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WORLDS OF SCIENCE FICTION

JUNE 35 CENTS

EXCLUSIVE!

Eminent Men of Science Preview "Project Vanguard" Man's First Skirmish in the Conquest of Space!

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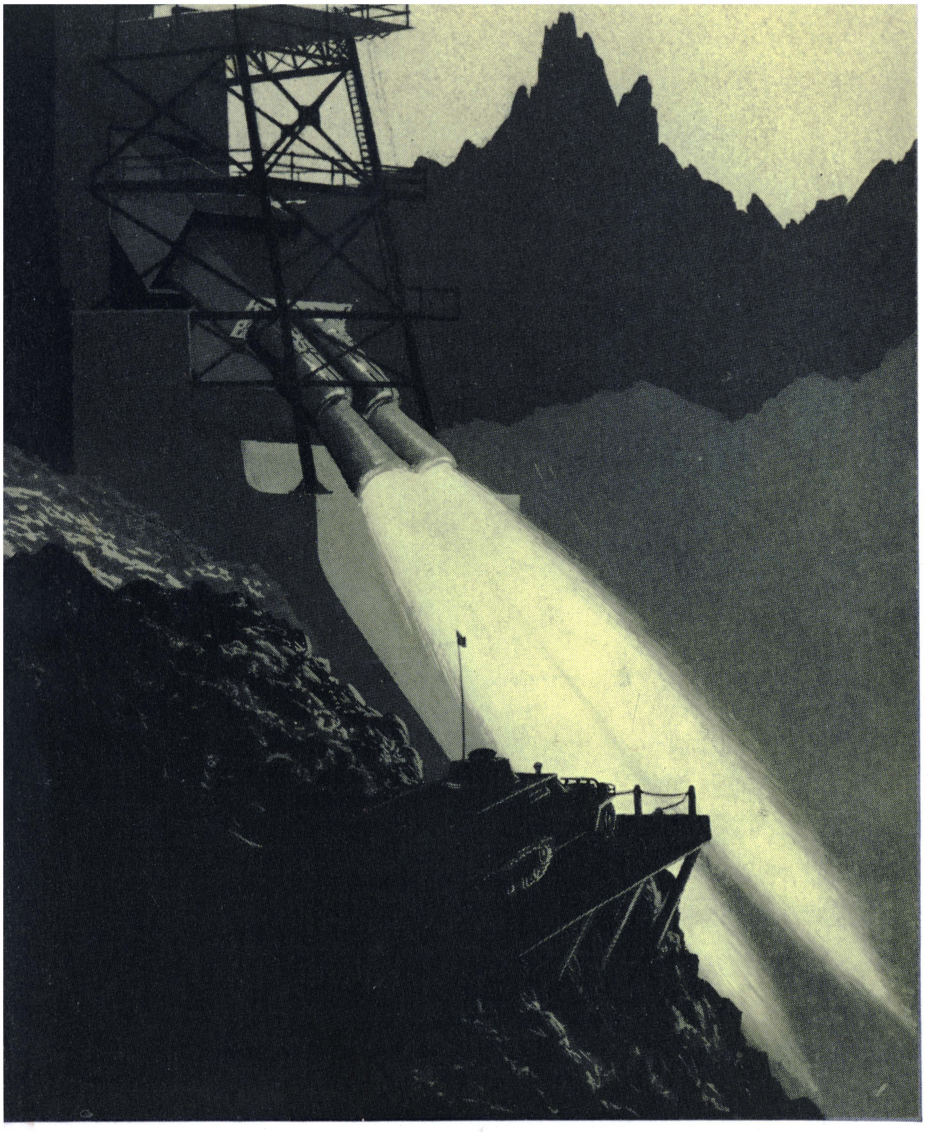
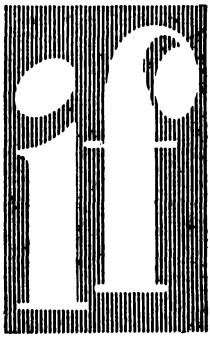
SATELLITE

By JAMES M. NUDING with PAUL J. VANOUS



TESTING ENGINES FOR STAGE ONE—The two rocket motors for Stage One are mounted here in tandem for test firing prior to installation in the air frame. These motors are designed to yield three hundred thousand pounds of thrust to lift the three stage assembly. The test crew is stationed in a heavily armored vehicle downslope from the test stand to observe the firing. The vibration and roar created by these monster engines is inconceivable to anyone who has not witnessed such a firing. Men have been known to assume the foetal position, or lose control of their bodily functions, under its impact. (Now see inside back cover.)



WORLDS of SCIENCE FICTION

JUNE 1956

All Stories New and Complete

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SPECIAL!

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Three-stage Satellite Rocket by Mel Hunter

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Next (August) issue on sale June 12th

Editor's REPORT

A YEAR from now (and who doesn't know it?) science will embark on the most colossal probing of the mysteries of the universe the world has ever known. The occasion, of course, is the International Geophysical Year—an 18-months "year" which will last from July 1, 1957, through December, 1958. During this time 40 nations will pool their scientific brains to prove a lot of things and to disprove a lot of other things. Weather, gravity, outer atmosphere, latitudes and longitudes, oceanography, earthquakes, glaciology and many other pertinent subjects will get close clinical scrutiny. It's going to be an exciting 18 months, not only for the science minded and the science fiction fan but for anyone who can read, write, see, feel, smell or hear.

BEGINNING in this issue, we are publishing a series of articles that may well turn out to be a world scoop on anticipating the design and functioning of the artificial satellite to be launched through "Operation Vanguard", one of the United States' most prominent contributions to the IGY—and certainly the most dramatic. Since the first announcement by President Eisenhower, there has been a bombardment of newspaper, radio and TV stories, but still the public has received only a vague, general idea of what this first (if Russia doesn't make good its boast) artificial satellite is actually going to be like. Being a top-secret project, this is only natural. And it's going to be a good while before anybody gets the Government's own story. However, we did the next best thing: we sought the calculated predictions of scientists who, though not connected with "Project Vanguard", are actively engaged in various phases of rocket development—rocket design, propulsion, astrophysics, instrumentation and other phases of astronautics. They are men high in their fields—and, we believe, what they present will be very, very close to the satellite of "Project Vanguard". The authors of the first two articles are James M. Nuding and Paul J. Vanous, who present a plan for constructing and launching the satellite vehicle, and the instrumentation and operation of the actual satellite after it reaches its orbit.

JAMES M. NUDING is lead Research Engineer, Atomic Research Energy and Problems of Instrumentation, at North American Aviation. His rise to eminence has the flavor and color of a story by

Horatio Alger. Born in Oakland, California, in 1905, he was orphaned at the age of ten. Through training received in technical classes in high school and night school, he was able to secure a license as a radio operator. His first job as a radio operator was aboard a four-masted barque bound for the Bering Sea. From "wind jammering" he went to the Coast Guard, where he served aboard a rum-runner in the same capacity. After leaving the Coast Guard he had a variety of jobs which included experimenting with X-ray, glass blowing for neon tubes, and work on high-voltage electrical systems.

His first big step upward in the field of science was when he went to Stanford University to work on the Klystron Project, under the Varian brothers. (The klystron, incidentally, is a gadget that makes possible U.H.F. transmission.) A year later, he went to Sperry Gyro to work out commercial applications for the klystron. When the Sperry laboratories moved east, he went to the University of California, where he worked, under Professor Lawrence, on TUBA, a radar-jamming device used in World War II. After a short tenure here he transferred to the 60-inch cyclotron lab, becoming its chief of operations.

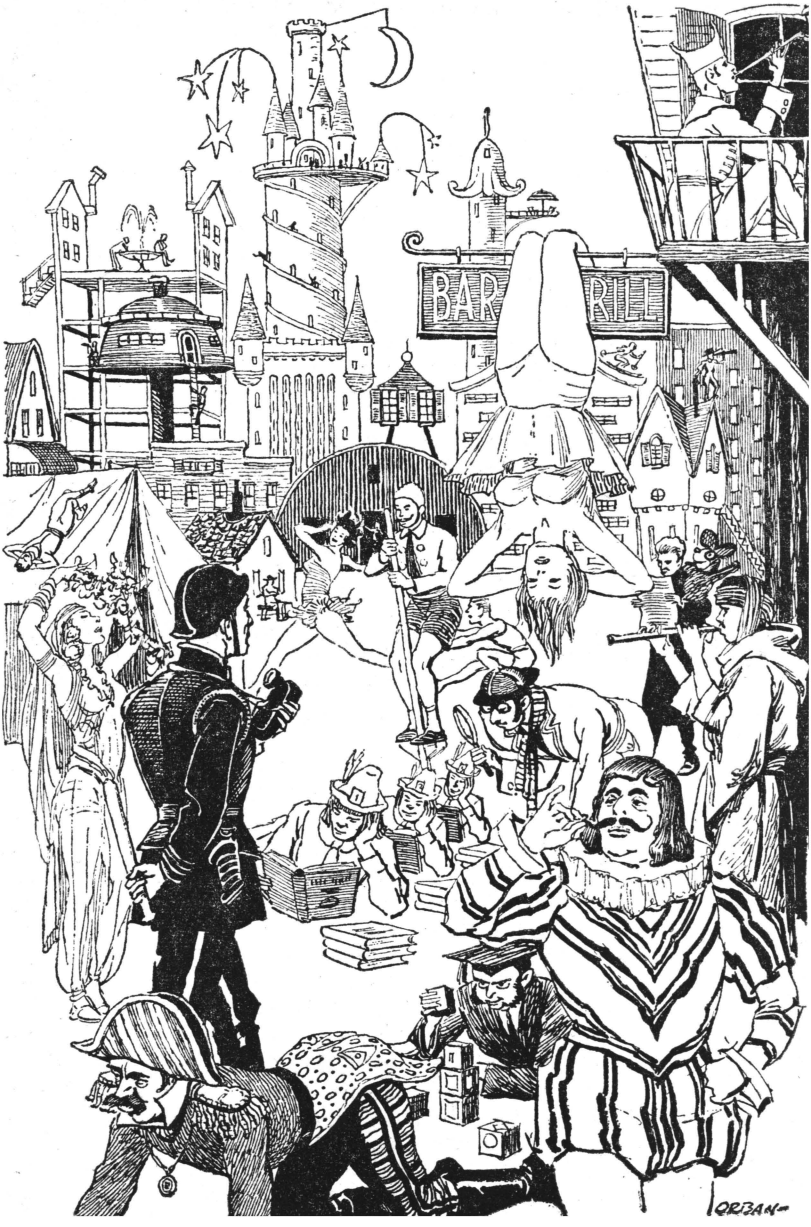
In 1942, with the war at fever pitch, he was again transferred, this time to the Calutron Project, where he experimented with an electronic device for separating the U235 isotope for use in the A-bomb. Within a year he was a supervisor and training head. In 1943 he was sent to Oak Ridge and for three years he was engaged in work on process improvement of the Electromagnetic Separation Plant. He went to North American Aviation in 1946 and has remained there since.

James Nuding is a long time member and former president of the Pacific Rocket Society, an active group dedicated to the pursuit of astronautical research and the furtherance of space flight. Under the auspices of this organization, he became one of the pioneers in the actual designing, building and firing of many of the successful rockets which have roared into southern California skies.

PAUL J. VANOUS, a young man of 31 years, is Microwave Senior Design Engineer, Missile Guidance Systems Division, at Bendix Aviation. A resident of Burbank, California, he holds a degree in Electrical Engineering from the University of California and a membership card in the Microwave Chapter of I.R.E. Much of his time is spent flying across the country on problems of component development. Mr. Vanous made the original designs and drawings from which the interior illustrations and June and August covers were adapted.

MUCH MORE could be written about James Nuding and Paul Vanous. I wish we could run a more detailed story about each instead of this brief introduction.

(Continued on page 120)


BAR
GRILL
ORBAN

Madmen must be guarded or exterminated. But how could the Kyben exterminate their own ancestors?

THE CRACKPOTS

BY HARLAN ELLISON

Illustrated by Paul Orban

HE WAS standing on a street corner, wearing a long orange nightgown and a red slumber-cap with a tassel. He was studiously picking his nose.

"Watch him!" cried Furth. "Watch what he does! Get the technique accurately!"

For this I studied four years to become an expert? thought Themus.

Furth looked at the younger man for the first time in several minutes. "Are you watching him?" The elder Watcher nudged his companion, causing Themus'

dicto-box to bump unceremoniously against his chest.

"Yes, yes, I'm watching," answered Themus, "but what possible reason could there be to watch a lunatic picking his nose on a public street corner?" Annoyance rang in his voice.

Furth swung on him, his eyes cold-steel. "You *watch* them, that's your job. And don't ever forget that! And dictate it into that box strapped to your stupid shoulders. If I ever catch you failing to notice and dictate what they're doing, I'll have you shipped back to Central and then into the Mines. You understand what I'm saying?"

Themus nodded dumbly, the attack having shocked and surprised him, so sudden and intensive was it.

He watched the Crackpot.

His stomach felt uneasy. His voice quavered as he described in minute detail, as he had been taught, the procedure. It made his nose itch. He ignored it. Soon the Crackpot gave a little laugh, did a small dance-step, and skipped out of sight across the street and around the corner.

Themus spoke into the Communicator-Attachment on his box: "Watcher, sector seventy, here. Male, orange nightgown, red slumber-cap, coming your way. Pick him up, sixty-nine. He's all yours. Over."

An acknowledging buzz came from the Attachment, Themus said, "Out here," and turned the Attachment off.

Furth, who had been dictating the detailed tying of a can on the tail of a four-legged Kyben dog by a tall, bald Crackpot, concluded his report as the dog ran off barking wildly, muttered, "Off," into the dicto-box and turned once more to Themus. The younger Watcher tightened inside. *Here it comes.*

Unexpectedly, the senior Watcher's voice was quiet, almost gentle. "Come with me, Themus, I want to talk with you."

They strode through the streets of Valasah, capital city of Kyba, watching the other branch of Kyben. The native Kyben, those who put light-tubes in their mouths and twisted their ears in expectation of fluorescence, those who pulled their teeth with adjusto-wrenches, those who sat and scribbled odd messages on the sidewalks, called the armor-dressed Kyben, "Stuffed-Shirts." The governing Kyben, those with the armor and high-crested metal helmets bearing the proud emblem of the eye-and-eagle, called their charges, "Crackpots."

They were both Kyben.

There was a vast difference.

Furth was about to delineate the difference to his new aide. The senior Watcher's great-cape swirled in a rain of black as he turned into the Pub-crawler.

At a table near the front, Furth pulled his cape about his thighs and sat down, motioning Themus to the other chair.

The waiter walked slowly over to them, yawning behind his hand. Furth dictated the fact briefly. The waiter gave a high-pitched maniacal laugh. Themus felt his blood chill. These people were all mad, absolutely mad.

"Two glasses of *greth,*" Furth said.

The waiter left. Furth recorded the fact. The waiter had kicked him before he had gone behind the bar.

When the drinks arrived, Furth took a long pull from the helix-shaped glass, slumped back, folded his hands on the table and said, "What did you learn at Academy-Central?"

The question took Themus by surprise. "Wh-what do you mean? I learned a great many things."

"Such as? Tell me."

"Well, there was primary snooping, both conscious and subconscious evaluation, reportage—four full years of it—shorthand, applied dictology, history, manners, customs, authority evaluation, mechanics, fact assemblage . . ."

He found the subjects leaping to the front of his mind, tumbling from his lips. He had been second in his class of twelve hundred, and it had all stuck.

Furth cut him off with a wave of his hand. "Let's take that history. Capsule it for me."

Furth was a big man, eyes oddly set far back in hollows above deep yellow cheeks, hair white about the temples, a lean and electric man, the type who radiates energy even when asleep. Themus suspected this was his superior's way of testing him. He recited:

"The Corps is dedicated to gathering data. It will Watch and detect, assimilate and file. Nothing will escape the gaze of the Watcher. As the eagle soars, so the eye of the Watcher will fly to all things."

"God, *no,* man, I mean the *History!* The *History.*" The elder Watcher precision-tapped his fingers one after another in irritation. "What is the story of the Kyben. Of Kyba itself. Of your job here. What is our relation to these?"

He waved his hand, taking in the bar, the people in the streets, the entire planet and its twin suns blazing yellow in the afternoon sky.

