissed the suit (see *Estate of William F. Jenkins v. Paramount Pictures Corp.*, 90 F. Supp. 2d 706 (E.D. Va. 2000) for the full text of the court's ruling). The court found that regardless of whether Leinster's story first coined "first contact", it has since become a generic (and therefore unprotectable) term that described the overall genre of science fiction in which humans first encounter alien species. Even if the title was instead "descriptive"—a category of terms higher than "generic" that may be protectable—there was no evidence that the title had the required association in the public's mind (known as "secondary meaning") such that its use would normally be understood as referring to Leinster's story. The Second Circuit Court of Appeals affirmed the lower court's dismissal without comment. William F. Jenkins was also an inventor, best known for the front projection process used for special effects in motion pictures and television in place of the older rear projection process and as an alternative to bluescreen. Source: Wikipedia

Also available on Feedbooks for Leinster:

- *A Matter of Importance* (1959)
- *The Machine That Saved The World* (1957)
- *Space Tug* (1953)
- *Operation Terror* (1962)
- *Operation: Outer Space* (1958)
- *Mad Planet* (1920)
- *Talents, Incorporated* (1962)
- *The Wailing Asteroid* (1960)
- *Long Ago, Far Away* (1959)
- *The Aliens* (1959)

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Bordman knew there was something wrong when the throbbing, acutely uncomfortable vibration of rocket blasts shook the ship. Rockets were strictly emergency devices, these days, so when they were used there was obviously an emergency.

He sat still. He had been reading, in the passenger lounge of the *Warlock*—a very small lounge indeed—but as a senior Colonial Survey officer he was well-traveled enough to know when things did not go right. He looked up from the bookscreen, waiting. Nobody came to explain the eccentricity of a spaceship using rockets. It would have been immediate, on a regular liner, but the *Warlock* was practically a tramp. This trip it carried just two passengers. Passenger service was not yet authorized to the planet ahead, and would not be until Bordman had made the report he was on his way to compile. At the moment, though, the rockets blasted, and stopped, and blasted again. There was something definitely wrong.

The *Warlock's* other passenger came out of her cabin. She looked surprised. She was Aletha Redfeather, an unusually lovely Amerind. It was extraordinary that a girl could be so self-sufficient on a tedious space-voyage, and Bordman approved of her. She was making the journey to Xosa II as a representative of the Amerind Historical Society, but she'd brought her own bookreels and some elaborate fancywork which—woman-fashion—she used to occupy her hands. She hadn't been at all a nuisance. Now she tilted her head on one side as she looked inquiringly at Bordman.

"I'm wondering, too," he told her, just as an especially sustained and violent shuddering of rocket-impulsion made his chair legs thutter on the floor.

There was a long period of stillness. Then another violent but much shorter blast. A shorter one still. Presently there was a half-second blast which must have been from a single rocket tube because of the mild shaking it produced. After that there was nothing at all.

Bordman frowned to himself. He'd been anticipating groundfall within a matter of hours, certainly. He'd just gone through his specbook carefully and re-familiarized himself with the work he was to survey on Xosa II. It was a perfectly commonplace minerals-planet development, and he'd expected to clear it FE—fully established—and probably TP and NQ ratings as well, indicating that tourists were permitted and no quarantine was necessary. Considering the aridity of the planet, no bacteriological dangers could be expected to exist, and if tourists wanted to view its

monstrous deserts and infernolike wind sculptures—why they should be welcome.

But the ship had used rocket drive in the planet's near vicinity. Emergency. Which was ridiculous. This was a perfectly routine sort of voyage. Its purpose was the delivery of heavy equipment—specifically a smelter—and a senior Colonial Survey officer to report the completion of primary development.

Aletha waited, as if for more rocket blasts. Presently she smiled at some thought that had occurred to her.

"If this were an adventure tape," she said humorously, "the loudspeaker would now announce that the ship had established itself in an orbit around the strange, uncharted planet first sighted three days ago, and that volunteers were wanted for a boat landing."

Bordman demanded impatiently:

"Do you bother with adventure tapes? They're nonsense! A pure waste of time!"

Aletha smiled again.

"My ancestors," she told him, "used to hold tribal dances and make medicine and boast about how many scalps they'd taken and how they did it. It was satisfying—and educational for the young. Adolescents became familiar with the idea of what we nowadays call adventure. They were partly ready for it when it came. I suspect your ancestors used to tell each other stories about hunting mammoths and such. So I think it would be fun to hear that we were in orbit and that a boat landing was in order."

Bordman grunted. There were no longer adventures. The universe was settled; civilized. Of course there were still frontier planets—Xosa II was one—but pioneers had only hardships. Not adventures.

The ship-phone speaker clicked. It said curtly:

"Notice. We have arrived at Xosa II and have established an orbit about it. A landing will be made by boat."

Bordman's mouth dropped open.

"What the devil's this?" he demanded.

"Adventure, maybe," said Aletha. Her eyes crinkled very pleasantly when she smiled. She wore the modern Amerind dress—a sign of pride in the ancestry which now implied such diverse occupations as

interstellar steel construction and animal husbandry and llano-planet colonization. "If it were adventure, as the only girl on this ship I'd have to be in the landing party, lest the tedium of orbital waiting make the"—her smile widened to a grin—"the pent-up restlessness of trouble-makers in the crew——"

The ship-phone clicked again.

"Mr. Bordman. Miss Redfeather. According to advices from the ground, the ship may have to stay in orbit for a considerable time. You will accordingly be landed by boat. Will you make yourselves ready, please, and report to the boat-blister?" The voice paused and added, *"Hand luggage only, please."*

Aletha's eyes brightened. Bordman felt the shocked incredulity of a man accustomed to routine when routine is impossibly broken. Of course survey ships made boat landings from orbit, and colony ships let down robot hulls by rocket when there was as yet no landing grid for the handling of a ship. But never before in his experience had an ordinary freighter, on a routine voyage to a colony ready for its final degree-of-completion survey, ever landed anybody by boat.

"This is ridiculous!" said Bordman, fuming.

"Maybe it's adventure," said Aletha. "I'll pack."

She disappeared into her cabin. Bordman hesitated. Then he went into his own. The colony on Xosa II had been established two years ago. Minimum comfort conditions had been realized within six months. A temporary landing grid for light supply ships was up within a year. It had permitted stock-piling, and it had been taken down to be rebuilt as a permanent grid with every possible contingency provided for. The eight months since the last ship landing was more than enough for the building of the gigantic, spidery, half-mile-high structure which would handle this planet's interstellar commerce. There was no excuse for an emergency! A boat landing was nonsensical!

But he surveyed the contents of his cabin. Most of the cargo of the *Warlock* was smelter equipment which was to complete the outfitting of the colony. It was to be unloaded first. By the time the ship's holds were wholly empty, the smelter would be operating. The ship would wait for a full cargo of pig metal. Bordman had expected to live in this cabin while he worked on the survey he'd come to make, and to leave again with the ship.

Now he was to go aground by boat. He fretted. The only emergency equipment he could possibly need was a heat-suit. He doubted the

urgency of that. But he packed some clothing for indoors, and then defiantly included his specbook and the volumes of definitive data to which specifications for structures and colonial establishments always referred. He'd get to work on his report immediately he landed.

He went out of the passenger's lounge to the boat-blister. An engineer's legs projected from the boat port. The engineer withdrew, with a strip of tape from the boat's computer. He compared it dourly with a similar strip from the ship's figurebox. Bordman consciously acted according to the best traditions of passengers.

"What's the trouble?" he asked.

"We can't land," said the engineer shortly.

He went away—according to the tradition by which ships' crews are always scornful of passengers.

Bordman scowled. Then Aletha came, carrying a not-too-heavy bag. Bordman put it in the boat, disapproving of the crampedness of the craft. But this wasn't a lifeboat. It was a landing boat. A lifeboat had Lawlor drive and could travel light-years, but in the place of rockets and rocket fuel it had air-purifiers and water-recovery units and food-stores. It couldn't land without a landing grid aground, but it could get to a civilized planet. This landing boat could land without a grid, but its air wouldn't last long.

"Whatever's the matter," said Bordman darkly, "it's incompetence somewhere!"

But he couldn't figure it out. This was a cargo ship. Cargo ships neither took off nor landed under their own power. It was too costly of fuel they would have to carry. So landing grids used local power—which did not have to be lifted—to heave ships out into space, and again used local power to draw them to ground again. Therefore ships carried fuel only for actual space-flight, which was economy. Yet landing grids had no moving parts, and while they did have to be monstrous structures they actually drew power from planetary ionospheres. So with no moving parts to break down and no possibility of the failure of a power source—landing grids couldn't fail! So there couldn't be an emergency to make a ship ride orbit around a planet which had a landing grid!

The engineer came back. He carried a mail sack full of letter-reels. He waved his hand. Aletha crawled into the landing-boat port. Bordman followed. Four people, with a little crowding, could have gotten into the

little ship. Three pretty well filled it. The engineer followed them and sealed the port.

"Sealed off," he said into the microphone before him.

The exterior-pressure needle moved halfway across the dial. The interior-pressure needle stayed steady.

"All tight," said the engineer.

The exterior-pressure needle flicked to zero. There were clanking sounds. The long halves of the boat-blister stirred and opened, and abruptly the landing boat was in an elongated cup in the hull-plating, and above them there were many, many stars. The enormous disk of a nearby planet floated into view around the hull. It was monstrous and blindingly bright. It was of a tawny color, with great, irregular areas of yellow and patches of bluishness. But most of it was the color of sand. And all its colors varied in shade—some places were lighter and some darker—and over at one edge there was blinding whiteness which could not be anything but an ice cap. But Bordman knew that there was no ocean or sea or lake on all this whole planet, and the ice cap was more nearly hoarfrost than such mile-deep glaciation as would be found at the poles of a maximum-comfort world.

"Strap in," said the engineer over his shoulder. "No-gravity coming, and then rocket-push. Settle your heads."

Bordman irritably strapped himself in. He saw Aletha busy at the same task, her eyes shining. Without warning, there came a sensation of acute discomfort. It was the landing boat detaching itself from the ship and the diminishment of the ship's closely-confined artificial-gravity field. That field suddenly dropped to nothingness, and Bordman had the momentary sickish dizziness that flicked-off gravity always produces. At the same time his heart pounded unbearably in the instinctive, racial-memory reaction to the feel of falling.

Then roarings. He was thrust savagely back against his seat. His tongue tried to slide back into his throat. There was an enormous oppression on his chest. He found himself thinking panicky profanity.

Simultaneously the vision ports went black, because they were out of the shadow of the ship. The landing boat turned—but there was no sensation of centrifugal force—and they were in a vast obscurity with merely a dim phantom of the planetary surface to be seen. But behind them a blue-white sun shone terribly. Its light was warm—hot—even though it came through the polarized shielding ports.

"Did ... did you say," panted Aletha happily—breathless because of the acceleration—"that there weren't any adventures?"

Bordman did not answer. But he did not count discomfort as an adventure.

The engineer did not look out the ports at all. He watched the screen before him. There was a vertical line across the side of the lighted disk. A blip moved downward across it, showing their height in thousands of miles. After a long time the blip reached the bottom, and the vertical line became double and another blip began to descend. It measured height in hundreds of miles. A bright spot—a square—appeared at one side of the screen. A voice muttered metallically, and suddenly seemed to shout, and then muttered again. Bordman looked out one of the black ports and saw the planet as if through smoked glass. It was a ghostly reddish thing which filled half the cosmos. It had mottlings. Its edge was curved. That would be the horizon.

The engineer moved controls and the white square moved. It went across the screen. He moved more controls. It came back to the center. The height-in-hundreds blip was at the bottom, now, and the vertical line tripled and a tens-of-miles-height blip crawled downward.

There were sudden, monstrous plungings of the landing boat. It had hit the outermost fringes of atmosphere. The engineer said words it was not appropriate for Aletha to hear. The plungings became more violent. Bordman held on—to keep from being shaken to pieces despite the straps—and stared at the murky surface of the planet. It seemed to be fleeing from them and they to be trying to overtake it. Gradually, very gradually, its flight appeared to slow. They were down to twenty miles, then.

Quite abruptly the landing boat steadied. The square spot bobbed about in the center of the astrogation screen. The engineer worked controls to steady it.

The ports cleared a little. Bordman could see the ground below more distinctly. There were patches of every tint that mineral coloring could produce. There were vast stretches of tawny sand. A little while more, and he could see the shadows of mountains. He made out mountain flanks which should have had valleys between them and other mountain flanks beyond, but they had tawny flatnesses between, instead. These, he knew, would be the sand plateaus which had been observed on this planet and which had only a still-disputed explanation. But he could see

areas of glistening yellow and dirty white, and splashes of pink and streaks of ultramarine and gray and violet, and the incredible red of iron oxide covering square miles—too much to be believed.

The landing-boat's rockets cut off. It coasted. Presently the horizon tilted and all the dazzling ground below turned sedately beneath them. There came staccato instructions from a voice-speaker, which the engineer obeyed. The landing boat swung low—below the tips of giant mauve mountains with a sand plateau beyond them—and its nose went up. It stalled.

Then the rockets roared again—and now, with air about them and after a momentary pause, they were horribly loud—and the boat settled down and down upon its own tail of fire.

There was a completely blinding mass of dust and rocket fumes which cut off all sight of everything else. Then there was a crunching crash, and the engineer swore peevishly to himself. He cut the rockets again. Finally.

Bordman found himself staring straight up, still strapped in his chair. The boat had settled on its own tail fins, and his feet were higher than his head, and he felt ridiculous. He saw the engineer at work unstrapping himself. He duplicated the action, but it was absurdly difficult to get out of the chair.

Aletha managed more gracefully. She didn't need help.

"Wait," said the engineer ungraciously, "till somebody comes."

So they waited, using what had been chair backs for seats.

The engineer moved a control and the windows cleared further. They saw the surface of Xosa II. There was no living thing in sight. The ground itself was pebbles and small rocks and minor boulders—all apparently tumbled from the starkly magnificent mountains to one side. There were monstrous, many-colored cliffs and mesas, every one eaten at in the unmistakable fashion of wind-erosion. Through a notch in the mountain wall before them a strange, fan-shaped, frozen formation appeared. If such a thing had been credible, Bordman would have said that it was a flow of sand simulating a waterfall. And everywhere there was blinding brightness and the look and feel of blistering sunshine. But there was not one single leaf or twig or blade of grass. This was pure desert. This was Xosa II.

Aletha regarded it with bright eyes.

"Beautiful!" she said happily. "Isn't it?"

"Personally," said Bordman, "I never saw a place that looked less homelike or attractive."

Aletha laughed.

"My eyes see it differently."

Which was true. It was accepted, nowadays, that humankind might be one species but was many races, and each saw the cosmos in its own fashion. On Kalmet III there was a dense, predominantly Asiatic population which terraced its mountainsides for agriculture and deftly mingled modern techniques with social customs not to be found on—say—Demeter I, where there were many red-tiled stucco towns and very many olive groves. In the llano planets of the Equis cluster, Amerinds—Aletha's kin—zestfully rode over plains dotted with the descendants of buffalo and antelope and cattle brought from ancient Earth. On the oases of Rustam IV there were date palms and riding camels and much argument about what should be substituted for the direction of Mecca at the times for prayer, while wheat fields spanned provinces on Canna I and highly civilized emigrants from the continent of Africa on Earth stored jungle gums and lustrous gems in the warehouses of their spaceport city of Timbuk.

So it was natural for Aletha to look at this wind-carved wilderness otherwise than as Bordman did. Her racial kindred were the pioneers of the stars, these days. Their heritage made them less than appreciative of urban life. Their inborn indifference to heights made them the steel-construction men of the cosmos, and more than two-thirds of the landing grids in the whole galaxy had their coup-feather symbols on the key posts. But the planet government on Algonka V was housed in a three-thousand-foot white stone tepee, and the best horses known to men were raised by ranchers with bronze skins and high cheekbones on the llano planet Chagan.

Now, here, in the *Warlock's* landing boat, the engineer snorted. A vehicle came around a cliff wall, clanking its way on those eccentric caterwheels that new-founded colonies find so useful. The vehicle glittered. It crawled over tumbled boulders, and flowed over fallen scree. It came briskly toward them. The engineer snorted again.

"That's my cousin Ralph!" said Aletha in pleased surprise.

Bordman blinked and looked again. He did not quite believe his eyes. But they told the truth. The figure controlling the ground car was Indian—Amerind—wearing a breechcloth and thick-soled sandals and three streamlined feathers in a band about his head. Moreover, he did not ride in a seat. He sat astride a semi-cylindrical part of the ground car, over which a gaily-colored blanket had been thrown.

The ship's engineer rumbled disgustedly. But then Bordman saw how sane this method of riding was—here. The ground vehicle lurched and swayed and rolled and pitched and tossed as it came over the uneven ground. To sit in anything like a chair would have been foolish. A back rest would throw one forward in a frontward lurch, and give no support in case of a backward one. A sidewise tilt would tend to throw one out. Riding a ground car as if in a saddle was sense!

But Bordman was not so sure about the costume. The engineer opened the port and spoke hostilely out of it:

"D'you know there's a lady in this thing?"

The young Indian grinned. He waved his hand to Aletha, who pressed her nose against a viewport. And just then Bordman did understand the costume or lack of it. Air came in the open exit port. It was hot and desiccated. It was furnace-like!

"How, 'Letha," called the rider on the caterwheel steed. "Either dress for the climate or put on a heat-suit before you come out of there!"

Aletha chuckled. Bordman heard a stirring behind him. Then Aletha climbed to the exit port and swung out. Bordman heard a dour muttering from the engineer. Then he saw her greeting her cousin. She had slipped out of the conventionalized Amerind outfit to which Bordman was accustomed. Now she was clad as Anglo-Saxon girls dressed for beaches on the cool-temperature planets.

For a moment Bordman thought of sunstroke, with his own eyes dazzled by the still-partly-filtered sunlight. But Aletha's Amerind coloring was perfectly suited to sunshine even of this intensity. Wind blowing upon her body would cool her skin. Her thick, straight black hair was at least as good protection against sunstroke as a heat-helmet. She might feel hot, but she would be perfectly safe. She wouldn't even sunburn. But he, Bordman——

He grimly stripped to underwear and put on the heat-suit from his bag. He filled its canteens from the boat's water tank. He turned on the tiny, battery-powered motors. The suit ballooned out. It was intended for

short periods of intolerable heat. The motors kept it inflated—away from his skin—and cooled its interior by the evaporation of sweat plus water from its canteen tanks. It was a miniature air-conditioning system for one man, and it should enable him to endure temperatures otherwise lethal to someone with his skin and coloring. But it would use a lot of water.

He climbed to the exit port and went clumsily down the exterior ladder to the tail fin. He adjusted his goggles. He went over to the chattering young Indians, young man and girl. He held out his gloved hand.

"I'm Bordman," he said painfully. "Here to make a degree-of-completion survey. What's wrong that we had to land by boat?"

Aletha's cousin shook hands cordially.

"I'm Ralph Redfeather," he said, introducing himself. "Project engineer. About everything's wrong. Our landing grid's gone. We couldn't contact your ship in time to warn it off. It was in our gravity field before it answered, and its Lawlor drive couldn't take it away—not working because of the field. Our power, of course, went with the landing grid. The ship you came in can't get back, and we can't send a distress message anywhere, and our best estimate is that the colony will be wiped out—thirst and starvation—in six months. I'm sorry you and Aletha have to be included."

Then he turned to Aletha and said amiably:

"How's Mike Thundercloud and Sally Whitehorse and the gang in general, 'Letha?"