Themus licked his thin lips, "The Kyben rule the Galaxy—is that what you want?" He breathed easier as the older man nodded. He continued, by rote: "The Kyben rule the Galaxy. They are the organizers. All other races realize the superior reasoning and administrative powers of the Kyben, and thus allow the Kyben to rule the Galaxy."

He stopped, biting his lower lip, "With your permission, Superior, can I do this some other way? Back at Academy-Central memorization was required, even on Penares it seemed apropos, but somehow—*here*—it sounds foolish to me. No disrespect intended, you understand, I'd just like to ramble it off quickly. I gather all you want are the basics."

The older man nodded his head for Themus to continue in any fashion he chose.

"We are a power, and all the others are too scared of us to try usurping because we run it all better than any ten of them could, and the only trouble is with the Earthmen and the Mawson Confederation, with whom we are negotiating right now. The only thing

we have against us is this planet of black sheep relatives. They happen to be our people, but we left them some eleven hundred years ago because they were a pain in the neck and the Kyben realized they had a universe to conquer, and we wish we could get rid of them, because they're all quite mad, and if anyone finds out about them, we'll lose prestige, and besides they're a nuisance."

He found himself out of breath after the long string of phrases, and he stopped for a second. "There isn't a sane person on this planet, which isn't strange because all the 4-Fs were left when our ancestors took to space. In the eleven hundred years we've been running the Galaxy, these Crackpots have created a culture of imbecility for themselves. The Watcher garrison is maintained, to make sure the lunatics don't escape and damage our position with the other worlds around us.

"If you have a black sheep relative, you either put him away under surveillance so he can't bother you, or you have him exterminated. Since we aren't barbarians like the Earthmen, we keep the madmen here, and watch them full time."

He stopped, realizing he had covered the subject quite well, and because he saw the sour expression on Furth's face.

"That's what they taught you at Academy-Central?" asked the senior Watcher.

"That's about it, except that Watcher units are all over the Galaxy, from Penares to Kyba, from the home planet to our furthest holding, doing a job for which they were trained and which no other order could do. Performing an invaluable service to all Kyben, from Kyben-Central outward to the edges of our exploration."

"Then don't you ever forget it, hear?" snapped Furth, leaning quickly across to the younger man. "Don't you ever let it slip out of your mind. If anything happens while you're awake and on the scene, and you miss it, no matter how insignificant, you'll wind up in the Mines." As if to illustrate his point, he clicked the dicto-box to "on" and spoke briefly into it, keeping his eyes on a girl neatly pouring the contents of a row of glasses on the bar's floor and eating the glasses, all but the stems, which she left lying in an orderly pile.

He concluded, and leaned back toward Themus, pointing a stubby finger, "You've got a soft job here, boy. Ten years as a Watcher and you can retire. Back to a nice cozy apartment in a Project at Kyben-Central or any other planet you choose, with anyone you choose, doing anything you choose—within the bounds of the Covenant, of course. You're lucky you made it into the Corps. Many a mother's son would *give* his mother to be where you are."

He lifted the helix-glass to his lips and drained it.

Themus sat, scratched his nose, and watched the purple liquid disappear.

It was his first day on Kyba, his Superior had straightened him out, he knew his place, he knew his

job. Everything was clean and top-notch.

Somehow he was miserable.

THEMUS looked at himself. At himself as he knew he was, not as he thought he was. This was a time for realities, not for wishful thinking.

He was twenty-three, average height, blue hair, blue eyes, light complexion—just a bit lighter yellow than the average gold-color of his people—superior intelligence, and with the rigid, logical mind of his kind. He was an accepted Underclass member of the Watcher Corps with a year of interne work at Penares-Base and an immediate promotion to Kyba, which was acknowledged the soft spot before retirement. For a man as new to the Corps as Themus' five years made him, this was a remarkable thing, and explainable only by his quick and brilliant dictographic background.

He was a free man, a quick man with a dicto-box, a good-looking man, and unfortunately, an unhappy man.

He was confused by it all.

His summation of himself was suddenly shattered by the rest of his squad's entrance into the common-room, voices pitched on a dozen different levels.

They came through the sliding-doors, jostling and joking with one another, all tall and straight, all handsome and intelligent.

"You should have seen the one I got yesterday," said one man, zipping up his chest-armor. "He was sitting in the Dog's-Skull—you know, that little place on the corner of Bremen and Gabrett—with a bowl of noodle-soup in front of him, tying the things together." The rest of the speaker's small group laughed uproariously. "When I asked him what he was doing, he said, 'I'm a noodle-knitter, stupid.' *He* called *me* stupid! A noodle-knitter!" He elbowed the Underclassman next to him in the ribs and they both roared with laughter.

Across the room, strapping his dicto-box to his chest one of the elder Underclassmen was studiously holding court.

"The worst ones are the psychos, gentlemen. I assure you, from six years service here, that they take every prize ever invented. They are destructive, confusing, and elaborate to record. I recall one who was stacking *juba*-fruits in a huge pyramid in front of the library on Hemmorth Court. I watched him for seven hours, then suddenly he leaped up, bellowing, kicked the whole thing over, threw himself through a shop-front, attacked a woman shopping in the store, and finally came to rest exhausted in the gutter. It was a twenty-eight minute record, and I assure you it stretched my ability to quick-dictate. If he had . . ."

Themus lost the train of the fellow's description. The talks were going on all over the common-room as the squad prepared to go out. His was one of three hundred such squads, all over the city, shifted every four hours of the thirty-two hour day so there was no section of the city left untended.

Few, if any, things escaped the notice of the Watcher Corps.

He pulled on his soft-soled jumpboots, buckled his dicto-box about him, and moved into the briefing-room for instructions.

The rows of seats were fast filling up, and Themus hurried down the aisle.

Furth, dressed in an off-duty suit of plastic body armor with elaborate scrollwork embossed on it, and the traditional black great-cape, was seated with legs neatly crossed at the front of the room, on a slightly raised podium.

Themus took a seat next to the Watcher named Elix, one who had been chortling over an escapade with a pretty female Crackpot. Themus found himself looking at the other as though he were a mirror image. *Odd how so many of us look alike,* he thought. Then he caught himself. It was a ridiculous thought, and an incorrect one, of course. It was not that they looked alike, it was merely that the Kyben had found for themselves a central line, a median, to which they conformed. It was so much more logical and rewarding that way. If your brother looks and acts as you do, you can predict him. If you can predict him, efficiency will follow.

Only these Crackpots defied prediction. Madmen!

"There are two current items on our orders of business today, gentlemen," Furth announced, rising.

Note pads and stylii appeared as though by magic, but Furth shook his head and indicated they were not needed.

"No, these aren't memoranda, gentlemen. The first is a problem of discipline. The second is an alert." There was a restless murmur in the room, and Themus glanced around to see uneasiness on many faces. What could it be?

"The problem of discipline is simply—" he pointed at Elix seated beside Themus, "—such of your Underclassmen as Watcher Elix."

Elix rose to attention.

"Pack your gear, Watcher Elix, you leave for Kyben-Central this afternoon."

Themus noted with fascination that the Watcher's face turned a shade paler.

"M-may I ask why, Superior Furth?" Elix gasped out, maintaining Corps protocol even through his panic.

"Yes, yes, of course," replied Furth in a casual, matter-of-fact manner. "You were on the scene of an orgy in the Hagars Building yesterday during second-shift, were you not?"

Elix swallowed with difficulty and nodded yes, then catching himself he said, "Yes, Superior Furth."

"How much of that orgy did you record?"

"As much as I could before it broke up, sir."

"What you mean is, as much as you could before you found that fondling a young woman named Guzbee was more interesting than your on-duty job. Correct?"

"She—she just *talked* to me for a short time, Superior; I recorded the entire affair. It was—"

"Out!" Furth pointed toward the door to the common-room.

Elix slumped visibly, turned out of the row, walked up the aisle, and out of the briefing-room.

"And let that be an indication, gentlemen, that we will tolerate no activities with these people, be they Kyben or not. We are here to watch, and there are enough female-Watchers and Central personnel so that any desires that may be aroused in you may be quenched without recourse to our wards. Is that quite clear, gentlemen?"

He did not wait for an answer. They knew it was clear, and he knew it was clear. The message had been transmitted in the most readily understood manner.

"Now to the other business at hand," continued Furth. "We are currently looking for a man named Boolbak, who, we are told, pinches steel. I have no explanation of this description, gentlemen, merely that he 'pinches steel.'

"I can tell you that he has a big, bushy white beard, what they call twinkling eyes, a puffy-cheeked face and a scar across his forehead from temple to temple. He weighs something between 190 and 200 pounds, fat and short, and always dresses in a red jacket and knickers with white fur on them.

"If you see this man, you are to follow him, dictograph him completely—*completely,* do you understand?—and not lose sight of him unless you are relieved by at least ten other Watchers. Is that clear?"

Again he did not wait for an answer, but snapped his fingers casually, indicating the daily briefing was over.

Themus rose with the other thirty-eight Watchers and began to leave the room. There was a uniform look on all their faces; they all had the picture of Elix behind their eyes. Themus began to edge out of his row. He started when Furth called to him.

"Oh, Watcher Themus, I'd like a word with you."

Furth was a strange man, in many ways. He did not fit Themus' picture of a Superior, from previous experience with them, and, still bewildered by the abrupt fate assigned Elix, he found himself looking on his Superior with a mixture of awe, incredulousness, hatred and fear.

"I hope the—uh—little lesson you saw today will not upset you. It was a harsh measure, to be sure, but it was the only way to get the point across."

Themus knew precisely what the Superior Watcher meant, for he had been taught from youth that this was the way matters should be handled. He also knew what he felt, but he was Kyben, and Kyben know their place.

Furth looked at him for a long moment, then pulled the black sheen that was his cloak closer about him. "I have you slated for big things here, Themus. We will have a post open for a new Junior Watcher in another six to eight months, and your record indicates you're a strong possibility."

Themus was shocked at the familiarity in both conversation protocol and exposition of Corps business, but he kept the astonishment from showing on his face.

"So I want you to keep an eye

open here in Valasah," continued Furth. "There are a number of—well—irregularities we want to put a stop to."

"What sort of irregularities, Superior?" The Superior's familiarities had caused a corresponding ease to settle over the Underclassman.

"For one, this fraternization—oh, strictly on an 'occupying troops' level, to be sure, but still a deviation from the norm—and another is that we've had a number of men leave the Corps."

"You mean sent home or—like Watcher Elix?"

The Superior squirmed visibly. "Well, no, not exactly. What I mean is, they've—you might say disappeared."

Themus eyes opened wider in surprise. "Disappeared? That indicates free choice."

The roles of Superior and Underclassman seemed for the moment to have been transposed, as Furth tried to explain to the new Watcher. "They've just gone. That's all. We can't find any trace of them. We suspect the Crackpots have been up to tricks more annoying than usual."

He suddenly stopped, realizing he had lowered himself by explaining to a lesser, and drew himself erect.

"But then, there's always been a certain percentage of loss here. Unusual, but not too unusual. This *is* a mad world, don't forget."

Themus nodded.

"But then, to compensate, there are a certain number of Crackpots who want to leave their insane people, also. We take off a good three hundred every year; people with the proper Kyben mind, the kind who can snap into a problem and solve it in no time. Good, logical thinkers. The administrative type. You know."

"I see, sir," said Themus, not at all understanding.

He was becoming more and more lost in trying to fathom his Superior.

The elder Watcher seemed to sense a change in the Underclassman's attitude, for once again he became brusque, realizing he had overstepped himself.

"Well, accurate snooping, to you. Good rounds!"

Themus snapped a brisk salute at the Superior and left quickly.

HIS BEAT that day was the Seventh Sector, a twelve-block coverage with five fellow Watchers, their rounds overlapping. It was a route from the docks to the minaret-village. From the stock-pens near the Golwal Institute to the pueblo-city.

Valasah, like all cities on Kyba, was a wild melange of disorder. Airy, fragile towers of transparent plastic rose spiraling next to squat quonset-buildings. Teepees hunkered down next to buildings, of multi-dimensional eccentricity, whose arms twisted in on themselves till the eye lost the track of their form.

Streets twisted and suddenly opened onto others. Many stopped dead as though their builders had tired of the effort of continuing.

Large empty lots stood next to stores in which customers fought to get at the merchandise.

The people strutted, capered, hobbled, marched and walked-backwards on both hands and feet through the streets, in the stores, across the tops of a hundred different styles of transportation.

Themus snapped his dicto-box on and spoke, "Record," into it. Then he walked slowly down one street, up the next, into an office building, through doors, past knots of people, dictating anything and everything. Occasionally he would see a fellow Watcher and they would exchange salutes, eyes never leaving their wards.

The Crackpots seemed oblivious to his presence. No conversation would slow or halt at his approach, no one would move from his path, all seemed to accept him somehow.

This bothered Themus.

Why aren't they angry at our eavesdropping? he wondered. *Why do they tolerate us so? Is it fear of the Kyben might? But they are Kyben, too. They call us stuffed-shirts, but they are still Kyben. Or were once. What happened to the Kyben might that was born into each of them?*

His thoughts were cut off by sight of an old woman, skin almost yellow-white from age, rapidly wielding a three-pronged pickaxe at the cement of a gutter. He stopped, began dictating, and watched as she broke through the street, pulling out huge gouts of cement-work and dirt from underneath. In a moment she was down on hands and knees, feverishly digging with her gnarled old hands at the dirt.

After thirty-nine minutes, her hands were raw and bleeding, the hole was quite four feet deep, and she kneeled in it, dirt arcing away into the air.

The fifty-minute mark brought her to a halt. She climbed laboriously out of the six-foot hole, grabbed the pickaxe and leaped back in. Themus moved nearer the edge. She was hacking away madly at a sewer pipe some three feet thick.

In a few moments she had driven a gaping hole in the side of the pipe. She reached into her bodice and brought out a piece of what looked like dirty oilcloth, strung with wires.

Themus was astounded to see both clean water and garbage running out of the pipe. Both were running together. No, they *looked* as though they were running together, but the flow of clean water came spurting out in one direction, while the muck and garbage sprayed forth from the opposite direction. They were running in opposite directions in the same pipe!

She clamped the oilcloth onto the pipe, immediately stopping the escape of the water and refuse, and began filling the hole in. Themus watched her till the hole was neatly packed in, only slightly lower than the street level. She had thrown dirt haphazardly in all directions, and some of it was still evident on car tops and in doorways.

His curiosity could be contained no longer.

He walked over to the old woman, who was slapping dirt off her polka-dotted dress, getting spots of blood on it, from her rawed hands. "Excuse me—" he began.

The old woman's face suddenly assumed, "Oh no, here they are again!" as its message in life.

"Garbage runs with the drinking water?" He asked the question tremulously, thinking of all the water he had drunk since his arrival, of the number of deaths from botulism and ptomaine poisoning, of the madness of these people.

The old woman muttered something that sounded like, "Cretinous stuffed-shirt," and began to pick up a bag of groceries obviously dumped in a hurry before the excavating began.

"Are there many deaths from this?" Themus asked, knowing it was a stupid question, knowing the figures must be staggering, wondering if he would be one of the statistics.

"Hmmph, man, they don't even bother up and back to flow that way in negative polarization of the garboh, let me way from this maniac!" And she stalked off, dirt dropping in small clots from her polka-dotted dress.

He shook his head several times, trying to clear it, but the buzzing of his brains trying to escape through his ears prevented any comfort. He communicated her passage out of his sight through the Communicator-Attachment, received the word she had been picked up by someone else, and started to make his rounds again.

He stopped in mid-stride. It dawned on him suddenly: why hadn't that bit of oilcloth been squirted out of the hole from the pressure in the pipe? What had held it on?

He felt his tongue begin to swell in his mouth, and he realized it had all been deceiving. There had been wires attached to that scrap of oilcloth, they had served some purpose. Undoubtedly that was it. Undoubtedly.

His fine Kyben mind pushed the problem aside.

He walked on, watching, recording.

With a sudden headache.

THE AFTERNOON netted a continuous running commentary on the ordinary mundane habits of the Crackpots (biting each other on the left earlobe, which seemed to be a common activity; removing tires from landcars and replacing them with wadded-up articles of clothing; munching loaves of the spiral Kyben bread on the streets; poking long sticks through a many-holed board, to no visible purpose), and several items that Themus considered off-beat even for these warped members of his race:

Item: a young man leaped from the seventeenth story of an office building, plummeted to the third, landed on an awning, and after bouncing six times, lowered himself off the canvas, through the window, into the arms of an attractive blonde girl holding a stenographic pad, who immediately threw the pad away and began kissing him.