The *Warlock* rolled on in her newly-established orbit about Xosa II. The landing boat was aground, having removed the two passengers. It would come back. Nobody on the ship wanted to stay aground, because they knew the conditions and the situation below—unbearable heat and the complete absence of hope. But nobody had anything to do! The ship had been maintained in standard operating condition during its two-months' voyage from Trent to here. No repairs or overhauls were needed. There was no maintenance-work to speak of. There would be only stand-by watches until something happened. There would be nothing to do on those watches. There would be off-watch time for twenty-one out of every twenty-four hours, and no purposeful activity to fill even half an hour of it. In a matter of—probably—years, the *Warlock* should receive aid. She might be towed out of her orbit to space in which the Lawlor drive could function, or the crew might simply be taken off.

But meanwhile, those on board were as completely frustrated as the colony. They could not do anything at all to help themselves.

In one fashion the crewmen were worse off than the colonists. The colonists had at least the colorful prospect of death before them. They could prepare for it in their several ways. But the members of the *Warlock's* crew had nothing ahead but tedium.

The skipper faced the future with extreme, grim distaste.

The ride to the colony was torment. Aletha rode behind her cousin on the saddle-blanket, and apparently suffered little if at all. But Bordman could only ride in the ground-car's cargo space, along with the sack of mail from the ship. The ground was unbelievably rough and the jolting intolerable. The heat was literally murderous. In the metal cargo space, the temperature reached a hundred and sixty degrees in the sunshine—and given enough time, food will cook in no more heat than that. Of course a man has been known to enter an oven and stay there while a roast was cooked, and to come out alive. But the oven wasn't throwing him violently about or bringing sun-heated—blue-white-sun heated—metal to press his heat-suit against him.

The suit did make survival possible, but that was all. The contents of its canteens gave out just before arrival, and for a short time Bordman had only sweat for his suit to work with. It kept him alive by forced ventilation, but he arrived in a state of collapse. He drank the iced salt water they gave him and went to bed. He'd get back his strength with a proper sodium level in his blood. But he slept for twelve hours straight.

When he got up, he was physically normal again, but abysmally ashamed. It did no good to remind himself that Xosa II was rated minimum-comfort class D—a blue-white sun and a mean temperature of one hundred and ten degrees. Africans could take such a climate—with night-relief quarters. Amerinds could do steel construction work in the open, protected only by insulated shoes and gloves. But Bordman could not venture out-of-doors except in a heat-suit. He couldn't stay long then. It was not a weakness. It was a matter of genetics. But he was ashamed.

Aletha nodded to him when he found the Project Engineer's office. It occupied one of the hulls in which colony-establishment materials had been lowered by rocket power. There were forty of the hulls, and they had been emptied and arranged for inter-communication in three separate communities, so that an individual could change his quarters and

ordinary associates from time to time and colony fever—frantic irritation with one's companions—was minimized.

Aletha sat at a desk, busily making notes from a loose leaf volume before her. The wall behind the desk was fairly lined with similar volumes.

"I made a spectacle of myself!" said Bordman, bitterly.

"Not at all!" Aletha assured him. "It could happen to anybody. I wouldn't do too well on Timbuk."

There was no answer to that. Timbuk was essentially a jungle planet, barely emerging from the carboniferous stage. Its colonists thrived because their ancestors had lived on the shores of the Gulf of Guinea, on Earth. But Anglos did not find its climate healthful, nor would many other races. Amerinds died there quicker than most.

"Ralph's on the way here now," added Aletha. "He and Dr. Chuka were out picking a place to leave the records. The sand dunes here are terrible, you know. When an explorer-ship does come to find out what's happened to us, these buildings could be covered up completely. Any place could be. It isn't easy to pick a record-cache that's quite sure to be found."

"When," said Bordman skeptically, "there's nobody left alive to point it out. Is that it?"

"That's it," agreed Aletha. "It's pretty bad all around. I didn't plan to die just yet."

Her voice was perfectly normal. Bordman snorted. As a senior Colonial Survey officer, he'd been around. But he'd never yet known a human colony to be extinguished when it was properly equipped and after a proper pre-settlement survey. He'd seen panic, but never real cause for a matter-of-fact acceptance of doom.

There was a clanking noise outside the hulk which was the Project Engineer's headquarters. Bordman couldn't see clearly through the filtered ports. He reached over and opened a door. The brightness outside struck his eyes like a blow. He blinked them shut instantly and turned away. But he'd seen a glistening, caterwheel ground car stopping not far from the doorway.

He stood wiping tears from his light-dazzled eyes as footsteps sounded outside. Aletha's cousin came in, followed by a huge man with remarkably dark skin. The dark man wore eyeglasses with a curiously

thick, corklike nosepiece to insulate the necessary metal of the frame from his skin. It would blister if it touched bare flesh.

"This is Dr. Chuka," said Redfeather pleasantly, "Mr. Bordman. Dr. Chuka's the director of mining and mineralogy here."

Bordman shook hands with the ebony-skinned man. He grinned, showing startlingly white teeth. Then he began to shiver.

"It's like a freeze-box in here," he said in a deep voice. "I'll get a robe and be with you."

He vanished through a doorway, his teeth chattering audibly. Aletha's cousin took half a dozen deliberate deep breaths and grimaced.

"I could shiver myself," he admitted "but Chuka's really acclimated to Xosa. He was raised on Timbuk."

Bordman said curtly:

"I'm sorry I collapsed on landing. It won't happen again. I came here to do a degree-of-completion survey that should open the colony to normal commerce, let the colonists' families move in, tourists, and so on. But I was landed by boat instead of normally, and I am told the colony is doomed. I would like an official statement of the degree of completion of the colony's facilities and an explanation of the unusual points I have just mentioned."

The Indian blinked at him. Then he smiled faintly. The dark man came back, zipping up an indoor warmth-garment. Redfeather dryly brought him up to date by repeating what Bordman had just said. Chuka grinned and sprawled comfortably in a chair.

"I'd say," he remarked humorously, in that astonishingly deep-toned voice of his, "sand got in our hair. And our colony. And the landing grid. There's a lot of sand on Xosa. Wouldn't you say that was the trouble?"

The Indian said with elaborate gravity:

"Of course wind had something to do with it."

Bordman fumed.

"I think you know," he said fretfully, "that as a senior Colonial Survey officer, I have authority to give any orders needed for my work. I give one now. I want to see the landing grid—if it is still standing. I take it that it didn't fall down?"

Redfeather flushed beneath the bronze pigment of his skin. It would be hard to offend a steelman more than to suggest that his work did not stand up.

"I assure you," he said politely, "that it did not fall down."

"Your estimate of its degree of completion?"

"Eighty per cent," said Redfeather formally.

"You've stopped work on it?"

"Work on it has been stopped," agreed the Indian.

"Even though the colony can receive no more supplies until it is completed?"

"Just so," said Redfeather without expression.

"Then I issue a formal order that I be taken to the landing-grid site immediately," said Bordman angrily. "I want to see what sort of incompetence is responsible! Will you arrange it—at once?"

Redfeather said in a completely emotionless voice:

"You want to see the site of the landing grid. Very good. Immediately."

He turned and walked out into the incredible, blinding sunshine. Bordman blinked at the momentary blast of light, and then began to pace up and down the office. He fumed. He was still ashamed of his collapse from the heat during the travel from the landed rocket-boat to the colony. Therefore he was touchy and irritable. But the order he had given was strictly justifiable.

He heard a small noise. He whirled. Dr. Chuka, huge and black and spectacled, rocked back and forth in his seat, suppressing laughter.

"Now, what the devil does that mean?" demanded Bordman suspiciously. "It certainly isn't ridiculous to ask to see the structure on which the life of the colony finally depends!"

"Not ridiculous," said Dr. Chuka. "It's—hilarious!"

He boomed laughter in the office with the rounded ceiling of a remade robot hull. Aletha smiled with him, though her eyes were grave.

"You'd better put on a heat-suit," she said to Bordman.

He fumed again, tempted to defy all common sense because its dictates were not the same for everybody. But he marched away, back to the cubbyhole in which he had awakened. Angrily, he donned the heat-suit that had not protected him adequately before, but had certainly saved his life. He filled the canteens topping full—he suspected he hadn't done so the last time. He went back to the Project Engineer's office with a feeling of being burdened and absurd.

Out a filter-window, he saw that men with skins as dark as Dr. Chuka's were at work on a ground car. They were equipping it with a sunshade and curious shields like wings. Somebody pushed a sort of caterwheel handtruck toward it. They put big, heavy tanks into its cargo space. Dr. Chuka had disappeared, but Aletha was back at work making notes from the loose-leaf volume on the desk.

"May I ask," asked Bordman with some irony, "what your work happens to be just now?"

She looked up.

"I thought you knew," she said in surprise. "I'm here for the Amerind Historical Society. I can certify coups. I'm taking coup-records for the Society. They'll go in the record-cache Ralph and Dr. Chuka are arranging, so no matter what happens to the colony, the record of the coups won't be lost."

"Coups?" demanded Bordman. He knew that Amerinds painted feathers on the key-posts of steel structures they'd built, and he knew that the posting of such "coup-marks" was a cherished privilege and undoubtedly a survival or revival of some American Indian tradition back on Earth. But he did not know what they meant.

"Coups," repeated Aletha matter-of-factly. "Ralph wears three eagle-feathers. You saw them. He has three coups. Pinions, too! He built the landing grids on Norlath and—Oh, you don't know!"

"I don't," admitted Bordman, his temper not of the best because of what seemed unnecessary condescensions on Xosa II.

Aletha looked surprised.

"In the old days," she explained, "back on Earth, if a man scalped an enemy, he counted coup. The first to strike an enemy in a battle counted coup, too—a lesser one. Nowadays a man counts coups for different things, but Ralph's three eagle-feathers mean he's entitled to as much respect as a warrior in the old days who, three separate times, had killed and scalped an enemy warrior in the middle of his own camp. And he is, too!"