He did not seem to be hurt by the fall or the abrupt landing. Themus was not sure whether they had been total strangers before the leap, but he did record a break in their amours when his Audio Pickup caught her panting, "What was the name?"

Item; a blind beggar approached him on the street, crying for alms, and when he reached into a pocket to give the fellow a coin, the beggar drew himself taller than Themus had thought he could, and spat directly onto Themus' jump-boots. "Not *that* coin, you clod, not *that* coin. The *other* one." Themus was amazed, for he had but two coins in his pocket and the one intended had been a silver half-kyle and the one the beggar seemed to want was a copper nark. The beggar became indignant at the delay and hurried away, carefully sidestepping a group of men who came hurrying out of an alley.

Item: Themus saw a woman in a televiz booth, rapidly erasing the wall. Viz numbers left there by a hundred occupants suddenly disappeared under the woman's active hands. When she had the walls completely bare she reached into a bag at her feet and brought out a tube of spray-paint.

In a few minutes the booth was re-painted a cheery pink, and was completely dry.

Then she began writing new numbers in. After an hour and a quarter, she left, and Themus did too.

Item: a young woman lowered herself by her legs from the sign above a bar-and-grill, swinging directly into Themus' path.

Even upside down she looked good to Themus. She was wearing a pretty print dress and lavender lace-undies. Themus averted his eyes and began to step around her.

"Hello," she said.

Themus stopped and found himself looking up at her, hanging by her knees from the big wooden sign that said, YOU CAN EAT HERE TOO!

She was a beautiful girl, indeed; bright blue hair, a fair golden complexion, high cheekbones, lovely legs, delightful—

He drew himself to attention, turning his eyes slightly away from her, "Watcher Themus at your service, Miss."

"I like you," she said.

"Ummm?" asked Themus, not quite believing he had heard her correctly.

"Do I stutter?"

"Oh—*no*—certainly *not!*"

"Then you heard what I said."

"Well, yes, I suppose I did."

"Then why ask me to repeat it?"

"Because — because — you just *don't* come down that way and tell someone you like them. It isn't—it isn't—well, it isn't—it just isn't *ladylike!*"

She did a double-flip in the air and came down lightly on the balls of her feet, directly in front of the Watcher. "Oh, swizzlegup! It's ladylike if I want to do it. If you can't tell I'm a lady just from looking at me, then I'd better find someone who can tell the difference between the sexes."

Themus found himself quite enthralled. Somehow she was not like

the rest of the mad inhabitants of this world. She talked logically—although a bit more forwardly than what he had become accustomed to—and she was certainly delightful to look at. He began to ask her name, when a clear, bright picture of the damned Elix came to him. He turned to leave.

She grabbed him roughly by the sleeve, her fingernails tinkling on his armor.

"Wait a minute, where are you going? I'm not finished talking to you."

"I can't talk to you. The Superior doesn't approve." He nervously ran a hand across the bridge of his nose, while looking up and down the street for brother Watchers.

"Oh, urbbledooz! Him!" She giggled, "He doesn't like anything, that's his job. *If you have a job to do, do it, you understand?"* She mimicked Furth's voice faithfully, and Themus grinned in spite of himself. She seized on his gesture of pleasure and continued, hurriedly, "I'm nineteen. My name is Darfla. What's yours, Themus?"

"I've got to go. I'll be sent to the Mines. This isn't part of my job. I've got to Watch, don't you under—"

"Oh, all right! If I make it part of your stupid stuffed-shirt job will you talk to me?" She drew him into a wide, shadowed doorway with much difficulty.

"Well, I don't know how you can make it a part of my—" He looked about him in apprehension. Could he be court-martialed just for talking? Was he doomed already?

She cut in, "You're looking for a man named Boolbak, aren't you?"

"How did you—"

"Are you are you are you are you are you are you are you are you are?"

"Yes, *yes,* stop that! I don't know how you found out, but yes, we are, why?" Oddly, he found himself slipping into the running-away speech of these people, and it was both pleasing and distressing. He was somehow afraid he might be going native. *But in less than two days?*

"He's my uncle. Would you like to meet him?"

"Record!" Themus barked at his dicto-box.

"Oh, *must* you?" Darfla looked toward the twin suns and crossed her arms in exasperation.

Themus' brow furrowed and he reluctantly muttered, "Off," into the box. "I'm a Watcher, and that's what I'm supposed to do. Watch. But if I don't record it all, then they can't send it to Kyben-Central and there won't be any tapes for me, and I'll get sent to the Mines." He stopped, then added, with a finger stiffly pointed between her eyebrows, "And that may not bother *you,* but I've seen reels of the Mines and crawling through a bore-shaft not much wider than your body dragging an ore-sack tied to your leg, and the chance that sterility won't have time to hit before your face just ups and falls off, well, it sort of makes me worry."

He looked at her, surprised. She was tinkling. Her laughter was actually a tinkle, falling lightly from her and pleasantly tingling his ears. "What are you laughing at?" he

frowned, trying to be angry though her laughter made him feel lighter than he had since he'd hit this madball world.

"Your face *ups* and *falls off!*" She laughed again. "That's the kind of thing you stuffed-shirts would expect *me* to say! Beautiful! Yes, I'm sure I like you."

The underclass Watcher was confused. He looked about in confusion, feeling distinctly as though he had come in during the middle of a conversation. "I—I'd better be going. I don't think I want to meet your—"

"All right, all right. Suppose I fix your stupid box so it keeps right on recording; recording things that are happening, in your voice, without your being here, then would you leave it and come with me?"

"Are you out of your mind?" he yelled in a hushed tone.

"Certainly," she said, smiling broadly.

He turned once more to leave, angry and annoyed at her making fun of him. Again she stopped him.

No, I'm sorry. Please, I can do it. Honestly. Here, let me have it."

"Look, I *can't* give you my dicto-box. That's about the most terrible thing a Watcher can do. I'd be—I'd be—they'd hang me, shoot me, starve me, kill me, then send the ashes of my cremated stump to our Mines to be used for feeding the slave-apes. Leave me alone!" The last was a rising note, for the girl had lifted her skirt and drawn a curved knife from her garter-belt and was determinedly prying off the top of the dicto-box, still attached to Themus' chest.

The Watcher fought down a mad impulse to ask her why she was wearing a garter-belt when she wasn't wearing hose, and tried to stop her.

"Wait! Wait! They'll throw me out of the Corps. Stop! Here, let go there, wait a minute, I say wait-aminuteforgod'sake, if you won't stop, at least let me take it off so you don't slice my throat. Here."

He slipped the shoulder-straps off and unbuckled the belt. The dicto-box fell into the girl's hand and she set to work fumbling about in the machine's intricate innards.

Finally she stood up, her feet lost in a pile of wire-spools, vacuum tubes, metal separators, punch-circuits and plastic coils. The box looked empty inside, except for a strangely flotsam-like construction in one corner.

"Look what you've done now!"

"Stop whining, man! It's all right."

"If it's all right, make it record and play back for me." He was terrified, indignant, furious and interested, all at once."

"I can't."

"Whaaaaaaat!"

"Why should I? I'm crazy, remember?"

Themus felt his face turn to lava. "Damn you! Look what you've done to me! In five minutes you've taken me from my Corps and sentenced me to a life that may be no longer than all the brains you have, stretched end to end!"

"Oh, stop being so melodramatic." She was smiling, tinkling again. "Now you can come with

me to meet my Uncle. There's no reason why you should stay here. There is a chance the box will play, if you come back to it later, as I said it would. But even if it doesn't, staying here is no help, since it isn't functioning. I'll get a mechanic to fix it, if that will make you any happier."

"No Crackpot mechanic can fix that, you fool! It's a masterpiece of Kyben science. It took hundreds of men thousands of hours to arrive at this— Oh, what's the use!" He sat down in the doorway, head in his hands.

Somehow, her logic was sound. If the box was broken, there was no reason for his refusing to go with her, for staying there could only bring him trouble sooner. It was sound, yes, but only sound on the muggy foundation of her ruining the machine in the first place. He was beginning to feel like a *tompora*-snake—the kind that swallows its own tail. He didn't know which end was which.

"Come with me." Her voice had suddenly lost its youthful happiness. It was suddenly strong, commanding. He looked up.

"Get on your feet!"

He arose slowly.

"Now, come with me. If you want to come back to your box, it will be here, and it will work. Right now it will do as well if you believe I'm mad and ruined your dicto-box." She jerked her head sharply toward the street. "Come on. Perhaps you can reinstate yourself by finding the man named Boolbak."

It was hopeless there among the remnants of the dicto-box. There was a chance the girl wasn't as totally insane as she seemed and she actually might be Boolbak's niece. And, somehow, against all his better, stricter, reasoning to the contrary, her logic was queerly sound. In a fugitive sort of way.

He went with her.

(Wondering if he was insane, himself.)

THEMUS FOLLOWED the girl through sections of the city Superior Furth had missed during his guided tour of inspection. They passed under a beautifully filigreed arch into a gardened street lined with monstrous blossoms growing to heights of eight and nine feet on either side of the road, casting twin shadows from the bright suns above.

Once he stopped her, in the shadows of a towering flower, and asked, "Why did you decide you wanted me to meet your Uncle?"

"I've been watching you all day," she said simply, as if prepared to leave that as a total explanation.

"But why me?"

"I like you," she said, as though being purposely repetitious to impress him. Themus distinctly got the idea she was treating him as she would a very young child.

"Oh. I see," he said, more baffled than before. They continued down the street through an area covered by long, low structures that might have been factories were it not for the impossibly tall and spindly-looking towers that reared from the roof of each one. Themus shaded his eyes from the glare of the

twin suns as he sought to glimpse what was at the top of each tower. He could see nothing.

"What are those?" he asked. He was surprised to hear his own voice. It sounded like that of an inquisitive little boy.

"Quiet, you."

That was the last thing Darfla said till they came out of nowhere and grabbed her and Themus.

Before the Watcher knew what was happening, a horde, more men than he could count, had surrounded them. They were dressed in everything from loincloth and top hat to burnoose and riding boots. Darfla gave one sharp, tiny squeal and then let her hands fall limply to her sides.

"All right, you want your say, so say!" Anger and annoyance fluttered in her voice.

A short, pock-faced man wearing a suit that appeared to be made from ropes of different colors stepped forward.

"We thought negative (click-click!) and wanted to talk on this at Cave (click-click!)." Themus listened with growing amazement. Not only did the man intersperse every few words with a metallic, unnerving tongue-clacking, but he said the word "Cave" with a low, mysterious, important tone totally unlike the rest of his speech which was quite flat and uninflected.

Darfla raised her hands, palms upward, in resignation. "What can I say, Deere, after I say I'm sorry?"

The man addressed as Deere shook his head and said, "(Click-click!) we before talked and him not now *never never never!* Nothing to say against the (Click!) but he's def but def a stuffed one at least well now for a time (Click!). Cave." Same clucking, same cryptic tone when speaking of the Cave. Themus began to worry in direct proportion to the number of surrounders.

"Let's go," Darfla said over her shoulder to Themus, not taking her eyes from Deere.

"W-where?" trembled Themus.

"Cave. Where else?"

"Oh, nowhere—I guess." He tried to be light-hearted about it. Somehow, he failed miserably.

They started off, the surrounders doing a masterful job of surrounding; cutting Themus and the girl off from anyone who might be looking. They were a walking camouflage.

Darfla began to needle Deere with caustic, and to Themus, cryptic remarks. Deere looked about to turn and put his pudgy fist in her face, and Themus nudged the girl to stop.

"Woof woof a goldfish," she tossed off as a final insult.

"(Click!)" answered Deere, sticking his tongue out.

It was a huge, featureless block in the midst of completely empty ground. Something about it suggested that it was an edifice of total disinterest. Themus recalled buildings he had seen in his youth that had been vaguely like this one. Buildings he would make a point of not bothering to enter, so uninteresting were they.

Inside it was a cave.

Stalactites hung down from the ceiling in wedge-shaped rockiness. Stalagmites pushed their way up from the floor, spiking the stone underfoot. A mud collar surrounded a small pool in which clear water rippled. The walls were hewn out of rock, the floor was sand-covered stone.

They could have been five miles underground. It was another world.

It was crammed with Crackpots.

Themus walked between two huge men wearing fezzes and sword-belts, behind the clicking Deere and next to Darfla, who looked uneasy. Themus felt more than merely uneasy. He was terrified.

"Deere!"

It was Darfla. She had stopped, was being pushed unwillingly by the weight of people moving behind her. "I want this talked out right now. Here. Now. Here. Now. Here. Now—"

"Don't (Click!) try that here, Darfla. We have ours, too, you know (Click-click!)."

"All right. Straight, then."

"Were you taking him to see Boolbak?"

"Yes why?"

"You know your Uncle isn't reliable. He could say anything, Darfla. We have no fear, really, but why tempt the Chances." He pursed his pudgy lips and said, "We'll have to re-condition your Watcher, girl. I'm sorry." There was a murmur from the large, restless crowd.

Themus did not know what reconditioning was, nor what the whole conversation had been about, nor who these people were, but he recognized the Watcher part, and the fact that something unpleasant was about to happen to him.

He looked around for a way out, but there was none. He was effectively manacled by the sheer weight of numbers. The Cave was filled, and the walls were lined with people. All they had to do was move in and he'd be squashed.

He remained very still, turned his inward eyes upward and ran painstakingly over the list of his family Lords, offering up to each of them paens of praise and pleas for help and deliverance.

"No, no!" Darfla was pleading, "He's not really. He's a Kyben. I wouldn't have been able to stand him, would I, if he were a real Stuff?"

Deere bit the inside of his cheek in thought. "We thought so, too, when we got the list, but since he's been here, it's been too early to tell, and now you've let him too close to it all. We don't like this, Darfla, but—"

"Test him. He'll show you." She was suddenly close to Deere, his hand in hers, her face turned down to the fat little man's pudgy stare. "Please, Deere. For what Uncle used to be."

Deere exhaled fully, pursed his lips again and said, "All right, Darfla. If the others say it's all right. It's not my decision to make."

He looked around. There was a mutter of assent from the throng. Deere turned to Themus, looking at the Watcher appraisingly.

Then suddenly—

"Here it is: we're mad. You must prove to us *you* are mad. You must do—oh, let's see—five mad acts. Truly mad. Right here in the Cave. You can do anything but harm one of us or try to escape. And we're mad, so we'll know if they're mad acts or not. Now, go on."

"Tell him the rest, Deere, tell him—" Darfla began.

"Quiet, woman! That's all there is, Watcher. Go on." He stood back, arms folded across his round little belly.

"Mad? What kind of madness? I mean, like what? I don't . . . I can't do any . . ." Themus looked at Darfla. Something unhinged within him at sight of her, about to cry.

He thought for a while. The crowd became impatient, voices called out things from the pack. He thought longer. Then his face smiled all the way from his mouth to his hairline.

Calmly he walked over to Darfla and began undressing her.

The clack of jaws falling was an audible thing in the sudden silence of the Cave.

Themus stripped her piece by piece, carefully knotting and pulling each piece of clothing before he went on to the next. Blouse. Knot and pull tight. Belt. Knot and pull tight. Skirt. Knot and pull tight.

Darfla offered no resistance, but her face went stoney and her jaw muscles worked rhythmically.

Eventually she was naked to the skin.

Themus bent down, made sure each item of clothing was securely knotted. Then he gathered it all up in a bundle and brought the armful to the girl. She put out her arms and he dropped the bundle into them.

"Knots to you," he said.

"One," said Deere.

Themus could feel small generators in his head begin to spin, whirr and grind as they worked themselves up to a monstrous headache.

He stood spraddle-legged in the open area among the Crackpots, a tall-blue-haired man with a nose just a trifle too long and cheeks just a trifle too sunken, and rubbed his a-trifle-too-long nose in deep concentration.

Again he smiled.

Then he spun three times on his toes, badly, and made a wild dash for one of the onlookers.

The Crackpot looked around in alarm, saw his neighbors smiling at his discomfort, and looked back at Themus, who had stopped directly in front of him.