Bordman grunted.

"Barbarous, I'd say!"

"If you like," said Aletha. "But it's something to be proud of—and one doesn't count coup for making a lot of money!" Then she paused and said curtly: "The word 'snobbish' fits it better than 'barbarous.' We are snobs! But when the head of a clan stands up in Council in the Big Tepee

on Algonka, representing his clan, and men have to carry the ends of the feather headdress with all the coups the members of his clan have earned—why one is proud to belong to that clan!" She added defiantly, "Even watching it on a vision-screen!"

Dr. Chuka opened the outer door. Blinding light poured in. He did not enter—and his body glistened with sweat.

"Ready for you, Mr. Bordman!"

Bordman adjusted his goggles and turned on the motors of his heat-suit. He went out the door.

The heat and light outside were oppressive. He darkened the goggles again and made his way heavily to the waiting, now-shaded ground car. He noted that there were other changes beside the sunshade. The cover-deck of the cargo space was gone, and there were cylindrical riding seats like saddles in the back. The odd lower shields reached out sidewise from the body, barely above the caterwheels. He could not make out their purpose and irritably failed to ask.

"All ready," said Redfeather coldly. "Dr. Chuka's coming with us. If you'll get in here, please——"

Bordman climbed awkwardly into the boxlike back of the car. He bestrode one of the cylindrical arrangements. With a saddle on it, it would undoubtedly have been a comfortable way to cover impossibly bad terrain in a mechanical carrier. He waited. About him there were the squat hulls of the space-barges which had been towed here by a colony ship, each one once equipped with rockets for landing. Emptied of their cargoes, they had been huddled together into the three separate, adjoining communities. There were separate living quarters and mess halls and recreation rooms for each, and any colonist lived in the community of his choice and shifted at pleasure, or visited, or remained solitary. For mental health a man has to be assured of his free will, and over-regimentation is deadly in any society. With men psychologically suited to colonize, it is fatal.

Above—but at a distance, now—there was a monstrous scarp of mountains, colored in glaring and unnatural tints. Immediately about there was raw rock. But it was peculiarly smooth, as if sand grains had rubbed over it for uncountable aeons and carefully worn away every trace of unevenness. Half a mile to the left, dunes began and went away to the horizon. The nearer ones were small, but they gained in size with

distance from the mountains—which evidently affected the surface-winds hereabouts—and the edge of seeing was visibly not a straight line. The dunes yonder must be gigantic. But of course on a world the size of ancient Earth, and which was waterless save for snow-patches at its poles, the size to which sand dunes could grow had no limit. The surface of Xosa II was a sea of sand, on which islands and small continents of wind-swept rock were merely minor features.

Dr. Chuka adjusted a small metal object in his hand. It had a tube dangling from it. He climbed into the cargo space and fastened it to one of the two tanks previously loaded.

"For you," he told Bordman. "Those tanks are full of compressed air at rather high pressure—a couple of thousand pounds. Here's a reduction-valve with an adiabatic expansion feature, to supply extra air to your heat-suit. It will be pretty cold, expanding from so high a pressure. Bring down the temperature a little more."

Bordman again felt humiliated. Chuka and Redfeather, because of their races, were able to move about nine-tenths naked in the open air on this planet, and they thrived. But he needed a special refrigerated costume to endure the heat. More, they provided him with sunshades and refrigerated air that they did not need for themselves. They were thoughtful of him. He was as much out of his element, where they fitted perfectly, as he would have been making a degree-of-completion survey on an underwater project. He had to wear what was practically a diving suit and use a special air supply to survive!

He choked down the irritation his own inadequacy produced.

"I suppose we can go now," he said as coldly as he could.

Aletha's cousin mounted the control-saddle—though it was no more than a blanket—and Dr. Chuka mounted beside Bordman. The ground car got under way. It headed for the mountains.

The smoothness of the rock was deceptive. The caterwheel car lurched and bumped and swayed and rocked. It rolled and dipped and wallowed. Nobody could have remained in a normal seat on such terrain, but Bordman felt hopelessly undignified riding what amounted to a hobbyhorse. Under the sunshade it was infuriatingly like a horse on a carousel. That there were three of them together made it look even more foolish. He stared about him, trying to take his mind from his own absurdity. His goggles made the light endurable, but he felt ashamed.

"Those side-fins," said Chuka's deep voice pleasantly, "the bottom ones, make things better for you. The shade overhead cuts off direct sunlight, and they cut off the reflected glare. It would blister your skin even if the sun never touched you directly."

Bordman did not answer. The caterwheel car went on. It came to a patch of sand—tawny sand, heavily mineralized. There was a dune here. Not a big one for Xosa II. It was no more than a hundred feet high. But they went up its leeward, steeply slanting side. All the planet seemed to tilt insanely as the caterwheels spun. They reached the dune's crest, where it tended to curl over and break like a water-comber, and here the wheels struggled with sand precariously ready to fall, and Bordman had a sudden perception of the sands of Xosa II as the oceans that they really were. The dunes were waves which moved with infinite slowness, but the irresistible force of storm-seas. Nothing could resist them. Nothing!

They traveled over similar dunes for two miles. Then they began to climb the approaches to the mountains. And Bordman saw for the second time—the first had been through the ports of the landing-boat—where there was a notch in the mountain wall and sand had flowed out of it like a waterfall, making a beautifully symmetrical cone-shaped heap against the lower cliffs. There were many such falls. There was one place where there was a sand-cascade. Sand had poured over a series of rocky steps, piling up on each in turn to its very edge, and then spilling again to the next.

They went up a crazily slanting spur of stone, whose sides were too steep for sand to lodge on, and whose narrow crest had a bare thin coating of powder.

The landscape looked like a nightmare. As the car went on, wabbling and lurching and dipping on its way, the heights on either side made Bordman tend to dizziness. The coloring was impossible. The aridness, the desiccation, the lifelessness of everything about was somehow shocking. Bordman found himself straining his eyes for the merest, scrubbiest of bushes and for however stunted and isolated a wisp of grass.

The journey went on for an hour. Then there came a straining climb up a now-windswept ridge of eroded rock, and the attainment of its highest point. The ground car went onward for a hundred yards and stopped.

They had reached the top of the mountain range, and there was doubtlessly another range beyond. But they could not see it. Here, at the place to which they had climbed so effortfully, there were no more rocks. There was no valley. There was no descending slope. There was sand.

This was one of the sand plateaus which were a unique feature of Xosa II. And Bordman knew, now, that the disputed explanation was the true one.

Winds, blowing over the mountains, carried sand as on other worlds they carried moisture and pollen and seeds and rain. Where two mountain ranges ran across the course of long-blowing winds, the winds eddied above the valley between. They dropped sand into it. The equivalent of trade winds, Bordman considered, in time would fill a valley to the mountain tops, just as trade winds provide moisture in equal quantity on other worlds, and civilizations have been built upon it. But——

"Well?" said Bordman challengingly.

"This is the site of the landing grid," said Redfeather.

"Where?"

"Here," said the Indian dryly. "A few months ago there was a valley here. The landing grid had eighteen hundred feet of height built. There was to be four hundred feet more—the lighter top construction justifies my figure of eighty per cent completion. Then there was a storm."

It was hot. Horribly, terribly hot, even here on a plateau at mountain-top height. Dr. Chuka looked at Bordman's face and bent down in the vehicle. He turned a stopcock on one of the air tanks brought for Bordman's necessity. Immediately Bordman felt cooler. His skin was dry, of course. The circulated air dried sweat as fast as it appeared. But he had the dazed, feverish feeling of a man in an artificial-fever box. He'd been fighting it for some time. Now the coolness of the expanded air was almost deliriously refreshing.

Dr. Chuka produced a canteen. Bordman drank thirstily. The water was slightly salted to replace salt lost in sweat.

"A storm, eh?" asked Bordman, after a time of contemplation of his inner sensations as well as the scene of disaster before him. There'd be some hundreds of millions of tons of sand in even a section of this plateau. It was unthinkable that it could be removed except by a long-time sweep of changed trade winds along the length of the valley. "But what has a storm to do——"

"It was a sandstorm," said Redfeather coldly. "Probably there was a sunspot flare-up. We don't know. But the pre-colonization survey spoke of sandstorms. The survey team even made estimates of sandfall in various places as so many inches per year. Here all storms drop sand instead

of rain. But there must have been a sunspot flare because this storm blew for"—his voice went flat and deliberate because it was stating the unbelievable—"for two months. We did not see the sun in all that time. And we couldn't work, naturally. The sand would flay a man's skin off his body in minutes. So we waited it out.

"When it ended, there was this sand plateau where the survey had ordered the landing grid to be built. The grid was under it. It is under it. The top of eighteen hundred feet of steel is still buried two hundred feet down in the sand you see. Our unfabricated building-steel is piled ready for erection—under two thousand feet of sand. Without anything but stored power it is hardly practical"—Redfeather's tone was sardonic—"for us to try to dig it out. There are hundreds of millions of tons of stuff to be moved. If we could get the sand away, we could finish the grid. If we could finish the grid, we'd have power enough to get the sand away—in a few years, and if we could replace the machinery that wore out handling it. And if there wasn't another sandstorm."

He paused. Bordman took deep breaths of the cooler air. He could think more clearly.

"If you will accept photographs," said Redfeather politely, "you can check that we actually did the work."

Bordman saw the implications. The colony had been formed of Amerinds for the steel work and Africans for the labor the Amerinds were congenitally averse to—the handling of complex mining-machinery underground and the control of modern high-speed smelting operations. Both races could endure this climate and work in it—provided that they had cooled sleeping quarters. But they had to have power. Power not only to work with, but to live by. The air-cooling machinery that made sleep possible also condensed from the cooled air the minute trace of water vapor it contained and that they needed for drink. But without power they would thirst. Without the landing grid and the power it took from the ionosphere, they could not receive supplies from the rest of the universe. So they would starve.

And the *Warlock*, now in orbit somewhere overhead, was well within the planet's gravitational field and could not use its Lawlor drive to escape with news of their predicament. In the normal course of events it would be years before a colony ship capable of landing or blasting out of a planetary gravitational field by rocket-power was dispatched to find out why there was no news from Xosa II. There was no such thing as

interstellar signaling, of course. Ships themselves travel faster than any signal that could be sent, and distances were so great that mere communication took enormous lengths of time. A letter sent to Earth from the Rim even now took ten years to make the journey, and another ten for a reply. Even the much shorter distances involved in Xosa II's predicament still ruled out all hope. The colony was strictly on its own.

Bordman said heavily:

"I'll accept the photographs. I even accept the statement that the colony will die. I will prepare my report for the cache Aletha tells me you're preparing. And I apologize for any affront I may have offered you."

Dr. Chuka nodded approvingly. He regarded Bordman with benign warmth. Ralph Redfeather said cordially enough:

"That's perfectly all right. No harm done."

"And now," said Bordman shortly, "since I have authority to give any orders needed for my work, I want to survey the steps you've taken to carry out those parts of your instructions dealing with emergencies. I want to see right away what you've done to beat this state of things. I know they can't be beaten, but I intend to leave a report on what you've tried!"

The *Warlock* swung in emptiness around the planet Xosa II. It was barely five thousand miles above the surface, so the mottled terrain of the dry world flowed swiftly and perpetually beneath it. It did not seem beneath, of course. It simply seemed out—away—removed from the ship. And in the ship's hull there was artificial gravity, and light, and there were the humming sounds of fans which kept the air in motion and flowing through the air apparatus. Also there was food, and adequate water, and the temperature was admirably controlled. But nothing happened. Moreover, nothing could be expected to happen. There were eight men in the crew, and they were accustomed to space-voyages which lasted from one month to three. But they had traveled a good two months from their last port. They had exhausted the visireels, playing them over and over until they were intolerable. They had read and re-read all the bookreels they could bear. On previous voyages they had played chess and similar games until it was completely predictable who would beat whom in every possible contest.

Now they viewed the future with bitterness. The ship could not land, because there was no landing grid in operation on the planet below

them. They could not depart, because the Lawlor drive simply does not work within five diameters of an Earth-gravity planet. Space is warped only infinitesimally by so thin a field, but a Lawlor drive needs almost perfectly unstressed emptiness if it is to take hold. They did not have fuel enough to blast out the necessary thirty-odd thousand miles against gravity. The same consideration made their lifeboats useless. They could not escape by rocket-power and their Lawlor drives, also, were ineffective.

The crew of the *Warlock* was bored. The worst of the boredom was that it promised to last without limit. They had food and water and physical comfort, but they were exactly in the situation of men sentenced to prison for an unknown but enormous length of time. There was no escape. There could be no alleviation. The prospect invited frenzy by anticipation.

A fist fight broke out in the crew's quarters within two hours after the *Warlock* had established its orbit—as a first reaction to their catastrophe. The skipper went through the ship and painstakingly confiscated every weapon. He locked them up. He, himself, already felt the nagging effect of jangling nerves. There was nothing to do. He didn't know when there would ever be anything to do. It was a condition to produce hysteria.

There was night. Outside and above the colony there were uncountable myriads of stars. They were not the stars of Earth, of course, but Bordman had never been on Earth. He was used to unfamiliar constellations. He stared out a port at the sky, and noted that there were no moons. He remembered, when he thought, that Xosa II had no moons. There was a rustling of paper behind him. Aletha Redfeather turned a page in a loose-leaf volume and painstakingly made a note. The wall behind her held many more such books. From them could be extracted the detailed history of every bit of work that had been done by the colony-preparation crews. Separate, tersely-phrased items could be assembled to make a record of individual men.

There had been incredible hardships, at first. There were heroic feats. There had been an attempt to ferry water supplies down from the pole by aircraft. It was not practical, even to build up a reserve of fluid. Winds carried sand particles here as on other worlds they carried moisture. Aircraft were abraded as they flew. The last working flier made a forced landing five hundred miles from the colony. A caterwheel expedition went out and brought the crew in. The caterwheel trucks were armored

with silicone plastic, resistant to abrasion, but when they got back they had to be scrapped. There had been men lost in sudden sand-squalls, and heroic searches for them, and once or twice rescues. There had been cave-ins in the mines. There had been accidents. There had been magnificent feats of endurance and achievement.

Bordman went to the door of the hull which was Ralph Redfeather's Project Engineer office. He opened it. He stepped outside.

It was like stepping into an oven. The sand was still hot from the sunshine just ended. The air was so utterly dry that Bordman instantly felt it sucking at the moisture of his nasal passages. In ten seconds his feet—clad in indoor footwear—were uncomfortably hot. In twenty the soles of his feet felt as if they were blistering. He would die of the heat at night, here! Perhaps he could endure the outside near dawn, but he raged a little. Here where Amerinds and Africans lived and thrived, he could live unprotected for no more than an hour or two—and that at one special time of the planet's rotation!

He went back in, ashamed of the discomfort of his feet and angrily letting them feel scorched rather than admit to it.

Aletha turned another page.

"Look, here!" said Bordman angrily. "No matter what you say, you're going to go back on the *Warlock* before——"

She raised her eyes.

"We'll worry about that when the time comes. But I think not. I'd rather stay here."

"For the present, perhaps," snapped Bordman. "But before things get too bad you go back to the ship! They've rocket fuel enough for half a dozen landings of the landing boat. They can lift you out of here!"

Aletha shrugged.

"Why leave here to board a derelict? The *Warlock's* practically that. What's your honest estimate of the time before a ship equipped to help us gets here?"

Bordman would not answer. He'd done some figuring. It had been a two-month journey from Trent—the nearest Survey base—to here. The *Warlock* had been expected to remain aground until the smelter it brought could load it with pig metal. Which could be as little as two weeks, but would surprise nobody if it was two months instead. So the ship would not be considered due back on Trent for four months. It would not be considered overdue for at least two more. It would be six

months before anybody seriously wondered why it wasn't back with its cargo. There'd be a wait for lifeboats to come in, should there have been a mishap in space. There'd eventually be a report of noncommunication to the Colony Survey headquarters on Canna III. But it would take three months for that report to be received, and six more for a confirmation—even if ships made the voyages exactly at the most favorable intervals—and then there should at least be a complaint from the colony. There were lifeboats aground on Xosa II, for emergency communication, and if a lifeboat didn't bring news of a planetary crisis, no crisis would be considered to exist. Nobody could imagine a landing grid failing!

Maybe in a year somebody would think that maybe somebody ought to ask around about Xosa II. It would be much longer before somebody put a note on somebody else's desk that would suggest that when, or if, a suitable ship passed near Xosa II, or if one should be available for the inquiry, it might be worth while to have the noncommunication from the planet looked into. Actually, to guess at three years before another ship arrived would be the most optimistic of estimates.

"You're a civilian," said Bordman shortly. "When the food and water run low, you go back to the ship. You'll at least be alive when somebody does come to see what's the matter here!"

Aletha said mildly:

"Maybe I'd rather not be alive. Will you go back to the ship?"

Bordman flushed. He wouldn't. But he said doggedly;

"I can order you sent on board, and your cousin will carry out the order!"

"I doubt it very much," said Aletha pleasantly.

She returned to her task.

There were crunching footsteps outside the hulk. Bordman winced a little. With insulated sandals, it was normal for these colonists to move from one part of the colony to another in the open, even by daylight. He, Bordman, couldn't take out-of-doors at night! His lips twisted bitterly.

Men came in. There were dark men with rippling muscles under glistening skin, and bronze Amerinds with coarse straight hair. Ralph Redfeather was with them. Dr. Chuka came in last of all.

"Here we are," said Redfeather. "These are our foremen. Among us, I think we can answer any questions you want to ask."

He made introductions. Bordman didn't try to remember the names. Abeokuta and Northwind and Sutata and Tallgrass and T'ckka and Spottedhorse and Lewanika—— They were names which in combination would only be found in a very raw, new colony. But the men who crowded into the office were wholly at ease, in their own minds as well as in the presence of a senior Colonial Survey officer. They nodded as they were named, and the nearest shook hands. Bordman knew that he'd have liked their looks under other circumstances. But he was humiliated by the conditions on this planet. They were not. They were apparently only sentenced to death by them.

"I have to leave a report," said Bordman curtly—and he was somehow astonished to know that he did expect to leave a report rather than make one; he accepted the hopelessness of the colony's future—"on the degree-of-completion of the work here. But since there's an emergency, I have also to leave a report on the measures taken to meet it."

The report would be futile, of course. As futile as the coup-records Aletha was compiling, which would be read only after everybody on the planet was dead. But Bordman knew he'd write it. It was unthinkable that he shouldn't.

"Redfeather tells me," he added, again curtly, "that the power in storage can be used to cool the colony buildings—and therefore condense drinking water from the air—for just about six months. There is food for about six months. If one lets the buildings warm up a little, to stretch the fuel, there won't be enough water to drink. Go on half rations to stretch the food, and there won't be enough water to last and the power will give out anyhow. No profit there!"

There were nods. The matter had been thrashed out long before.

"There's food in the *Warlock* overhead," Bordman went on coldly, "but they can't use the landing boat more than a few times. It can't use ship fuel. No refrigeration to hold it stable. They couldn't land more than a ton of supplies all told. There are five hundred of us here. No help there!"

He looked from one to another.

"So we live comfortably," he told them with irony, "until our food and water and minimum night-comfort run out together. Anything we do to try to stretch anything is useless because of what happens to something else. Redfeather tells me you accept the situation. What are you doing—since you accept it?"

Dr. Chuka said amiably:

"We've picked a storage place for our records, and our miners are blasting out space in which to put away the record of our actions to the last possible moment. It will be sandproof. Our mechanics are building a broadcast unit we'll spare a tiny bit of fuel for. It will run twenty-odd years, broadcasting directions so it can be found regardless of how the terrain is changed by drifting sand."