The Crackpot wore a shirt and slacks of motley, a flat mortarboard-type hat askew over his forehead. The mortar-board slipped a fraction of an inch as he looked at Themus.

The Watcher stood before him, intently staring at his own hand. Themus was clutching his left elbow with his right hand. His left hand was extended, the fingers bent up like spikes, to form a rough sort of enclosure.

"See my guggle-fish?" asked Themus.

The Crackpot opened his mouth

once, strangled a bit, closed his mouth, strangled a bit, opened his mouth again. Nothing came out.

Themus extended his hand directly under the other's nose. It was obviously a bowl he was holding in his hand. "See my guggle-fish?" he repeated.

Confused, the Crackpot managed to say, "W-*what* g-guggle-fish? I don't see any fish."

"That isn't odd," said Themus, grinning, "they all died last week."

Over the roar of the crowd the voice of a blocky-faced man next to the motley-wearer rose:

"I see your guggle-fish. Right there in the bowl. *I* see them. Now what?"

"You're crazier than I am," said Themus, letting the mythical bowl evaporate as he opened his hand, "I don't have any bowl."

"Two, said Deere, his brow furrowed.

Without wasting a moment, Themus began shoving the Crackpots toward the wall. Without resistance they allowed themselves to be pushed a bit. Then they stopped.

"For this one I'll need everyone's help," said Themus. "Everybody has to line up. I need everyone in a straight line, a real straight line." He began shoving again. This time they all allowed themselves to be pushed into a semblance of order, a line straight across the Cave.

"No, no," muttered Themus slowly, "that isn't quite good enough. Here." He went to one end, began moving each Crackpot a bit forward or backward till they were all approximately in the same positions of the line.

He went to the right end and squinted down the line.

"You there, fourth from the end, move back a half-step, will you. Uh, yes, that's—just—*stop!* Fine. Now you," he pointed to a fellow with yellow bagged-out trousers and no shirt, "move up just a smidgee-un-uh-nuh! *Stop!* That's just perfect."

He stepped back away from them and looked along both ways, surveying them as a general surveys his troops.

"You're all nicely in line. All the same. The Crackpots are neatly maneuvered into being regimented Stuffed-Shirts. Thank you," he said, grinning widely.

"Three," said Deere, blushing and furrowed at the same time.

Themus was pacing back and forth by the time the crowd had hurriedly and self-consciously gotten itself out of rank and clumped around the Cave again.

He paced from one huge stalagmite, kicking it on turning, to the edge of the mud-surrounded pool and began scrabbling in the mud at his feet.

He scooped up two huge handfuls of the runny stuff and carried it a few feet away to a rock surface. Plunking it down he hurried back for another handful. This he carried with wild abandon, spraying those near him with drops of the gunk, till he was back where he had deposited the previous load. Then he stopped, considered for a long moment, then placed the mud gingerly atop the other, at an angle.

Then he hurried back for more.

This he again placed with careful deliberation, tongue poking from a corner of his mouth, eyes narrowed in contemplation.

Then another load.

And another.

Each one placed with more care than the last, till he had a huge structure over four feet tall.

He stepped back from it, looked at it, raised his thumb and squinted at it through one eye. Then he raced back to the deep hole that had been gouged out of the mud and took a fingerful of the stuff.

He ran back, patted it carefully into place, smoothed it with an experienced hand, and stepped back, with a sigh and a look of utter contentment and achievement.

"Ah! Just the way I wanted it," he said . . .

. . . and jumped into the hole.

"Four," said Deere, tears of laughter streaming down his cheeks.

Themus sat in the hole, legs drawn up and crossed, hands cupping his chin, elbows on knees. He sat.

And sat longer.

And still sat.

And remained seated.

Deere walked over to him and looked down. "What is the fifth act of madness?"

"There isn't any."

Deere looked away, and began to turn, as though satisfied with the Watcher's answer. More quickly than anyone could follow, he had swivelled back and his head had revolved on his head in a blur, *"There isn't any?"*

"I'm going to sit here and not do any more."

The crowd murmured again. "What?" cried Deere. "What do you mean, you won't do any more? We set you five. You've only done four. Why no fifth?"

"Because if I don't do a fifth, you'll kill me, and I think that's mad enough even for you."

Though Deere's back was turned and he was walking away, Themus was certain he heard, "Five," from somewhere.

"THEY WANT you to come back here again after you've seen my Uncle," said Darfla, a definite chill in her voice.

They were walking briskly down a moving traverseway, the girl a few steps ahead of the Watcher.

Themus knew he had a small problem on his hands.

"Look, Darfla, I'm sorry about that back there, but it was my life or a little embarrassment for you. It was the first thing I could bring to mind, and I had to stall for time. I'm *really* sorry, but I'm sure they've seen a woman naked before, and you must have been naked before a man before so it shouldn't—"

Themus fell silent. They continued down the traverseway, Darfla striding forward, anger evident in each long step.

Finally the girl came to an intersection of belt-strips and agilely swung across till she was on the slowest moving outer belt. She stepped off, took several rapid steps to lose momentum, and turned to Themus.

"We'd better stop in here for a moment and get you something to

wear over that Watcher uniform. It isn't hard to avoid the Stuffed-Shirts," she said, looking at him with disparagement, "but there's no sense taking foolish chances."

She indicated a small shop that was all window and no door, with a hastily-painted message across one of the panes. ELGIS THE COSTUMER and IF WE DON'T GOT IT, IT AIN'T WORTH HAVING! They entered through a cleverly-designed window that spun on a center-pin.

Inside the shop Darfla spoke briefly to a tall, thin Crackpot in black half-mask and body-tight black suit. He disappeared down a shaft in the floor from which stuck a shining pole.

The girl pulled a bolt of cloth off a corner of the counter and perched herself, with trim legs crossed. Themus stood looking at the shop.

It was a costumer's all right, and with an arrangement and selection of fantastic capacities. Clothing ranged from rustic Kyben farm-garb to the latest spun plastene fibers from all over the Galaxy. He was marvelling at the endless varieties of clothing when the tall, thin Crackpot slid back up the pole.

He stepped off onto the floor, much to Themus' amazement, and no elevator-disc followed him. It appeared that the man had come up the pole the same way he had gone down, without mechanical assistance. Themus was long past worrying over such apparent inconsistencies. He shrugged and looked at the suit the fellow had brought up with him.

Ten minutes later he looked at the suit on himself, in a full-length mirror-cube, and smiled at his sudden change from Underclass Watcher Themus to a sheeted and fetish-festooned member of the Toad-Revelers cult found on Fewbhuh IV.

His earrings hung in shining loops to his shoulders, and the bag of toad-shavings on his belt felt heavier than he thought it should. He pulled the drawstrings on the bag and gasped. They *were* toad-shavings. He tucked the bottom folds of the multi-colored sheet into his boot-tops, swung the lantern onto his back, and looked at Darfla in expectation.

He caught her grinning, and when he, too, smiled, her face went back to its recent stoniness.

Darfla made some kind of arrangement with Elgis, shook his hand, bit his ear, said, "How are the twins, Elgis?" to which the costumer replied, "Eh!" in a lack-adaisical tone, and they left.

The rest of the trip through the patchwork-quilt of Valasah was spent in silence.

The Crackpots were not what they seemed. Of that Themus was certain. He had been very stupid not to notice it before, and he thought the Watchers must be even more stupid for not having seen it in all their hundreds of years on Kyba.

But there was a factor he did not possess. Garbage and water that ran in different directions through the same pipe, a beggar that knew how many coins he had in his pocket, a girl who could rip

out the innards of a dicto-box, leaving it so it would work—and somehow he was now certain it *would* work—without a human behind it, and a full-sized cave built inside a concrete block. These were not the achievements of madmen.

But they *were* mad!

They had to be. All the things which seemed mysterious and superhuman were offset by a million acts of out-and-out insanity. They lived in a world of no standardization, no conformity at all. There was no way to gauge the way these people would act, as you could with the Kyben of the stars. It was—it was —well, *insane!*

Themus' nose itched in confusion, but he refrained from unseemly scratching.

"Don't I look like Santa Claus?" he said.

"Who?" asked Themus, looking at the roly-poly florid face and bushy beard. He tried to ignore the jaggedly yellow scar that reached from temple to temple.

"Santa Claus, Santa Claus, you lout! Haven't you ever heard of the Earthmen's mythical hero, Santa Claus? He was the hero of the Battle of the Alamo, he discovered what they call The Great Pyramid of Gizeh, he was the greatest drinker of milk out of wooden shoes that planet ever knew!"

"What's milk?" asked Themus.

"Lords, what a clod!" He screwed up his lips in a childish pout. "I did immense research work on the subject. Immense!" Then he muttered, under his breath, almost as an afterthought, "Immense."

The old man was frightened. It showed, even through the joviality of his garb and appearance.

Themus could not understand the old man. He looked as though he would be quite the maddest of the lot, but he talked in a soft, almost whispering voice, lucidly, and for the most part of familiar things. Yet there was something about him which set him apart from the other Crackpots. He did not have the wild-eyed look.

No one was saying anything and the sounds of their breathing in the basement hideout was loud in Themus' ears. "Are you Boolbak, the steel-pincher?" the Watcher asked, to make conversation. It seemed like the thing to say.

The bearded oldster shifted his position on the coal pile on which he was sitting, blackening his beard, covering his red suit with dust. His voice changed from a whisper to a shrill. "A spy! A spy! They've come after me! You'll do it to me! You'll bend it! Get away from me, get away from me, gedda way from me, geddawayfromee!" The old man was peering out from over the top of the pile, pointing a shaking finger at Themus.

"Uncle Boolbak!" Darfla's brows drew down and she clapped her hands together. The old man stopped shouting and looked at her.

"What?" he asked, pouting childishly.

"He's no spy, whatever he is," she said, casting a definitely contemptuous glance at Themus. "He was a Watcher alerted to find you. I liked him," she said looking toward the ceiling to find salvation

for such a foul deed, "and I thought that it was about time you stopped this nonsense of yours and spoke to one of them. So I brought him here."

"Nonsense? Nonsense, is it! Well, you've sealed my doom, girl! Now they'll bend it around your poor Uncle's head as sure as Koobis and Poorah rise every morning. Oh, what have you done?"

The girl shook her head sadly, "Oh, stop it, will you. No one wants to hurt you. Show him your steel-pinching."

"No!" he answered, pouting again.

Themus watched in amazement. The man was senile. He was a tottering, doddering child. Of what possible use could he be? Of what possible *interest* could he be to both the Watchers and the Crackpots, who had tried to stop Darfla's bringing him here?

Suddenly the old man smiled secretly and moved in closer, sidling up to the Watcher as though he had a treasure everyone was after. He made small motions with his pudgy fingers, indicating he wanted Themus' attention, his patience, his silence, and his ear, in that order. It was a most eloquent motioning, and Themus found he was complying, though no vocal request had been made. He bent closer.

Uncle Boolbak dug into a pocket of the red coal-coated jacket, and fished out a cane-shaped, striped piece of candy. "Want a piece of candy? Huh, want it, huh?"

Themus felt an urge to bolt and run, but he summoned all his dignity and said, "I'm Themus, Underclass Watcher, and I was told you—pinch steel. Is that right?"

For a moment the old man looked unhappy that the Watcher did not want any candy, then suddenly his face hardened. The eyes lost their twinkle and looked like two cold diamonds blazing at him. Boolbak's voice, too, became harder, more mature, actually older. "Yes, that's right, I 'pinch' steel, as you put it. You wonder what that means, eh?"

Themus found himself unable to talk. The man's whole demeanor had changed. The Watcher suddenly felt like a child before a great intellect. He could only nod.

"Here. Let me show you. The old man went behind the furnace and brought out two plates of steel. From a workbench along one wall he took a metal punch and double-headed hammer. He threw down one of the plates, and handed Themus the punch and hammer.

"Put a hole in this with that punch," he said, motioning Themus toward the other plate, which he had laid flat on the workbench.

Themus hesitated. "Come, come, boy. Don't dawdle."

The Watcher stepped to the workbench, set the punch on the plate and tapped lightly till he had a hole started. Then he placed the punch in it again and brought the hammer down on its head with two swift strokes. The clangs rang loud in the dim basement. The punch sank through the plate and went a quarter-inch into the table. "I didn't hit it very hard," Themus explained, looking over his shoulder at "Santa Claus."

"That's all right. It's very soft steel. Too many impurities. Kyben spacecraft are made of a steel which isn't too much better than this, though they back it with strong reinforcers. Now watch."

He took the plate in his hand, holding it between thumb and forefinger at one corner, letting it hang down. With the other hand he pinched it at the opposite corner, pressing thumb and forefinger together tightly.

The plate crumbled to dust, drifting down over the old man's pinching hand in a bright stream.

Themus' mouth opened of its own accord, his chest tightened. Such a thing wasn't possible. The old man was a magician.

The dust glowed up at him from the floor. It was slightly luminous. He goggled, unable to help himself.

"Now," said Boolbak, taking the other plate. "Put a hole in this one."

Themus found he was unable to lift the hammer. His hands refused to obey. One did not see such things and remain untouched.

"Snap out of it, boy! Come on, punch!" The old man's voice was commanding; Themus broke his trance.

He placed the punch on the second plate and in three heavy blows had gone through it and into the table again.

"Fine, fine," said Uncle Boolbak, holding the second plate as he had the first. He pinched it, with a slight revolving movement of the fingers.

The steel seemed to change. It stayed rigid in shape, but the planes of it darkened, ran together. It was a flat piece of metal, but suddenly it seemed to have depths, other surfaces.

Boolbak held it out to Themus, "Put another hole in it."

Themus took it, wonderingly, and laid it down on the workbench. It seemed heavier than before. He brought the hammer down sharply, three times.

The metal was unmarred.

He set the punch and hammered again, harder, half a dozen times. He took the punch away. Its' point was dulled, the punch shank was slightly bowed. The metal was unscarred.

"It's—it's—" he began, his tongue abruptly becoming a wad of cotton-batting in his mouth.

Boolbak nodded, "It's changed, yes. It is now harder than any steel ever made. It can withstand heat or cold that would either melt to paste or shatter to splinters any other metal. It is impregnable. It is the ideal war-metal. With it an army is invincible. It is the closest thing to an ultimate weapon ever devised, for it is unstoppable.

"A tank composed of this metal would be a fearsome juggernaught. A spaceship of it could pierce the corona of a sun. A soldier wearing body-armor of it would be a superman." He stood back, his lips a thin line, letting Themus look dumfoundedly at the plate he held.

"But how do you—how can you —it's impossible! How can you make this? What have you done to it?" Themus felt the room swirl around him, but that defied the

laws of the universe.

"Sit down, boy, I want to talk to you. I want to tell you some things." He put one arm around Themus' shoulders, leading him to a flight of stairs, to sit down.

Themus looked at Darfla. She was biting her lip. Was this the talk the Crackpots did not want him to have with Uncle Boolbak?

Themus sensed: this is it. This is an answer. Perhaps not *the* answer to all that troubled him, but it was, unquestionably, *an* answer.

Suddenly he didn't want to know. He was afraid; terribly afraid. He stammered, "Do-do you think you should? I'm a Watcher, you know, and I don't want to—"

The old man cut him off with a wave of his hand, and pushed him down firmly.

"You think you're watching us, don't you?" began Boolbak. "I mean, you think the Watchers Corps was assigned here to keep an eye on all the loonies, don't you? To keep the black sheep in the asylum so the star-flung Kyben don't lose face or esteem in the Galaxy, isn't that it?"

Themus nodded, reluctantly, not wanting to insult the old man.

Boolbak laughed. "Fool! We *want* you here. Do you think for a moment we'd allow you blundering, pompous snoopers around if we didn't have a use for you?"

"Let me tell you a story," the old man went on. "Hundreds of years ago, before what you blissfully call the Kyben Explosion into space, both Crackpots and Stuffed-Shirts lived here, though they weren't divided that way, back then. The Stuffed-Shirts were the administrators, the implements of keeping everything neatly filed, and everyone in line. That type seems to gravitate toward positions of influence and power.

"The Crackpots were the nonconformists. They were the ones who kept coming up with the new ideas. They were the ones who painted the great works of art. They were the ones who composed the most memorable music. They were the ones who overflowed the lunatic asylums. They thought up the great ideas, true, but they were a thorn in the side of the Stuffs, because they couldn't be predicted. They kept running off in all directions at once. They were a regimental problem. So the Stuffs tried to keep them in line, gave them tedious little chores to do, compartmentalized them in thought, in habits, in attitudes. The non-cons snapped. There is no record of it, but there was almost a war on this planet that would have wiped out every Kyben—of both breeds—to the last man."

He rubbed a hand across his eyes, as if to wipe away unpleasant images.

Themus and Darfla listened, intently, their eyes fastened to those of the old man in his ridiculous costume. Themus knew Darfla must have heard the story before, but still she strained to catch every sound Boolbak made.

"Luckily, the cooler heads won. An alternate solution was presented, and carried out. You've always thought the Kyben left their misfits, the Crackpots, behind. That we

were left here because we weren't good enough, that we would disgrace our hard-headed pioneers before the other races, isn't that the story you've always heard? That we are the black sheep of the Kyben?"

He laughed, shaking his head.

"Fools! We threw you out! We didn't want you tripping all over our heels, annoying us. We weren't left behind—*you* were thrown away!"

Themus' breath caught in his throat. It was true. He knew it was true. He had no doubts. It was so. In the short space of a few seconds the whole structure of his life had been inverted. He was no longer a member of the elite corps of the elite race of the universe; he was a clod, an unwanted superfluousity, a tin soldier, a carbon-copy.

He started to say something, but Boolbak cut him off. "We have nothing against ruling the Galaxy. We like the idea, in fact. Makes things nice when we want something unusual and it takes influence to get it quickly. But why should we bother doing the work when we can pull a string or two and one of you armor-plated puppets will perform the menial tasks.

"Certainly we allow you to rule the Galaxy. It keeps you out of trouble, and out of our hair. You rule the Galaxy, but *we* rule *you!*"

Thunder rolled endlessly through the Watcher's head. He was being bombarded with lightning, and he was certain any moment he would rip apart. It was too much, all too suddenly.

Boolbak was still talking: "We keep the Watcher Corps on other worlds both for spying purposes and as a cover-up. So we can have a Watcher Corps here on Kyba without attracting any attention to ourselves. A few hundred of you aren't that much bother, and its ridiculously easy to avoid you when we wish to. Better than a whole planet of you insufferable bores."

He stopped again, and pointed a pudgy finger at Themus' chest armor.

"We established the Watcher Corps as a liason between us, when we had innovations, new methods, concepts ready for use, and you, with your graspy little hands always ready to accept what the 'lunatics back home' had come up with.

"Usually the ideas were put into practice and you never knew they originated here.

"We made sure the Watchers basic motto was to watch, watch, watch whatever we did, to save ourselves the trouble of getting the information back where it would do the most good, undistorted—and believe me, if we didn't want you to see something, it wasn't hard to hide it from you; you're really quite simple and stupid animals—so when we had a new invention or concept, all we had to do was walk into a public square and demonstrate it for you. *Pegulla,* see—*pegulla,* do."

Themus mused aloud, interrupting the old man, "But what does, well, stacking *juba*-fruits in the square demonstrate?"

"We wouldn't expect your simple-celled minds to grasp something like that immediately," answered Boolbak. "But I happen to know

Shella, who did that, and I know what he was demonstrating. He was illustrating a new system of library filing, twice as efficient as the old one.

"He knew it would be dictated, sent back to Kyben-Central and finally understood for what it was. We give you enough clues. If something seems strange, think about it a while, and a logical use and explanation will appear. Unfortunately, that is the one faculty the Star-Flung Kyben are incapable of using. Their minds are patterned, their thoughts set in tracks." The laugh was a barb this time.

"But why are you all so—so—*mad?*" Themus asked, a quavering note in his voice.

"Beginning to crack, boy? I'll tell you why we're *mad,* as you put it. We're not mad, we're just doing what we want, when we want, the way we want. You rigid-thinkers can't recognize the healthy sanity of that. You think everyone has to wear a standardized set of clothes, go to his dentist a specified number of times, worship in delineated forms, marry a specified type of mate. In other words, live his life in a mold.

"The only way to stimulate true creativeness is to allow it to grow unchained with restrictions. We're not mad at all. We may put on a bit, just to cover from you boobs, but we're saner than you. Can you change the molecular structure of a piece of steel, just by touching it at a juncture of atom-chains?"

"Is that—that—how you did it?" Themus asked.

"Yes. How far could I have gotten on a thing of this kind if I'd grown up in a culture like the one you've always known?

"For every mad thing you see on this world, there is a logical, sane answer."

Themus felt his knees shaking. This was all too much to be taken at one sitting. The very fiber of his universe was being unwound and split down the grain.

He looked at Darfla for the first time in what seemed an eternity, and found it impossible to tell what she was thinking.

"But why haven't you shown this steel-pinching to the Watchers, if you want them to know all the new concepts?" the incredulous Themus questioned.

Boolbak's face suddenly went slack. The eyes became glassy and twinkly again. His face became flushed. He clapped his hands together childishly. "Oh, no! I don't want that!"

"But why?" demanded Themus.

Again the old man's face changed. This time abject terror shone out. He began to sweat. "They're gonna chase me, and bend a bar of iron around my head."

He leaped up and ran in a flurry back to the coal pile, where he burrowed into the black dust and peered out, trembling.

"But that's crazy! No one wants to bend a bar of iron around your head. Only a maniac would keep a secret like that because of a crazy reason like that!"

"Exactly," came Darfla's voice from behind him, sadly, "that's just it. Uncle *is* crazy."

THEY HAD wanted to see Themus after his talk with Uncle Boolbak, and though Darfla had taken pains to cover their tracks, a group of Crackpots were waiting outside the house when they emerged.

Themus was white and shaking, and made no movement of resistance as they were hustled into a low-slung bubble-roadster and whisked back to the Cave.

"Well, did he talk to that mad genius?" asked Deere.

Darfla nodded sullenly. "Just as you said. He knows."

Deere turned to Themus. "Not quite all however. Do you think you can take more, Watcher?"

Themus felt distinctly faint. One microscopic bit more added to the staggering burden of revelation he had had tossed on him, and he was prepared to sink through the floor.

However, Deere was not waiting for an answer. He motioned to a man in a toga and spiked belt, who came toward Themus. "See this man?" Deere asked.

Themus said yes. Deere tapped the man lightly on the chest, "Senior Watcher, First Grade, Norsim, lately disappeared from the barracks at Kyba-Base, Valasah." He pointed to three others standing together near the front of the crowd. "Those three were top men in the Corps, over a period of ten years. Now they're Crackpots."

Themus' eyebrows and hands asked, "But how?"

"There is a gravitating factor among Kyben," he explained. "There are Crackpots who are brought up as Stuffs who realize when they get here that their thinking has been fettered. Eventually they come to us. They come to us for the simple reason that the intellect rises through the Watcher ranks, and for several reasons gets assigned here. We've made sure the smartest boys get final assignment here.

"On the other side of the ledger there are non-cons who go psycho from the responsibility of being a free-thinker when they want supervision, and their thinking directed. They eventually wind up as Kyben, after minor re-conditioning so they don't remember all this," he waved his hand to indicate the Cave. "Now they're somewhere out there, and probably quite happy."

"But how can you make a Watcher disappear so completely, when the whole garrison here is looking—"

"Simple," said a voice from behind Themus.

Supervisor Furth just stood smiling.

Themus just stood choking.

The elder Watcher grinned at the confusion swirling about Themus' face.

"How did—when were you—" Themus stuttered.

Furth raised a hand to stop him. "I was an unbending Stuff for a good many years, Themus, before I realized the Crackpot in me wanted out." He grinned widely. "Do you know what did it?" I was kidnapped, put in a barrel with a bunch of chattering *pegullas,* and forced to think my way out. I finally made it, and when I crawled

out, all covered with *pegulla*-dung, these grinning maniacs helped me up and said, "More fun than a barrel of *pegullas!*"

Themus began to chuckle.

"That did it," said Furth.

"But why do you send men like Elix back to the Mines. You must know how horrible it is. That isn't at all consistent."

Furth's mouth drew down at the corners, "It is, when you consider that I'm supposed to be the iron hand of the Watcher garrison here on Kyba. We have to keep the Stuffs in line. They have to be maneuvered, while they think they're maneuvering us. And Elix was getting too far out of line."

"Do you know how close to being killed you came when we brought you here the first time?" Deere said.

Themus turned back to the pock-faced little man, "No. I—I—thought you'd just send me back and let the Corps deal with me."

"Hardly. We aren't afraid of our blundering brothers with the armored hides, but we certainly don't take wide chances to attract attention to ourselves. We like our freedom too much for that.

"You see, we aren't play-acting at being odd. We actually enjoy and live the job of being individuals. But there is a logic to our madness. Nothing we do is folly."

"But," Themus objected, "What are the explanations for things like —" and he finger-listed several things that had been bothering him.

"The garbage is negatively-polarized, so it touches nothing but its side of the sewer pipes," explained Furth. "The beggar, who by the way is a professional numismatist, can sense the 'structural aura' of various metals, that's how he knew how many and what type coins you had in your pocket. The Cave here is merely an adequate job of force-moving large areas of soil and rock, and atomic realignment . . ."

He explained for a few more minutes, Themus' astonishment becoming deeper and deeper at each further revelation of what he had considered superhuman achievements. Finally, the young Watcher asked, "But why haven't these discoveries been turned over to Kyben-Central?"

"There are some things our little categorizing brothers aren't ready for, as yet," explained Deere. "Even you were not ready. Chance saved you, you know."

Themus looked startled. "Chance?"

"Well, chance, and your innate intelligence, boy. We had to see if there was enough non-con in you to allow you to live. The re-conditioning in your case would have been—ah—something of a failure. The five mad acts you were to perform not only had to be mad—they had to be *logically* mad. They each had to illustrate a point."

"Wait a minute," said Themus. "I had no idea what I was going to do. I just did it, that's all."

"Um-hm. Quite right, but if *you* didn't know, at least your subconscious was able to put two and two together and come up with the proper four. The acts you did dem-

onstrated you had courage enough to be a non-con, that you were smart enough to maneuver us Crackpots—so it would be easy enough for you to help us maneuver the Stuffs—that you could be a non-con thinker when you had to be, and that you knew you were too valuable to kill.

"Even if *you* weren't in on it, your subconscious and the rest of *us* were."

"But—but—what I don't get is, why did you try to stop me from seeing Boolbak, and then let me go, and why does Boolbak hide from you and the Watchers both?"

"One at a time," replied Deere. "Boolbak hides because he *is* mad. There are some like that in every group. He happens to be a genius, but he's also a total madman. We don't try to keep tabs on him, because we already have the inventions he's come up with, but we don't put him out of the way because he might get something new one of these days we *don't* have, and then too, he was a great man once, long before—" He stopped suddenly, realizing he had stepped over the line from explanation to maudlinity. "We're not barbarians. Nor are we a secret underground movement. We don't want to overthrow anything, we just want to do as we please. If our brothers feel like foaming up and ruling star-systems, all well and good, it makes it easier for us to obtain the things we want, so we help them in a quiet way. Boolbak isn't doing anyone any harm, but we didn't think you were ready to be exposed to too much non-con thinking all at once, as we knew Boolbak would do. He always does.

"But Darfla was so concerned, and she seemed to like you, so we took a chance. It seemed to work out, luckily for you."

Themus looked at the girl. She was staring at him as though a layer of ice covered her. He smiled to himself.

Any amount of ice can be thawed by the proper application of intensive heat.

"We didn't want you to see him at first," Deere went on, "because we knew he would dump the cart. But when you showed us you were flexible enough to do the five mad acts, we knew you could take what Boolbak had to say.

"And we let him explain it, instead of us, because he's one damned fine story-teller. He can hold the interest. He's a born minstrel and you'd believe him before us."

"But why did he tell me all that? I thought you wanted it all kept quiet? He hardly knew me and he explained the whole situation, the way it really is. Why?" Themus inquired.

"Why? Because he's completely out of his mind—and he's a big-mouth to boot," Deere stated. "We tolerate Boolbak, but we make sure he keeps away from the Watchers, for the most part. If he does get through, though, it eventually shuttles to Furth and we snap a lid on it. I suppose he was ready to tell you because Darfla brought you to him. He has a soft spot for her.

"What I want to know is, why

(Continued on page 112)

"Operation Vanguard", Man's first skirmish with outer space, has fired the imaginations of millions who want to know: What will the Satellite actually look like? How will it reach its orbit? What instruments will it carry and what will they tell us? . . . Here are the predictions of two eminent rocket men.

SATELLITE

FIRST OF TWO PARTS

BY JAMES M. NUDING

Lead Research Engineer, Atomic Research Energy and Problems of Instrumentation, North American Aviation

WITH PAUL J. VANOUS

Microwave Senior Design Engineer, Missile Guidance Systems Division, Bendix Aviation

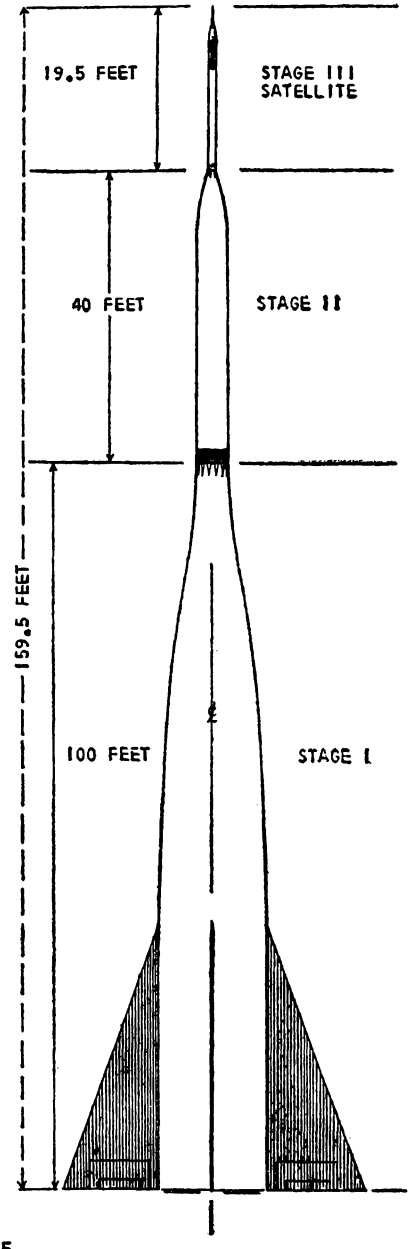
THE THOUGHT that Man might someday contrive to hoist himself by his own bootstraps across the last, and most formidable of the great frontiers into Space, has inflamed the imagination of writers, scientists and laymen for many generations. Out of these imaginations over the years, have come ideas. From the many fields of science and engineering have come concepts and mechanical improvements, until at last the weak sputter that filtered through Dr. Goddard's basement window has been raised to the shattering roar of today's rocket motors, producing horsepower measured in large chunks of a million. Power in amounts almost unimaginable a few years ago has come into our hands; and with it, the announcement by the President of the United States that this nation will pioneer in the exploration of the space frontier by launching a tem-

porary satellite into a predetermined orbital path around the Earth.

This launching of an Earth Satellite Vehicle is perhaps the most exciting of all the projects planned for the International Geophysical Year 1957. The program, known as "Project Vanguard", can, if it is successful, contribute more to the science of the world in general than any other single project envisaged. The mere fact that the Satellite when launched must necessarily fly over all the countries of the world, will call for a mutual trust and cooperation between them which will be unprecedented.

Coupled with this is the fact that such a Satellite will offer an unparalleled opportunity for science to study the physical phenomena surrounding the earth. During the past hundred years, Man, despite being earthbound, has made enormous strides toward understanding the universe. However, the limitations of not being able to mount his instruments above the heavy blanket of the atmosphere, has forced many of the problems to remain unsolved. With today's knowledge of rockets and instrumentation this need no longer be true.

There appear to be four main objectives to be accomplished in "Project Vanguard", the first of which is the testing of the feasibil-



At right are the dimensions of the three-stage Satellite rocket, the Satellite itself being the third stage. The "basketball" shape theory is exploded as impractical. The Satellite is here shown to be needle-shaped, 19.5 feet long and one foot in diameter.

ity of constructing a three stage Rocket-Satellite Vehicle and successfully establishing it in an orbit around the earth. Viewed from the standpoint of an astronautical enthusiast, the successful accomplishment of the first objective will justify the expense and effort of the whole project. However, since public funds are being spent in the financing of the program, other things must be accomplished to satisfy not only the general public, but also the scientists concerned with the Geophysical Year.