"And," said Bordman, "the fact that nobody will be here to give directions."

Chuka added benignly:

"We're doing a great deal of singing, too. My people are ... ah ... religious. When we are ... ah ... no longer here ... there have been boastings that there'll be a well-practiced choir ready to go to work in the next world."

White teeth showed in grins. Bordman was almost envious of men who could grin at such a thought. But he went on grimly:

"And I understand that athletics have also been much practiced."

Redfeather said:

"There's been time for it. Climbing teams have counted coup on all the worst mountains within three hundred miles. There's been a new record set for the javelin, adjusted for gravity constant, and Johnny Cornstalk did a hundred yards in eight point four seconds. Aletha has the records and has certified them."

"Very useful!" said Bordman sardonically. Then he disliked himself for saying it even before the bronze-skinned men's faces grew studiously impassive.

Chuka waved his hand.

"Wait, Ralph! Lewanika's nephew will beat that within a week!"

Bordman was ashamed again because Chuka had spoken to cover up his own ill-nature.

"I take it back!" he said irritably. "What I said was uncalled for. I shouldn't have said it! But I came here to do a completion survey and what you've been giving me is material for an estimate of morale! It's not my line! I'm a technician, first and foremost! We're faced with a technical problem!"

Aletha spoke suddenly from behind him.

"But these are men, first and foremost, Mr. Bordman. And they're faced with a very human problem—how to die well. They seem to be rather good at it, so far."

Bordman ground his teeth. He was again humiliated. In his own fashion he was attempting the same thing. But just as he was genetically not qualified to endure the climate of this planet, he was not prepared for a fatalistic or pious acceptance of disaster. Amerind and African, alike, these men instinctively held to their own ideas of what the dignity of a man called upon him to do when he could not do anything but die. But Bordman's idea of his human dignity required him to be still fighting: still scratching at the eyes of fate or destiny when he was slain. It was in his blood or genes or the result of training. He simply could not, with self-respect, accept any physical situation as hopeless even when his mind assured him that it was.

"I agree," he said coldly, "but still I have to think in technical terms. You might say that we are going to die because we cannot land the *Warlock* with food and equipment. We cannot land the *Warlock* because we have no landing grid. We have no landing grid because it and all the material to complete it is buried under millions of tons of sand. We cannot make a new light-supply-ship type of landing grid because we have no smelter to make beams, nor power to run it if we had, yet if we had the beams we could get the power to run the smelter we haven't got to make the beams. And we have no smelter, hence no beams, no power, no prospect of food or help because we can't land the *Warlock*. It is strictly a circular problem. Break it at any point and all of it is solved."

One of the dark men muttered something under his breath to those near him. There were chuckles.

"Like Mr. Woodchuck," explained the man, when Bordman's eyes fell on him. "When I was a little boy there was a story like that."

Bordman said icily:

"The problem of coolness and water and food is the same sort of problem. In six months we could raise food—if we had power to condense moisture. We've chemicals for hydroponics—if we could keep the plants from roasting as they grew. Refrigeration and water and food are practically another circular problem."

Aletha said tentatively:

"Mr. Bordman——"

He turned, annoyed. Aletha said almost apologetically:

"On Chagan there was a—you might call it a woman's coup given to a woman I know. Her husband raises horses. He's mad about them. And they live in a sort of home on caterwheels out on the plains—the llanos. Sometimes they're months away from a settlement. And she loves ice cream and refrigeration isn't too simple. But she has a Doctorate in Human History. So she had her husband make an insulated tray on the roof of their trailer and she makes her ice cream there."

Men looked at her. Her cousin said amusedly:

"That should rate some sort of technical-coup feather!"

"The Council gave her a brass pot—official," said Aletha. "Domestic science achievement." To Bordman she explained: "Her husband put a tray on the roof of their house, insulated from the heat of the house below. During the day there's an insulated cover on top of it, insulating it from the heat of the sun. At night she takes off the top cover and pours her custard, thin, in the tray. Then she goes to bed. She has to get up before daybreak to scrape it up, but by then the ice cream is frozen. Even on a warm night." She looked from one to another. "I don't know why. She said it was done in a place called Babylonia on Earth, many thousands of years ago."

Bordman blinked. Then he said decisively:

"Damn! Who knows how much the ground-temperature drops here before dawn?"

"I do," said Aletha's cousin, mildly. "The top-sand temperature falls forty-odd degrees. Warmer underneath, of course. But the air here is almost cool when the sun rises. Why?"

"Nights are cooler on all planets," said Bordman, "because every night the dark side radiates heat to empty space. There'd be frost everywhere every morning if the ground didn't store up heat during the day. If we prevent daytime heat-storage—cover a patch of ground before dawn and leave it covered all day—and uncover it all night while shielding it from warm winds—— We've got refrigeration! The night sky is empty space itself! Two hundred and eighty below zero!"

There was a murmur. Then argument. The foremen of the Xosa II colony-preparation crew were strictly practical men, but they had the habit of knowing why some things were practical. One does not do modern steel construction in contempt of theory, nor handle modern mining

tools without knowing why as well as how they work. This proposal sounded like something that was based on reason—that should work to some degree. But how well? Anybody could guess that it should cool something at least twice as much as the normal night temperature-drop. But somebody produced a slipstick and began to juggle it expertly. He astonishedly announced his results. Others questioned, and then verified it. Nobody paid much attention to Bordman. But there was a hum of absorbed discussion, in which Redfeather and Chuka were immediately included. By calculation, it astoundingly appeared that if the air on Xosa II was really as clear as the bright stars and deep day-sky color indicated, every second night a total drop of one hundred and eighty degrees temperature could be secured by radiation to interstellar space—if there were no convection-currents, and they could be prevented by——

It was the convection-current problem which broke the assembly into groups with different solutions. But it was Dr. Chuka who boomed at all of them to try all three solutions and have them ready before daybreak, so the assembly left the hulk, still disputing enthusiastically. But somebody had recalled that there were dewponds in the one arid area on Timbuk, and somebody else remembered that irrigation on Delmos III was accomplished that same way. And they recalled how it was done——

Voices went away in the ovenlike night outside. Bordman grimaced, and again said:

"Damn! Why didn't I think of that myself?"

"Because," said Aletha, smiling, "you aren't a Doctor of Human History with a horse-raising husband and a fondness for ice cream. Even so, a technician was needed to break down the problem here into really simple terms." Then she said, "I think Bob Running Antelope might approve of you, Mr. Bordman."

Bordman fumed to himself.

"Who's he? Just what does that whole comment mean?"

"I'll tell you," said Aletha, "when you've solved one or two more problems."

Her cousin came back into the room. He said with gratification:

"Chuka can turn out silicone-wool insulation, he says. Plenty of material, and he'll use a solar mirror to get the heat he needs. Plenty of temperature to make silicones! How much area will we need to pull in four thousand gallons of water a night?"

"How do I know?" demanded Bordman. "What's the moisture-content of the air here, anyhow?" Then he said vexedly, "Tell me! Are you using heat-exchangers to help cool the air you pump into the buildings, before you use power to refrigerate it? It would save some power——"

The Indian project engineer said absorbedly:

"Let's get to work on this! I'm a steel man myself, but——"

They settled down. Aletha turned a page.

The *Warlock* spun around the planet. The members of its crew withdrew into themselves. In even two months of routine tedious voyaging to this planet, there had been the beginnings of irritation with the mannerisms of other men. Now there would be years of it. At the beginning, every man tended to become a hermit so that he could postpone as long as possible the time when he would hate his shipmates. Monotony was already so familiar that its continuance was a foreknown evil. The crew of the *Warlock* already knew how intolerable they would presently be to each other, and the foreknowledge tended to make them intolerable now.

Within two days of its establishment in orbit, the *Warlock* was manned by men already morbidly resentful of fate; with the psychology of prisoners doomed to close confinement for an indeterminate but ghastly period. On the third day there was a second fist fight. A bitter one.

Fist fights are not healthy symptoms in a spaceship which cannot hope to make port for a matter of years.

Most human problems are circular and fall apart when a single trivial part of them is solved. There used to be enmity between races because they were different, and they tended to be different because they were enemies, so there was enmity—The big problem of interstellar flight was that nothing could travel faster than light, and nothing could travel faster than light because mass increased with speed, and mass increased with speed—obviously!—because ships remained in the same time-slot, and ships remained in the same time-slot long after a one-second shift was possible because nobody realized that it meant traveling faster than light. And even before there was interstellar travel, there was practically no interplanetary commerce because it took so much fuel to take off and land. And it took more fuel to carry the fuel to take off and land, and more still to carry the fuel for that, until somebody used power on the ground for heave-off instead of take-off, and again on the ground for

landing. And then interplanetary ships carried cargoes. And on Xosa II there was an emergency because a sandstorm had buried the almost completed landing grid under some megatons of sand, and it couldn't be completed because there was only storage power because it wasn't completed, because there was only storage power because——

But it took three weeks for the problem to be seen as the ultimately simple thing it really was. Bordman had called it a circular problem, but he hadn't seen its true circularity. It was actually—like all circular problems—inherently an unstable set of conditions. It began to fall apart when he saw that mere refrigeration would break its solidity.

In one week there were ten acres of desert covered with silicone-wool-felt in great strips. By day a reflective surface was uppermost, and at sundown caterwheel trucks hooked on to towlines and neatly pulled it over on its back, to expose gridded black-body surfaces to the starlight. And the gridding was precisely designed so that winds blowing across it did not make eddies in the grid-squares, and the chilled air in those pockets remained undisturbed and there was no conduction of heat downward by eddy currents, while there was admirable radiation of heat out to space. And this was in the manner of the night sides of all planets, only somewhat more efficient.