The second objective is the instrumentation of the third stage so that once in orbit, information of interest to the I.G.Y. scientists can be collected by it and transmitted to strategically placed monitor stations on the ground. From the viewpoint of the scientists, the accomplishment of the second objective will be the main justification; the more diverse the information collected, the more priceless the Satellite's contribution to research.

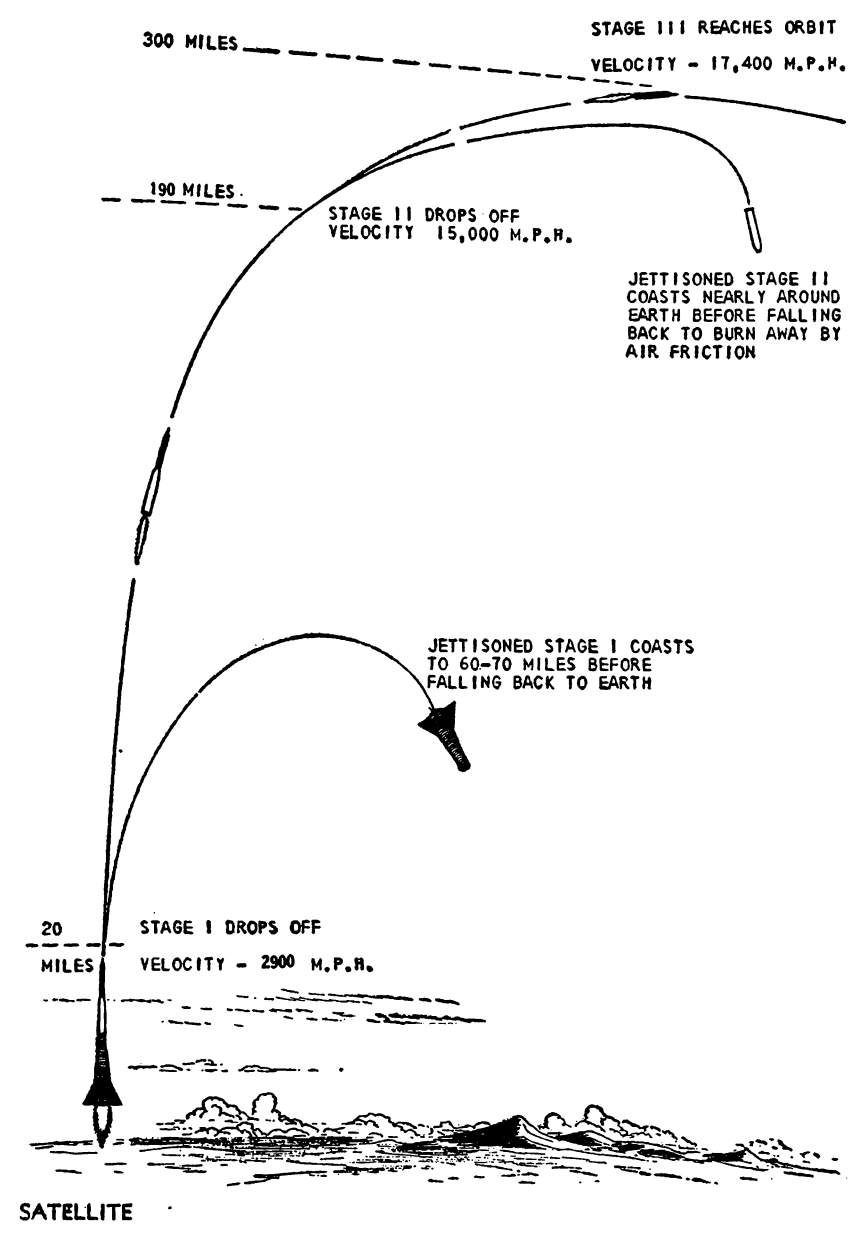
The knowledge gained by the second objective will be of vital importance in the accomplishment of the next step. This will be the planning of larger, more elaborate, and possibly manned satellites to be built in the future. The third objective, we feel, is probably of major interest to the military and, if pursued with the proper attitude, can be of inestimable value in the preservation of world peace.

The fourth objective is of longer range and possibly of somewhat visionary character, although one which should not be dismissed because of the lack of immediacy. It is the exploration of the hazards of space and the gaining of knowledge of space travel in general. Once a space vehicle has been manned, interplanetary exploration and travel will be the next logical step.

It is well to point out at this time that the actual design specifications to be used in the satellite project will undoubtedly involve rockets and instrumentation which are part of the military security of the United States, and as such have already been classified as secret. But since the authors of this article have no connections with, or sources of information from, "Project Vanguard", it will be interesting to see how close an "educated guess" will bring us to what actually develops.

WE feel that the "basket ball" nomenclature was an unfortunate choice. In the first place, it is very unlikely that the Satellite will look anything like a basket ball. The diameter of a basket ball is roughly twelve inches, and in order to put such a sphere into an orbit around the earth it must be carried there by a missile whose diameter must necessarily be somewhat larger. The missile must contain besides its propulsion system and guidance mechanism, a device for expulsion of the satellite. If this device is to

Scale at right shows altitudes at which first and second stages drop away. Nuding and Vanous predict that orbit eventually will be 300 miles above Earth's surface instead of 200 or 250 miles.


300 MILES
STAGE III REACHES ORBIT
VELOCITY - 17,400 M.P.H.
190 MILES
STAGE II DROPS OFF
VELOCITY 15,000 M.P.H.
JETTISONED STAGE II
COASTS NEARLY AROUND
EARTH BEFORE FALLING
BACK TO BURN AWAY BY
AIR FRICTION
JETTISONED STAGE I COASTS
TO 60-70 MILES BEFORE
FALLING BACK TO EARTH
20
MILES
STAGE I DROPS OFF
VELOCITY - 2900 M.P.H.
SATELLITE

add any appreciable velocity to that already attained from the carrier rocket, it will have to contain additional fuel in the form of an explosive charge. This explosive and the gun-like mechanism would be heavy, requiring many thousands of pounds of fuel in the first and second stages just to get it up there.

Assuming that we have placed a "basket ball" in orbit, what of value, if anything, will we have? A little rough calculation will show that a sphere twelve inches in diameter can contain very little useful instrumentation. It is possible that it could hold a battery operated power supply and a small radio transmitter of sufficient strength to be heard back on earth. By no amount of miniaturization however, could we squeeze in much of anything else. Authorities on upper atmosphere research agree that a Satellite Vehicle placed in a stable orbit 300 miles up could probably stay there a year before it fell back to earth. If this is so, then obviously no battery would be sufficient to power the transmitter for that length of time. Also, if the Vehicle is going to be circling the earth for that period of time, common sense dictates that it should be so instrumented that full advantage be taken of its sojourn in space.

It is true that some useful information other than the mechanics of getting up there, could be obtained from an uninstrumented Vehicle orbiting around the earth at a known altitude and velocity. Deviations in its orbital path as a function of geographical location would provide some clue to the deviations in the earth's magnetic field. Change in orbital velocity as a function of time and latitude would tell something about the density of the residual atmosphere through which the Satellite must travel as it slowly spirals its way back to earth. With the exception of these two bits of information, it is unlikely that anything of importance could be obtained from an uninstrumented vehicle. However, if the whole third stage of the rocket assembly is utilized, as it probably will be, the increased available volume and the great saving in weight will allow a much more elaborate instrumentation system to be put in orbit, with a correspondingly greater amount of useful information transmitted.

The designing and building of a rocket combination which is capable of raising the Satellite Vehicle to an altitude of up to 300 miles, is in itself an engineering feat of major importance. It is true that the United States has already sent a two stage rocket (Bumper Project) up 250 miles; but one must remember that the second stage of Bumper was a relatively small rocket with a very small payload. This was launched vertically and arrived at its 250 mile altitude with zero velocity, whereupon it merely fell back to earth.

In the case of the Satellite's second stage, it must, while carrying the relatively heavy third stage, arrive at or near the 300 mile goal in a fairly horizontal position and path. It must also at this time have

achieved a large fraction of the 17,400 miles per hour horizontal velocity necessary to keep the satellite in orbit. To do this it is necessary that stage one and stage two be BIG rockets!

STAGE ONE will probably be larger than any single rocket that has ever flown up to this time and will most likely consist of two of the largest rocket motors built, mounted side by side. It will develop in the neighborhood of 300,000 pounds of thrust for a period in excess of one minute. It will be about 15 feet in diameter and approximately 100 feet high. Its total weight will be on the order of 200,000 pounds, 150,000 pounds of which will be liquid fuel and oxidizer. The fuel will be alcohol or some similar liquid and the oxident will be liquid oxygen.

The propulsion system will be a modernized version of that used in the V2 rockets, i.e.—a steam or gas driven turbo-pump which draws the fuel and oxident from large storage tanks and forces them, at about 350 pounds per square inch pressure, through spray nozzles and combustion chambers where they combine and burn. The resultant hot gases, escaping through the motor nozzles, furnish the impulse which causes the assembly to rise.

Stage one will carry in its upper end, just below the socket where stage two sits, an electronic "brain" which will take controlling impulses from the master "brain" located in stage three. These impulses will be amplified and fed to servo-mechanisms located in the tail which will in turn actuate the steering vanes on the fins and also carbon vanes in the jet stream, just below the rocket nozzles. These carbon vanes will stabilize the rocket during the period in take-off when tail fins are ineffective.

Stage II may well be a Viking rocket or one similar in size and performance. The small tail fins used by the Viking could very well be left off in the case of the second stage. The motor mounted on a gimbal allows it to be swiveled in any direction, thus permitting the thrust from the jet to be used to steer the rocket after it has left the atmosphere—where tail fins would have nothing to bear against.

The apparently excessive size of Stage I and Stage II is necessitated by the fact that nearly all of the 300 mile altitude and the 17,400 mile per hour orbital velocity must be attained by the second stage so that fuel left in Stage III can be used for making orbital corrections in both position and velocity.

Stage III, which will also be the Satellite itself, should be a rocket with the performance characteristics of the Aerobee and with a guidance system similar to that of the Wac Corporal. While it should resemble the system of the Wac Corporal, it will require a considerable amount of modification to fit it for use as a satellite. This would involve mounting the motor on gimbals, and the installation of hydrogen peroxide jets mounted laterally for making altitude and roll corrections.

(Continued on page 89)

Illustrated by Ed Emsh

Time reversal exists at the sub-atomic level according to Feynman's Theory—and according to that same theory any entity can exist in three places at one time . . . Does this explain the strange co-existence of Summer, Mark and Wyn?

Z

BY CHARLES L. FONTENAY

WHAT SCIENTIFIC or supernatural principle is behind the mysterious appearances recorded some years ago by Mr. Charles Fort, I'm sure I don't know. It could, of course, be the same as that behind the sudden appearance of Wyndham Storm in Central Park, but I don't believe I've heard of a case that exactly paralleled this one.

I gather from a perusal of Mr. Fort's works that it is not uncommon for these unheralded visitors to come onstage without the for-

mality of clothing; but I don't believe it's customary for them to bring their wives along.

I got caught in a thunderstorm that night in Central Park—not New York's Central Park, but Allertown's Central Park, which isn't as big. Having no raincoat—the skies had appeared clear when I left home for the movies—I took refuge in the big octagonal bandstand.

The storm was brief, but spectacular; one of those violent affairs that often mark the arrival of a cold front to dispel an unusually intense midsummer heat wave. The rain slashed across the park in wind-whipped sheets, managing to drench me even in my shelter. Big trees bowed low and reluctantly hurled away leaves and limbs. Thunder rolled incessantly and the lightning made an eerie daylight of the blackness.

Suddenly, there was a terrific clap of thunder and a fiery flash that blotted out everything around me. Shaken, I picked myself up from the floor of the bandstand, still not sure I hadn't been struck. Blue smoke was boiling away from a wrecked tree about thirty feet away, in the midst of a clump of charred, waving shrubbery.

And like Venus rising from the foam the naked woman stepped out of the shrubbery, followed by the naked man.

My first impulse was to laugh at these two whom the storm had chased from their hiding place and to be astonished at their brashness in disrobing completely in the heart of the park. Then it occurred to me that the lightning must have stripped them. They might be hurt.

I jumped from the bandstand and walked swiftly over to them. To my utter amazement, the young woman promptly threw her arms around my neck and said:

"Whatever has just happened, Don, I want you to know it's you I love."

Then she kissed me.

"What on earth!" I exclaimed, disengaging myself. The man was looking from one to the other of us, mutely.

"I'm Summer Storm and this is my husband, Wyn Storm, and we live at 138 March Street," she said, all in a rush. "Oh, Don, I'm sorry you don't know us any more, but I should have known from the way Wyn was acting and everything that's going to happen . . ."

"Wait a minute, wait a minute!" I interrupted. "I don't know you. How did you know my name?"

She didn't answer, but just stood there, looking at me intently. I averted my eyes. I was beginning to recover from shock enough to be embarrassed.

"How about this?" I asked the man. "Why should I know you, and where do you come from?"

"I'm afraid I don't know," he replied, sounding perfectly honest about it. "I'm afraid I don't remember anything. Do you suppose I have amnesia?"

"That's possible," I said. "But your wife seems not to be bothered with it. All right. Summer Storm and Wyn Storm it is—but the names are too trite in these circumstances not to be false. Both of

you had better get back in the shrubbery while I get some help."

I found the policeman on the Main Street beat. As I thought, it was my old friend, Gus Adams. He accompanied me back to the park, the rain gleaming on his slicker.

"They picked a good address to lie about," he said, when I had explained the situation to him on the way. "The house at 138 March Street is vacant."

"They're probably spooners who got caught by that lightning bolt and are too ashamed to give their right names," I said. "If they had any clothes, I don't know what happened to them. I didn't see any in those bushes."

"What do you figure I ought to do with them, Mr. Gracey?" he asked.

"They look like decent youngsters," I said. "If it's all right with you, we'll take them out to my house until they're ready to let me help them get back where they came from,"

"You're taking a chance," he grunted. But we wrapped the woman in his slicker and tied my best suit coat around the man's waist. Gus called the town's only patrol car and had them drive us out to my house.

I suppose nudists and doctors eventually reach the point where they look on nakedness as normal. But, to me, my "orphans of the storm" looked a lot more like human beings when I had them clothed in a couple of my old sweaters and some slacks.

They might have been twins. For all I knew, they were, in spite of the woman's claim that they were man and wife. Their eyes were an identical sky-blue, their hair an identical pale, wavy gold. Her hair was cut short, his needed cutting, so they were a good match. I judged their ages to be about 23, although I've been over-estimating young women's ages since I passed 30.

"Now, suppose you tell me where you're from and what this is all about," I said sternly, when they had finished eating the meal I had rustled up for them.

The man spread his hands and, for the first time, he smiled. It was the smile of an archangel. Whatever the failure of his memory, his smile was that of wisdom and patience. I was to find, not much later, that the woman's smile was its feminine counterpart.

"I'm afraid I don't remember anything before standing in the park in the rain," said the man.

"What wrong? What's wrong, Don?" demanded the woman, a note of hysteria in her voice. "What's happening to us?"

"It's just that I don't understand this situation at all," I said. "You say you're husband and wife. Then you won't mind both sleeping here in the den, and tomorrow we'll see what we can find out."

In this remarkable fashion began a remarkable fifteen years.

LOOKING BACK on it, I suppose I loved Summer Storm from the time I saw her. I've been trying to decide what that makes me. Incestuous? Just narcissistic?

Or, perhaps, Jovian?

She was alone in the den when I looked in the next morning before breakfast. Wyn—short for "Wyndham," I learned later—was wandering around in the back yard, looking lost.

Summer had a pair of my scissors in her hand, evidently preparing to trim her hair. Somewhat to my surprise, she looked contrite when she saw me.

"I just thought I might look better with short hair," she explained.

"Good Lord, it's too short now!" I exclaimed. "I like women with long hair."

She hesitated, then reached up to begin clipping. Somewhat nettled, I turned on my heel and walked out.

That incident is noteworthy for its strange sequel. At breakfast, I was thunderstruck to observe that Summer Storm's hair was long—at least shoulder length, for it was done up in a neat bun behind her head. Where in my house had she found a wig to match her own hair? And how long must the wig have been originally, for her to have cut from it the long tresses I found later in the wastebasket?

After breakfast, I took Wyn with me to check on the house at 138 March Street. I left Summer at home. Although she claimed to remember things and Wyn said he couldn't, I could make nothing of her "memories." There was a strangeness about talking with her, too, something I couldn't quite put my finger on yet.

As Gus had said, the house at 138 March Street was vacant. It was for rent. The owner, old Albert Meecham, lived next door, and I made an impulsive decision on the spot.

"Your wife insists you live here, so you two must be connected with this address in some way," I told Wyn. "I'll rent the place for you while we're trying to run down some information on your background. If you decide to stay in Allertown, you can pay me back after you get a job."

The only way I knew to probe the origins of Wyn and Summer was through the customary channels. That afternoon, I went down to the police station to talk with my friend, Gus, before he started on his beat.

The Allertown police station is nothing but a room in the ancient city hall, a block off Main Street, but it does have a separate outside entrance. Gus was sitting on a bench in the shade by the entrance, fanning himself with his cap. The perspiration pasted his dark blue shirt to his well-padded arms and chest. The relief the storm had brought hadn't lasted long.

I sat down on the other end of the bench.

"Gus," I said, "can you fellows help me find out who those people are we picked up in the park last night? It's funny, but the man has amnesia, and I think the woman's a little strange in the head."

Gus looked at me a little reproachfully. He laid the cap down, to pull his handkerchief from his hip pocket and mop his brow.

"You mean that story you told me was the truth?" he asked. "I

thought they might be some relatives of yours, that had got into some sort of a scrape. Both of them look a lot like you."

"Do they? Well, they're no relatives of mine. I'd like to know just who they are. Mr. and Mrs. Wyndham Storm, she says."

"They don't come from Allertown," he said. "I'd know them if they was from Allertown. But they was raised around in this country somewhere."

"How do you know that?"

"There's a way of talking folks have around here. You don't hear it outside these three or four counties, and you wouldn't notice it if you wasn't watching for it. Take my word for it, those folks was born and raised not fifty miles from here."

"Well, just to be on the safe side, you'd better check to see that they're not wanted criminals," I said. "Amnesia would make a good dodge for a criminal."

"I've already done that," he said quietly. "They're not."

Wyn and Summer weren't missing persons from anywhere in our section of the state, either. Gus looked into that angle very thoroughly during the next few weeks, and reported failure.

Wyn got a job as clerk at McClellan's Dry Goods Store and, for reasons he did not confide to me, enrolled in night classes at Slayden College. He and Summer soon were established in the neighborhood as "that nice young couple that Don Gracey brought in from somewhere out West." How the townspeople got started on that Western origin theory, I don't know; I suppose it's natural for people to tack some sort of an origin on strangers.

I confess that their origin soon became a matter of minor importance to me, although I remained curious about it. I found Wyn extremely likeable; we became very close friends, although I estimate that I am ten to fifteen years older than Wyn. And, as I say, I was in love with Summer, although it was a long time before I admitted that to myself.

I told myself I felt about Summer as I would my own daughter, if a bachelor like me could say such a thing; and I felt toward Wyn as though he were my son. There was a good deal of accuracy to that description of my feelings, but there was a mystery about Summer that drew me powerfully.

I think the unattainable in woman is always irresistible. Summer had the most peculiar air of unattainability about her I ever have experienced. It was as though, when I touched her, it was a fleeting touch; when I looked at her, I was constantly beset by the feeling that she would, the next instant, shimmer into insubstantiality.

Talking with her heightened this illusion, rather than lessening it. A conversation with Summer was a unique experience. It was a little like two people trying to talk at once, each talking, then each hesitating to let the other have his say. Our words crossed each other, like scissor blades that do not quite meet. She might answer a question before it was asked, or take the

conversation off on tangent after tangent. Disconnected, discontinuous—those adjectives describe our conversations.

Except for his amnesia, dating back to the night in the park, Wyn was perfectly normal. After some time, he confided that he, too, was concerned about Summer's strangeness. I got the impression from him—though he did not go into great detail—that it extended beyond her conversation, to her actions.

"It seems to me that I ought to know what's wrong with Summer," he told me, very puzzled about it. "I mean, it seems I ought to remember. But I don't. I've gone so far as to talk it over with her."

"What did she say?" I asked.

"She said she wasn't going to tell me now. She said she'd tell me one of these days, but that when she did, I'd leave her. She smiled all the time she was saying it, in the strangest way."

Well, we had Summer examined. Old Doctor Lodge is no psychiatrist, but a man isn't a general practitioner for as long as he's been at it without learning something about the way a person's mind ticks. He said there was nothing wrong with Summer, mentally.

"She acts like she's still suffering a little from some sort of shock," he said. "If she was right next to a lightning bolt when it struck, I'm not surprised. It's lasting a little longer than such things usually do, but it'll clear up."

It didn't clear up, but Wyn and I got used to it.

Amateurs, they say, shouldn't fool around with hypnosis, and I suppose there's a sound reason behind that admonition. But I'm a little better than the average amateur hypnotist. I've not only done a good deal of it at club benefits and what not, but I've read pretty heavily in psychology. I decided to see if hypnotizing Wyn would give me any clue to his past and Summer's.

Summer sat beside me that night at their home, as I went through the familiar motions and Wyn sank into hypnotic trance.

Under hypnosis, Wyn recalled easily everything that had happened since that night in the park. But attempts to regress him past that night brought only a death-like silence, in which he sat pale and immobile. I tried several times, and at last succeeded in getting him in an extremely deep hypnotic state.

Suddenly, Summer interrupted with an exclamation.

"That's me!" she exclaimed. "That's what I told him four years ago!"

"Quiet, Summer," I commanded, looking at her curiously. "I think I may be able to get something out of Wyn now."

Despite total lack of response when regressed to ages 22 and 20, I regressed him to age 18. He stirred and murmured. His eyelids fluttered.

"What do you see?" I asked eagerly. "What are you doing?"

"Wyn?" he exclaimed. His voice was clear and treble, the voice of a woman, as he called his own name. He clenched his fists, and moved his head from side to side. "Wyn,

I'm going to have a baby!"

"What!" I exploded, amazed. "Wyn, what do you see?"

He opened his eyes.

"Why, I see you, Don," he said in his normal hearty voice. "What else should I see?"

With a suddenness I never have seen before or since, he had come out of the hypnotic state. I was afraid to delve any deeper. I didn't try hypnosis again.

During these first few years, Wyn and Summer gradually lost that identity of appearance which had made them look so much like twins the night I found them in the park. Wyn aged, not excessively but as any adult man would age in a few years. Summer, on the other hand, seemed to have found the secret of eternal youth. She grew ever more delicate and beautiful, and her fair skin seemed to take on a translucent glow.

I was a close friend of the couple, and I found that I was alone with Summer a good deal. Summer had shown an interest in schooling, too. She started in college with Wyn, then dropped back to high school, and finally fell back on studying at home. It wasn't that she wasn't bright. She seemed to recognize the facts she was studying almost at once, but tests and examinations were her downfall. She never could remember enough of the things she had studied to make a passing grade.

So I went to the house at 138 March Street often in the early evenings, to help Summer in her studies.

Their son was born about six years after they came to Allertown. It was a peculiar thing. There was no noticeable sign of pregnancy. Summer was sure she was pregnant, but Doctor Lodge scoffed at her, right up to the time of the birth.

"Sure, she has milk," he told Wyn and me, tugging at his white mustache and giving us a wise smile. "It's not unusual. She isn't carrying a child, though. It's a false pregnancy."

But the child was born. Then Doctor Lodge reversed himself and insisted she was carrying an unborn twin. Again he was wrong. Summer gradually but steadily recovered from the effects of the birth and regained her slender figure.

I still do not attempt to excuse Wyn for leaving his wife and newborn son. He was overwrought, it's true, but he should have taken them with him.

Instead, he came to me, his suitcase packed, when the child was about a month old. His face showed his agitation.

"Don, I'm leaving Summer," he said abruptly.

"Wyn! Why? What's happened?"

"I found out yesterday why she acts and talks so strangely. She told me. I couldn't sleep last night, and I've decided I must leave Allertown. Somewhere there may be people who can help me, but I can't find the help I need here."

"Was it so terrible?" I asked, trying to calm him. "What did she tell you, Wyn?"

He leaned forward intensely,

pointing a finger at me, and opened his mouth to speak. Then he shut it and sat back. He shook his head.

"No," he said. "Maybe it wouldn't affect you as it has me, but you couldn't feel comfortable about it. All I want from you, Don, is the promise that you'll take care of Summer and little Mark for me until I come back."

"You know I'll do that. They can move in here right away. But I think you're making a mistake, running away from whatever it is."

"I'm not running away," he replied. "I told you, I've got to have help."

That's all he would say. He left on the mid-afternoon train for Mayer City, and I went around to 138 March Street to help move his wife and child into my own home.

I didn't recall until three days later that Summer had predicted —or so Wyn had said—that when she told him why she acted as she did, he would leave her.

IF I CAN'T excuse Wyn for leaving his wife and child, I have even less excuse for becoming his wife's lover. The fact that the interlude may have been necessary to his very existence—and hers—is no justification, for I did not know that then. Nor do I know it certainly now.

But picture the plight of a man who has in his home a young and beautiful woman, the realization growing on him, day by day, that he has loved her for six years. And it was Summer's fault, as much as my own. Perhaps more. Despite Wyn's words, I could not be sure that he would return to her, and certainly she must have known that he would. Despite this, she did more than merely encourage me.

I have wondered often about the philosophical implications of this fact. If Summer had not encouraged me, I wouldn't have been bold enough to make any advances on my own account . . . and where would that have left Summer?

On the other hand, it was the most natural thing in the world that Summer should encourage me. She knew.

Wyn had been away only about two months when Summer, rousing herself from a deeply pensive mood one night, sat down by my side on the sofa and snuggled up close to me. I couldn't bring myself to pull away from her, but I exclaimed:

"Summer, this isn't right. What about Wyn?"

"I don't understand this coolness toward me, Don," she said, laying her head on my shoulder. "People who love each other shouldn't act so aloof."

"I was thunderstruck at this admission. But I couldn't help saying what I said then.

"I do love you, Summer," I confessed, almost choking.

At once she arose and left me. I thought I had offended her, and I was almost relieved that I had. It was best that she should be discouraged about any ideas she might have about me.

But thirty minutes later she gave

me a smile that made me not so sure she was offended. And the incident seemed to increase, rather than dampen, the warmth of her attitude toward me.

It was unpardonable, with Wyn gone so short a time, but I had no strength to resist the inexorable attentions of a woman I loved. When she came to me in negligee late one night a week later, I became Summer's lover.

I have said it was partly Summer's fault, and the sequence of events would make it appear almost entirely her fault. This is not true; and I found out several years later why it is not true.

My inexcusable affair with Summer lasted for about a year, before the conversation occurred which caused me to terminate it abruptly. I had just entered the parlor, where Summer was curled in a big chair, reading.

"I don't see any reason for our not loving each other, if we really do, Don," she said petulantly. "Wyn says he's my husband, but I don't feel that he is. Why should I be tied by a marriage ceremony I don't know anything about yet?"

I could not answer, for I was looking at her through new eyes. Her tone of voice had been so like that of an indignant child that it awakened me to something I should have seen before.

How like an adolescent girl she was, really! The pale gold hair framed a young face. Despite the rondures of her figure, there was a looseness about the way her legs were attached to her pelvis, giving her frame that impression of hollowness that is frequent among slender young virgins.

In the seven years I had known her, how could I ever have built up in my mind the picture of her as a mature woman?

When I thought about that sudden protestation of hers, made after we had lived as man and wife for a year, it seemed to me that it could only have arisen from remorse at such a situation. But it was neither this nor the fact that I was wronging her and Wyn that caused me to resolve then and there that never again would I so much as kiss her. It was that she was too young!

I did not waver in that resolve, from that time on.

But I thought a great deal about this matter: I had known Summer for seven years and she had been a woman when I first saw her. Yet her youthful appearance now made it impossible that she should have been adult then. Surely my memory did not play me wrong in picturing the Summer Storm I had seen that night in the park; indeed, the picture of her was burned indelibly on my mind. She must have, in the interim, become slighter, even smaller.

Oddly, this slenderizing process, once I noticed it, seemed reluctant to stop. The bathroom scales proved that she was losing weight slowly, but in her appearance the decline progressed much more rapidly. She began to get leggy and angular and she completely lost the once-voluptuous contours of her body, despite all the milk and starchy foods I could feed her. Nor was it that she

lost appetite. She ate voraciously.

At the same time, I became convinced she was losing her memory. Chance remarks dropped at odd times indicated that her recollection of Wyn, of the events before Mark's birth, of all her past life in Allertown, was extremely faulty; she never had shown signs of remembering any events before she came to Allertown.

As a matter of fact, it became increasingly apparent that she no longer accepted Mark as her son. The boy was growing out of babyhood with that speed which is so remarkable in children. She cared for him solicitously, but seemed to look on him as her little brother.

Of course, I took her to Doctor Lodge. He, in turn, went with us to consult doctors at Mayer City. He could find nothing wrong with Summer physically, nor could they.

They seemed to think we were faking. They heard my assurances, and those of Doctor Lodge, that Summer must be approaching the age of thirty, with obvious skepticism.

"There is nothing wrong with this girl except an unfortunate emotional aberration," one doctor told me flatly. "Physiologically she is a girl of about fourteen, and it is difficult for me to believe that her chronological age is any higher."

"As I told you before, she has a son nearly four years old," I said.

"I don't say that's impossible at her age, for it isn't," he retorted. "But this girl has never been a mother. She's a virgin."

I should have realized what all this meant. I believe there have been such cases in medical history before. But I suppose I was too close to it. I didn't understand, even when Summer reposed childish confidence in me.

"I know what's going to happen, you know, because it's already happened to me," she said. She was a skinny girl now, with enormous blue eyes. "You know what's happened, because it's already happened to you. Isn't it funny?"

Fortunately, Wyn returned not long after that. Wyn had the answer to the questions that had been puzzling me.

WYN GAVE no warning of his return. He just walked into the house one afternoon, carrying a suitcase and smoking a pipe.

When I found Wyn and Summer in the park, they had appeared to be twins. During Wyn's absence his hair had begun to gray—prematurely, I'm sure—and now he looked like Summer's father. The change in her must have been even more noticeable to him than it was to me, because he had been separated from her during its most remarkable development. But he showed no surprise at it.

"I knew what the trouble was before I left," he said soberly. "You see, as Summer's husband I was much closer to her than you could be, even since she and the boy have been living with you."

I could feel my ears turning red. I asked hurriedly:

"What is wrong with Summer, Wyn?"

"She lives backwards," he said.

"Time is reversed for her. It isn't only a physiological reversal. Everything goes backwards in time for her. The future is the past to Summer, and the past is the unknown future. She remembers the future, Don—she remembers it, because she has seen it happen."

"That's impossible!" I exclaimed. "How can she? It hasn't happened yet!"

"To her it has," he replied. "It may upset your conception of the future as a fluid thing of limitless possibilities, but Summer's experience is pretty good evidence that it is as frozen and stable as the past. As the Orientals say, what is to be will be."

I thought about that, and I thought I detected a flaw.

"Oh, no!" I said. "Wait a minute here, Wyn. If she can't remember the past even a minute ahead, you couldn't even talk with her. She'd remember what you were going to say, instead of what you had said. Not only that, she'd talk backward! You'd never be able to understand her."

"People are adaptable," he replied. "She evidently learned to talk backward—to her; correctly, to us. People learn to talk so others can understand them. And as for conversation, do you remember Summer ever answering a question directly?"

I started to say I did, for it seemed that I did. But a moment's reflection changed my mind. Not a direct question; and her participation in a conversation always had been a jumpy and disturbing thing.

"But we can talk with Summer," I protested. "For years we've been able to understand each other."

"Like writing letters that cross in the mails," he said. "And I think people do have some knowledge of the immediate future, even you and I. Summer would develop that faculty more than the average person."