In two weeks there was a water yield of three thousand gallons per night, and in three weeks more there were similar grids over the colony houses and a vast roofed cooling-shed for pre-chilling of air to be used by the refrigeration systems themselves. The fuel-store—stored power—was thereupon stretched to three times its former calculated usefulness. The situation was no longer a simple and neat equation of despair.

Then something else happened. One of Dr. Chuka's assistants was curious about a certain mineral. He used the solar furnace that had made the silicone wool to smelt it. And Dr. Chuka saw him. And after one blank moment he bellowed laughter and went to see Ralph Redfeather. Whereupon Amerind steel-workers sawed apart a robot hull that was no longer a fuel tank because its fuel was gone, and they built a demountable solar mirror some sixty feet across—which African mechanics deftly powered—and suddenly there was a spot of incandescence even brighter than the sun of Xosa II, down on the planet's surface. It played upon a mineral cliff, and monstrous smells developed and even the African mining-technicians put on goggles because of the brightness, and

presently there were threads of molten metal and slag trickling—and separating as they trickled—hesitantly down the cliff-side.

And Dr. Chuka beamed and slapped his sweating thighs, and Bordman went out in a caterwheel truck, wearing a heat-suit, to watch it for all of twenty minutes. When he got back to the Project Engineer's office he gulped iced salt water and dug out the books he'd brought down from the ship. There was the specbook for Xosa II, and there were the other volumes of definitions issued by the Colonial Survey. They were definitions of the exact meanings of terms used in briefer specifications, for items of equipment sometimes ordered by the Colony Office.

When Chuka came into the office, presently, he carried the first crude pig of Xosa II iron in his gloved hand. He gloated. Bordman was then absent, and Ralph Redfeather worked feverishly at his desk.

"Where's Bordman?" demanded Chuka in that resonant bass voice of his. "I'm ready to report for degree-of-completion credit that the mining properties on Xosa II are prepared as of today to deliver pig iron, cobalt, zirconium and beryllium in commercial quantities! We require one day's notice to begin delivery of metal other than iron at the moment, because we're short of equipment, but we can furnish chromium and manganese on two days' notice—the deposits are farther away."

He dumped the pig of metal on the second desk, where Aletha sat with her perpetual loose-leafed volumes before her. The metal smoked and began to char the desk-top. He picked it up again and tossed it from one gloved hand to the other.

"There y'are, Ralph!" he boasted. "You Indians go after your coups! Match this coup for me! Without fuel and minus all equipment except of our own making—I credit an assist on the mirror, but that's all—we're set to load the first ship that comes in for cargo! Now what are you going to do for the record? I think we've wiped your eye for you!"

Ralph hardly looked up. His eyes were very bright. Bordman had shown him and he was copying feverishly the figures and formulae from a section of the definition book of the Colonial Survey. The books started with the specifications for antibiotic growth equipment for colonies with problems in local bacteria. It ended with definitions of the required strength-of-material and the designs stipulated for cages in zoos for motile fauna, subdivided into flying, marine, and solid-ground creatures: sub-sub-divided into carnivores, herbivores, and omnivores, with the special specifications for enclosures to contain abyssal creatures

requiring extreme pressures, and the equipment for maintaining a healthfully re-poisoned atmosphere for creatures from methane planets.

Redfeather had the third volume open at, "Landing Grids, Lightest Emergency, Commerce Refuges, For Use Of." There were some dozens of non-colonized planets along the most-traveled spaceways on which refuges for shipwrecked spacemen were maintained. Small forces of Patrol personnel manned them. Space lifeboats serviced them. They had the minimum installations which could draw on their planets' ionospheres for power, and they were not expected to handle anything bigger than a twenty-ton lifeboat. But the specifications for the equipment of such refuges were included in the reference volumes for Bordman's use in the making of Colonial surveys. They were compiled for the information of contractors who wanted to bid on Colonial Survey installations, and for the guidance of people like Bordman who checked up on the work. So they contained all the data for the building of a landing grid, lightest emergency, commerce refuge for use of, in case of need. Redfeather copied feverishly.

Chuka ceased his boasting, but still he grinned.

"I know we're stuck, Ralph," he said amiably, "but it's nice stuff to go in the records. Too bad we don't keep coup-records like you Indians!"

Aletha's cousin—Project Engineer—said crisply:

"Go away! Who made your solar mirror? It was more than an assist! You get set to cast beams for us! Girders! I'm going to get a lifeboat aloft and away to Trent! Build a minimum size landing grid! Build a fire under somebody so they'll send us a colony ship with supplies! If there's no new sandstorm to bury the radiation refrigerators Bordman brought to mind, we can keep alive with hydroponics until a ship can arrive with something useful!"

Chuka stared.

"You don't mean we might actually live through this! Really?"

Aletha regarded the two of them with impartial irony.

"Dr. Chuka," she said gently, "you accomplished the impossible. Ralph, here, is planning to attempt the preposterous. Does it occur to you that Mr. Bordman is nagging himself to achieve the inconceivable? It is inconceivable, even to him, but he's trying to do it!"

"What's he trying to do?" demanded Chuka, wary but amused.

"He's trying," said Aletha, "to prove to himself that he's the best man on this planet. Because he's physically least capable of living here! His vanity's hurt. Don't underestimate him!"

"He the best man here?" demanded Chuka blankly. "In his way he's all right. The refrigeration proves that! But he can't walk out-of-doors without a heat-suit!"

Ralph Redfeather said dryly, without ceasing his feverish work:

"Nonsense, Aletha. He has courage. I give him that. But he couldn't walk a beam twelve hundred feet up. In his own way, yes. He's capable. But the best man——"

"I'm sure," agreed Aletha, "that he couldn't sing as well as the worst of your singing crew, Dr. Chuka, and any Amerind could outrun him. Even I could! But he's got something we haven't got, just as we have qualities he hasn't. We're secure in our competences. We know what we can do, and that we can do it better than any——" her eyes twinkled——"paleface. But he doubts himself. All the time and in every way. And that's why he may be the best man on this planet! I'll bet he does prove it!"

Redfeather said scornfully:

"You suggested radiation refrigeration! What does it prove that he applied it?"

"That," said Aletha, "he couldn't face the disaster that was here without trying to do something about it—even when it was impossible. He couldn't face the deadly facts. He had to torment himself by seeing that they wouldn't be deadly if only this one or that or the other were twisted a little. His vanity was hurt because nature had beaten men. His dignity was offended. And a man with easily-hurt dignity won't ever be happy, but he can be pretty good!"

Chuka raised his ebony bulk from the chair in which he still shifted the iron pig from gloved hand to gloved hand.

"You're kind," he said, chuckling. "Too kind! I don't want to hurt his feelings. I wouldn't, for the world! But really ... I've never heard a man praised for his vanity before, or admired for being touchy about his dignity! If you're right ... why ... it's been convenient. It might even mean hope. But ... hm-m-m—— Would you want to marry a man like that?"

"Great Manitou forbid!" said Aletha firmly. She grimaced at the bare idea. "I'm an Amerind. I'll want my husband to be contented. I want to be contented along with him. Mr. Bordman will never be either happy or content. No paleface husband for me! But I don't think he's through here

yet. Sending for help won't satisfy him. It's a further hurt to his vanity. He'll be miserable if he doesn't prove himself—to himself—a better man than that!"

Chuka shrugged his massive shoulders. Redfeather tracked down the last item he needed and fairly bounced to his feet.

"What tonnage of iron can you get out, Chuka?" he demanded. "What can you do in the way of castings? What's the elastic modulus—how much carbon in this iron? And when can you start making castings? Big ones?"

"Let's go talk to my foremen," said Chuka complacently. "We'll see how fast my ... ah ... mineral spring is trickling metal down the cliff-face. If you can really launch a lifeboat, we might get some help here in a year and a half instead of five——"

They went out-of-doors together. There was a small sound in the next office. Aletha was suddenly very, very still. She sat motionless for a long half-minute. Then she turned her head.

"I owe you an apology, Mr. Bordman," she said ruefully. "It won't take back the discourtesy, but—I'm very sorry."

Bordman came into the office from the next room. He was rather pale. He said wryly:

"Eavesdroppers never hear good of themselves, eh? Actually I was on the way in here when I heard—references to myself it would embarrass Chuka and your cousin to know I heard. So I stopped. Not to listen, but to keep them from knowing I'd heard their private opinions of me. I'll be obliged if you don't tell them. They're entitled to their opinions of me. I've mine of them." He added grimly, "Apparently I think more highly of them than they do of me!"

Aletha said contritely:

"It must have sounded horrible! But they ... we ... all of us think better of you than you do of yourself!"

Bordman shrugged.

"You in particular. 'Would you marry someone like me? Great Manitou, no!'"

"For an excellent reason," said Aletha firmly. "When I get back from here—if I get back from here—I'm going to marry Bob Running Antelope. He's nice. I like the idea of marrying him. I want to! But I look

forward not only to happiness but to contentment. To me that's important. It isn't to you, or to the woman you ought to marry. And I ... well ... I simply don't envy either of you a bit!"

"I see," said Bordman with irony. He didn't. "I wish you all the contentment you look for." Then he snapped: "But what's this business about expecting more from me? What spectacular idea do you expect me to pull out of somebody's hat now? Because I'm frantically vain!"

"I haven't the least idea," said Aletha calmly. "But I think you'll come up with something we couldn't possibly imagine. And I didn't say it was because you were vain, but because you are discontented with yourself. It's born in you! And there you are!"

"If you mean neurotic," snapped Bordman, "you're all wrong. I'm not neurotic! I'm not. I'm annoyed. I'll get hopelessly behind schedule because of this mess! But that's all!"

Aletha stood up and shrugged her shoulders ruefully.

"I repeat my apology," she told him, "and leave you the office. But I also repeat that I think you'll turn up something nobody else expects—and I've no idea what it will be. But you'll do it now to prove that I'm wrong about how your mind works."

She went out. Bordman clamped his jaws tightly. He felt that especially haunting discomfort which comes of suspecting that one has been told something about himself which may be true.

"Idiotic!" he fumed, all alone. "Me neurotic? Me wanting to prove I'm the best man here out of vanity?" He made a scornful noise. He sat impatiently at the desk. "Absurd!" he muttered wrathfully. "Why should I need to prove to myself I'm capable? What would I do if I felt such a need, anyhow?"

Scowling, he stared at the wall. It was irritating. It was a nagging sort of question. What would he do if she were right? If he did need constantly to prove to himself——

He stiffened, suddenly. A look of intense surprise came upon his face. He'd thought of what a self-doubtful, discontented man would try to do, here on Xosa II at this juncture.

The surprise was because he had also thought of how it could be done.

The *Warlock* came to life. Her skipper gloomily answered the emergency call from Xosa II. He listened. He clicked off the communicator

and hastened to an exterior port, deeply darkened against those times when the blue-white sun of Xosa shone upon this side of the hull. He moved the manual control to make it more transparent. He stared down at the monstrous, tawny, mottled surface of the planet five thousand miles away. He searched for the spot he bitterly knew was the colony's site.

He saw what he'd been told he'd see. It was an infinitely fine, thread-like projection from the surface of the planet. It rose at a slight angle—it leaned toward the planet's west—and it expanded and widened and formed an extraordinary sort of mushroom-shaped object that was completely impossible. It could not be. Humans do not create visible objects twenty miles high, which at their tops expand like toadstools on excessively slender stalks, and which drift westward and fray and grow thin, and are constantly renewed.

But it was true. The skipper of the *Warlock* gazed until he was completely sure. It was no atomic bomb, because it continued to exist. It faded, but was constantly replenished. There was no such thing!

He went through the ship, bellowing, and faced mutinous snarlings. But when the *Warlock* was around on that side of the planet again, the members of the crew saw the strange appearance, too. They examined it with telescopes. They grew hysterically happy. They went frantically to work to clear away the signs of a month and a half of mutiny and despair.

It took them three days to get the ship to tidiness again, and during all that time the peculiar tawny jet remained. On the sixth day the jet was fainter. On the seventh it was larger than before. It continued larger. And telescopes at highest magnification verified what the emergency communication had said.

Then the crew began to experience frantic impatience. It was worse, waiting those last three or four days, than even all the hopeless time before. But there was no reason to hate anybody, now. The skipper was very much relieved.

There was eighteen hundred feet of steel grid overhead. It made a crisscross, ring-shaped wall more than a quarter-mile high and almost to the top of the surrounding mountains. But the valley was not exactly a normal one. It was a crater, now: a steeply sloping, conical pit whose walls descended smoothly to the outer girders of the red-painted, glistening steel structure. More girders for the completion of the grid

projected from the sand just outside its half-mile circle. And in the landing grid there was now a smaller, elaborate, truss-braced object. It rested on the rocky ground, and it was not painted, and it was quite small. A hundred feet high, perhaps, and no more than three hundred across. But it was visibly a miniature of the great, now-uncovered, re-painted landing grid which was qualified to handle interstellar cargo ships and all the proper space-traffic of a minerals-colony planet.

A caterwheel truck came lurching and rolling and rumbling down the side of the pit. It had a sunshade and ground-reflector wings, and Bordman rode tiredly on a hobbyhorse saddle in its back cargo section. He wore a heat-suit.

The truck reached the pit's bottom. There was a tool shed there. The caterwheel-truck bumped up to it and stopped. Bordman got out, visibly cramped by the jolting, rocking, exhausting-to-unaccustomed-muscles ride.

"Do you want to go in the shed and cool off?" asked Chuka brightly.

"I'm all right," said Bordman curtly. "I'm quite comfortable, so long as you feed me that expanded air." It was plain that he resented needing even a special air supply. "What's all this about? Bringing the *Warlock* in? Why the insistence on my being here?"

"Ralph has a problem," said Chuka blandly. "He's up there. See? He needs you. There's a hoist. You've got to check degree-of-completion anyhow. You might take a look around while you're up there. But he's anxious for you to see something. There where you see the little knot of people. The platform."

Bordman grimaced. When one was well started on a survey, one got used to heights and depths and all sorts of environments. But he hadn't been up on steel-work in a good many months. Not since a survey on Kalka IV nearly a year ago. He would be dizzy at first.

He accompanied Chuka to the spot where a steel cable dangled from an almost invisibly thin beam high above. There was a strictly improvised cage to ascend in—planks and a handrail forming an insecure platform that might hold four people. He got into it, and Dr. Chuka got in beside him. Chuka waved his hand. The cage started up.

Bordman winced as the ground dropped away below. It was ghastly to be dangling in emptiness like this. He wanted to close his eyes. The cage went up and up and up. It took many long minutes to reach the top.

There was a platform there. Newly-made. The sunlight was blindingly bright. The landscape was an intolerable glare. Bordman adjusted his goggles to maximum darkness and stepped gingerly from the swaying cage to the hardly more solid-seeming area. Here he was in mid-air on a platform barely ten feet square. It was rather more than twice the height of a metropolitan skyscraper from the ground. There were actual mountain-crests only half a mile away and not much higher. Bordman was acutely uncomfortable. He would get used to it, but——

"Well?" he asked fretfully. "Chuka said you needed me here. What's the matter?"

Ralph Redfeather nodded very formally. Aletha was here, too, and two of Chuka's foremen—one did not look happy—and four of the Amerind steel-workers. They grinned at Bordman.

"I wanted you to see," said Aletha's cousin, "before we threw on the current. It doesn't look like that little grid could handle the sand it took care of. But Lewanika wants to report."

A dark man who worked under Chuka—and looked as if he belonged on solid ground—said carefully:

"We cast the beams for the small landing grid, Mr. Bordman. We melted the metal out of the cliffs and ran it into molds as it flowed down."

He stopped. One of the Indians said:

"We made the girders into the small landing grid. It bothered us because we built it on the sand that had buried the big grid. We didn't understand why you ordered it there. But we built it."

The second dark man said with a trace of swagger:

"We made the coils, Mr. Bordman. We made the small grid so it would work the same as the big one when it was finished. And then we made the big grid work, finished or not!"

Bordman said impatiently:

"All right. Very good. But what is this? A ceremony?"

"Just so," said Aletha, smiling. "Be patient, Mr. Bordman!"

Her cousin said conversationally:

"We built the small grid on the top of the sand. And it tapped the ionosphere for power. No lack of power then! And we'd set it to heave up

sand instead of ships. Not to heave it out into space, but to give it up to mile a second vertical velocity. Then we turned it on."

"And we rode it down, that little grid," said one of the remaining Indians, grinning. "What a party! Manitou!"

Redfeather frowned at him and took up the narrative.

"It hurled the sand up from its center. As you said it would, the sand swept air with it. It made a whirlwind, bringing more sand from outside the grid into its field. It was a whirlwind with fifteen megakilowatts of power to drive it. Some of the sand went twenty miles high. Then it made a mushroom-head and the winds up yonder blew it to the west. It came down a long way off, Mr. Bordman. We've made a new dune-area ten miles downwind. And the little grid sank as the sand went away from around it. We had to stop it three times, because it leaned. We had to dig under parts of it to get it straight up again. But it went down into the valley."

Bordman turned up the power to his heat-suit motors. He felt uncomfortably warm.

"In six days," said Ralph, almost ceremonially, "it had uncovered half the original grid we'd built. Then we were able to modify that to heave sand and to let it tap the ionosphere. We were able to use a good many times the power the little grid could apply to sand-lifting! In two days more the landing grid was clear. The valley bottom was clean. We shifted some hundreds of millions of tons of sand by landing grid, and now it is possible to land the *Warlock*, and receive her supplies, and the solar-power furnace is already turning out pigs for her loading. We wanted you to see what we have done. The colony is no longer in danger, and we shall have the grid completely finished for your inspection before the ship is ready to return."

Bordman said uncomfortably:

"That's very good. It's excellent. I'll put it in my survey report."

"But," said Ralph, more ceremonially still, "we have the right to count coup for the members of our tribe and clan. Now——"

Then there was confusion. Aletha's cousin was saying syllables that did not mean anything at all. The other Indians joined in at intervals, speaking gibberish. Aletha's eyes were shining and she looked incredibly pleased and satisfied.

"But what ... what's this?" demanded Bordman when they stopped.

Aletha spoke proudly.

"Ralph just formally adopted you into the tribe, Mr. Bordman—and into his clan and mine! He gave you a name I'll have to write down for you, but it means, 'Man-who-believes-not-his-own-wisdom.' And now——"

Ralph Redfeather—licensed interstellar engineer, graduate of the stiffest technical university in this quarter of the galaxy, wearer of three eagle-pinion feathers and clad in a pair of insulated sandals and a breechcloth—whipped out a small paint-pot and a brush from somewhere and began carefully to paint on a section of girder ready for the next tier of steel. He painted a feather on the metal.

"It's a coup," he told Bordman over his shoulder. "Your coup. Placed where it was earned—up here. Aletha is authorized to certify it. And the head of the clan will add an eagle-feather to the headdress he wears in council in the Big Tepee on Algonka, and—your clan-brothers will be proud!"

Then he straightened up and held out his hand.

Chuka said benignly:

"Being civilized men, Mr. Bordman, we Africans do not go in for uncivilized feathers. But we ... ah ... rather approve of you, too. And we plan a corroboree at the colony after the *Warlock* is down, when there will be some excellently practiced singing. There is ... ah ... a song, a sort of choral calypso, about this ... ah ... adventure you have brought to so satisfying a conclusion. It is quite a good calypso. It's likely to be popular on a good many planets."

Bordman swallowed. He was acutely uncomfortable. He felt that he ought to say something, and he did not know what.

But just then there was a deep-toned humming in the air. It was a vibrant tone, instinct with limitless power. It was the eighteen-hundred-foot landing grid, giving off that profoundly bass and vibrant, note it uttered while operating. Bordman looked up.

The *Warlock* was coming down.

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