Certainly. No wonder she had been so affectionate to me that it had been impossible for me to resist her. To her, at that time, we had already been lovers. By the same token, my own knowledge when the affair was concluded that we had been lovers must have created in me an attitude that was a strong incentive for her to yield to me at the end of our relationship—the beginning, to her.

What a way to live! Always trying to guess, from the conversation of those around her, what (to her) was going to happen, so she could react intelligently.

"But," I protested, still unwilling to accept it, "if the past is the future to her, her actions could affect the past."

"Exactly," he said. "I told you, this means you have to accept the principle that the past is just as mallable as the future, and the future is no more mallable than the past."

Wyn had known all this before he left. He had gone, not just to avoid seeing his wife revert to childhood before his eyes, but to delve into studies on the nature of time itself. Where he had been, how he had supported himself I didn't

know. I still don't know.

Summer, her age now about thirteen, was old enough to understand that she was Wyn's wife, but he did not resume his position as husband to her. Instead, he acted toward her and Mark both as a father. Me? I suppose I was something in the nature of a benevolent uncle now.

As a matter of fact, Wyn plunged so deeply into work that the task devolved upon me to be both father and mother to Summer and her child. Mark, developing apace into a vigorous young specimen, looked like both his parents—since their features were so much alike, he could not be said to resemble one more than the other.

Wyn did not return with his family to the house at 138 March Street. It had long been occupied by someone else. He moved in with us and, with my tacit consent, made my home both his home and the headquarters for his work.

His work actually was double. He got a good job, this time as engineer at the Allertown Mill Industries. During all his spare time, he worked at converting my precious den and my basement into something completely beyond my understanding.

There are some people who accept misfortune and live with it—or die with it. Others battle it angrily to the bitter end, even when there is no evidence that anyone ever conquered their particular misfortune before. Admittedly, there was little precedent for Summer's case; and this made the prognosis even less optimistic. Still, Wyn was constitutionally the latter type of person.

"I don't know how much longer she lived in the past before you found us," he told me. "Nothing I could do has helped my amnesia for that period. She may have lived to a ripe old age, for all I know.

"But we know that she has only a few years to live, the way she is now—perhaps twelve or thirteen. That's her physical age, and she is living backwards toward babyhood."

"What will she do?" I asked curiously. "Just fade away?"

"She has to be born," he answered solemnly. "My guess is that, a few years in the future, there will occur the most unique birth ever known to man—a birth in reverse. Some couple, somewhere—perhaps someone we know here in Allertown—will live through the experience of the daughter they never knew reentering the mother's womb and retracing her steps through the embryo stage to the moment of conception."

"Fantastic!" I exclaimed.

"It must be true," he insisted. "It has to be true, unless she reversed . . . will reverse . . . her direction in time after birth. In that case, perhaps some baby girl here even now is Summer, living coexistently with her reversed self."

"If you're going to reverse her direction in time again and make her live normally," I said, for he already had told me this was his aim, "I don't see how you can prevent a paradox. She has already lived in the past as an adult woman. If you reverse her existence at this

stage, then she can't be born, because she'd be living from her present age on, both forward and backward in time."

He shook his head.

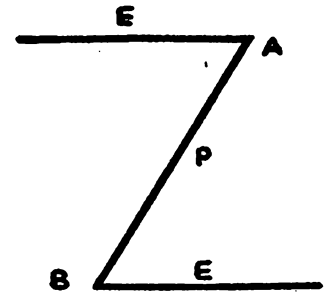
"I don't know," he said. "Perhaps it can't be done. Perhaps it would involve a parallel time stream, if there is such a thing. All I know is that I must try. If I can, she might still consent to be my wife later, if the difference in our ages isn't too great. That would be up to her."

"I don't see how you even know where to start on such a project," I confessed.

"The chances are slim," he admitted, "but I have some hope. The only actual time reversal we know, scientifically, is at the sub-atomic level. The theory was advanced by Feynman that annihilation of an electron-positron pair upon contact might be, not actual annihilation, but a 'time reversal' of the electron. The emission of a photon of energy, in such cases, is powerful enough to cause a recoil in time, and the positron is merely the electron traveling backward through time after the energy explosion."

I looked extremely blank.

"Look," said Wyn, taking up a pencil. He drew a big "Z" on a piece of scrap paper, labelling the two arms "E" and the connecting line "P". The angles he marked "A" and "B:"



"The flow of Time is from left to right," he explained. "At left is the past, at right the future. This electron, E, is moving normally along at the top of the diagram when it runs into an energy explosion at A. It reverses itself, going back through time as the positron, P, until it hits another energy explosion at B. Then it is reversed again into the right time direction, continuing as the electron E, at the bottom. You follow the line, as the pencil point does in making the Z, and it's a single body.

"But," and he drew a vertical line through the Z, "we move always forward in time. To us, the energy explosion at B happens before the one at A. Suddenly at B, a positron and an electron are created out of nothing. The electron at the top apparently has nothing to do with either of them. But the positron moves along and collides with it at A, leaving nothing there again —except, once more, an apparently unrelated electron, the one at the bottom of the diagram."

"But you're saying the same thing can exist in three places at once," I objected.

"Exactly, but in one of those places, it's traveling backward in time. So, if Summer's time reversal

occurred or will occur after birth, she may be existing somewhere else, as a younger girl, right now; besides being here in the house with us."

"Your example is, as you say, at the atomic level," I said. "How can you transfer that into terms of human beings?"

"The only thing I know to do," he said, is to create an energy explosion which I know won't hurt Summer physically, but may reverse her back to a normal direction. It would be like the energy explosion that meets the positron at B and forces it to continue existence as an electron."

"It appears to me," I said slowly, trying to grasp the concept, "that your explosion at B would have to have happened already if it were going to happen at all."

The amazing thing about it is that Wyn, the man who had studied all this thoroughly, apparently didn't understand what I meant. It just goes to show that he must have been right, when he said the future is as fixed as the past.

IT TOOK WYN four years to get his equipment ready for a test. He explained to me what it was supposed to do, but I never did get more than a general idea of the principle involved. The heart of the thing was a heavily wired chamber in the basement.

"The human body can take a lot of electricity, if it's administered in the right way," he said. "If it's administered in the wrong way, you've electrocuted somebody.

"I still don't know whether I've probed the secrets of the space-time fabric deeply enough to make this work, but I think it will reverse the charge of every atomic particle in the body of whatever is in that cubicle. I'm going to put a cat in it, as our first time-traveler.

"We may turn up with a cat and an anti-cat, the latter traveling backward in time. We may end with no cat at all. If so, maybe we've created an anti-cat in the past or maybe we've just electrocuted a cat."

"I don't see how you expect to interpret your results," I commented drily.

"If there's no cat, I won't risk it," he answered. "If we double our cats, I think we're on the way to something that may help Summer."

We picked our way through the mess of wiring and went upstairs. He had torn my bookcases out of one wall of the den and installed a control board with a television screen where the fireplace had been.

"The experiment will be controlled from here," he said. "The energies that are going to run around all over the basement would make it pretty dangerous for anyone down there. I'm sorry you can't watch, but somebody's got to keep the children away from here."

When he said "children," he meant Summer and Mark. Summer now looked as much a twin to her nine-year-old son as she had looked to her husband when I first saw them. At the last two Christmases, we had bought toys for both of them, and she played

happily with Mark. She called Wyn "daddy" and me "Uncle Don," just as Mark did.

Making them look even more like twins as we entered the living room on the day of Wyn's experiment was the fact that they were dressed alike. She wore a pair of Mark's overalls, and both had on T-shirts.

At the moment, the two were trying to put doll clothes on Thomas, the stray yellow cat Wyn had picked up for his experiment. We had had Thomas about six months now. Wyn and I had dubbed the animal "Tom," unaware of its sex—it had borne kittens during its stay with us—but the children thought the cat too dignified for the nickname. It was, except when they were trying out their various original ideas on it.

"Thomas is our first heroine—or martyr," said Wyn, and swept the cat up from the floor. Over the protests of the children, he stripped off the doll clothing. "You youngsters go out on the side lawn and play. Uncle Don will take care of you for a while."

Caring for the children had been my chore for so long I was accustomed to the peculiarities involved. Mark was as much a problem as any normal, active boy—no more. But Summer's reverse living, her reverse memory, made her even more difficult to deal with as she reverted to childish habits and attitudes.

For some weeks now, she had indulged in the fantasy that she was Mark and Mark was she, a game Mark rebelled at strenuously. At the same time, her manner of speaking had become so confused and tangled that it was often incoherent. If Wyn failed in his experiment, the next nine years threatened to be trying indeed.

The children left the house with me docilely enough, but as soon as we reached the lawn Mark burst into tears.

"What's the matter with you, young fellow?" I asked in surprise.

"What's Daddy going to do to Thomas?" he demanded. "Daddy's going to hurt Thomas!"

"Don't worry, Thomas isn't going to be hurt," I reassured him, aware that I might not be telling the truth.

The boy looked at me straight.

"I know what a martyr is," he said indignantly, his sobs subsiding. "I studied Joan of Arc in school."

"Daddy . . . Thomas in big furnace put," Summer informed us in her labored fashion. "Thomas all burnt up was going to. Him . . . but I him saved. Saved him, Summer and I."

"Neither one of you is going to do anything about Thomas right now," I said brusquely, recognizing Summer's use of the past tense as an expression of intention. "When Daddy's through with Thomas, you may play with him again."

Mark subsided, but he retained on his face a rebellious expression which had by now become familiar to me. Summer, although she said nothing for a few moments, became more excited. She alternately flushed and paled, breathing hard, until I began to fear she was ill.

Now a deep, powerful hum arose from the house. Wyn had switched

on the power and was ready for his experiment.

It was a tremendous volume of sound, a physical thing that throbbed through the ground under our feet and caused the leaves of the trees to tremble as in a breeze. An electric tension filled the air and seemed to intensify Summer's agitation. Her eyes dilated in fright and her teeth began to chatter.

"Away got I but!" she cried suddenly in a shrill voice. "Up blew it before away ran he and Thomas saved I! Me with up blew it and fire of full furnace big a was it! Furnace a in Thomas had they!"

"Here, child!" I shouted above the increasing roar of the generators. "You're hysterical. Nothing's going to happen to Thomas."

She quieted abruptly, glaring at Mark in affright. He stared back, equally alarmed.

"He isn't, Summer he's?" she asked me plaintively. "Boy a be Summer could how? Mark I'm know I."

I didn't understand this at all, especially when Summer began feeling her arms and legs and inspecting herself all over, carefully.

The sound of the machinery in the basement reached a shrieking crescendo that must have put the teeth of everyone in the neighborhood on edge. Mark came to life. His eyes shining fiercely, he grasped Summer by the arm.

"Are they going to hurt Thomas?" he demanded intently. "Are they, Summer?"

She looked at me, not the boy, and suddenly she was calm as though in the grip of profound shock. I could hardly hear her quiet, childish voice through the noise from the basement.

"Where . . . know . . . don't," she began haltingly. "Gone . . . Summer's but. Furnace the in him had they. Thomas saved I."

Her voice trailed to a gurgle and then she began to chant, "Burn Thomas burn Thomas burn Thomas . . ."

The boy suddenly broke from her and began to run for the house.

And, BACKWARD, she ran after him.

Caught by surprise, it was a moment before I could gather my wits and follow, shouting at them. They had disappeared around the corner of the house, and I rounded it in time to see them tug open the outside basement door and vanish inside. An eerie blue light flickered from the open door.

Trying to run too fast, I tripped over the garden hose and fell. I got to my feet, momentarily dazed.

The explosion knocked me flat on my back, blinded by the flash that burst from the basement windows and through the cracking walls.

The blast tilted the den up from the bottom. Its metal and concrete floor, reinforced for the experiment, buckled but remained unbroken, like a giant slide. Down that slide, through the smashed walls, Wyn catapulted, to fall unhurt into the grass.

But the rest of the house crumpled in on the basement and caught fire. Under the blazing piles of ruins, I could only surmise, were

trapped the children, both mother and son.

I wept frantically. At my age, I must have been a pitiful spectacle. Neighbors put their arms around my shoulders, tried to comfort me.

In contrast, Wyn was remarkably calm as he reported to Gus Adams.

"Every precaution was taken, Mr. Adams," he said, staring morosely into the smoking embers of the house. "Both of them ran into the basement just before the explosion. There was nothing anyone could do after that."

"Too bad, Mr. Storm, to lose your wife and son all at once," said Gus sympathetically, writing in his report book. We had kept Summer pretty well concealed behind the high board fence in recent years, so few people were aware of her retrogression. "If there's anything I can do to help, let me know."

I upbraided Wyn for his apparent callousness when we got to a room at the City Hotel.

"You may be right," he said. "But, first, I want to know something."

He had me relate to him everything that had transpired with the children after we left the house. He made me repeat several points and questioned me closely. He was interested particularly in what Summer had said, how she had said it and how she had acted. The whole thing was so clearly impressed on my mind, as it is today, that I'm sure I made few errors.

"Well," he said, when I had finished, "we'll never see either of them again, but I think I can say definitely they weren't killed in that explosion."

"I don't see how you can say that!" I exclaimed.

"You remember what I told you —that if Summer's existence had been reversed in time after she was born, she was existing somewhere else at the same time? Living normally as a younger child in one place, and as we knew her in reverse?"

I did remember it.

"Well, she was. But we thought she'd be a girl in both instances. When her time direction was reversed, so was her sex. *Mark and Summer were the same person!*"

I gasped. Wyn took a piece of hotel stationery from the rickety desk and scratched a zigzag on it with his pen. It was a figure like the one he had drawn in the library of our home, except that the top arm of this Z was very short.

He labelled the top arm of the Z "Mark," and the diagonal "Summer."

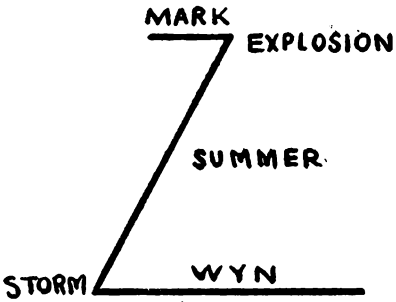
"My mistake was that I thought my energy explosion would be at B, throwing Summer back into a normal time direction. Instead, it was at A, reversing the time direction of Mark's existence: and the reversed Mark was Summer."

"But Mark was Summer's son." I exclaimed.

"Curious, isn't it?" he agreed, smiling strangely. "She gave birth to herself, like the phoenix. Nor is that all. She conceived herself!"

With a firm hand, he wrote "Wyn" above the bottom arm of the Z!

The diagram looked like this:



"The re-reversal!" His blue eyes were a little self conscious as they looked at me now. "Don, I was born Mark Storm. This explosion today reversed my time direction and I became Summer Storm, to give birth to myself nine years ago. And in a terrific burst of natural energy that you yourself saw, a crucible so fiery that it could wrench the very inner fabric and physical form of the body, the time flow for me was twisted back to its proper direction that night in the park and I became myself—to father myself six years later!

"I was my mother. I am my own father and my own son!"

There it is. Wyn believes he sprang from nothingness, from himself. Amid the wreckage of the laws of cause and effect that this whole thing involves, it's possible, I suppose. But a couple of details still bother me, details I haven't mentioned to Wyn.

Oh, it isn't the coincidences. If the future is fixed as is the past, they wouldn't necessarily be coincidences: things like Summer—in the reversed time in which she lived—stripping off her clothes, donning Gus Adams' raincoat over her nakedness and going with us out to the park, to that rendezvous with the lightning and Wyn.

One of the details I can't take is that it's hard to believe that, even in such strange twistings and turnings of time, any creature can initiate itself and, in effect, spring from nothing—though Wyn says it's done at the sub-atomic level in simple terms of conversion of energy to matter. But how about the fact that such a complicated creature as man is built by the action of the genes and chromosomes?

The other is that year that I was Summer's lover. If she was living backward biologically, wouldn't that apply, too, to the growth of an unborn child while it was still part of her. And Wyn left Allertown right after Mark's birth.

I've heard of virgin mothers. I'd rather believe in a "virgin father" than human creation from nothingness.

I once had hair, and it was blond. My eyes are blue. I look in the mirror, and then I look at Wyn lounging at ease behind his newspaper.

My son? My motherless son?

• • •

What Is Your Science I. Q.?

TRY answering the quiz below to find out how science-wise you are. Score 5 points for each correct answer; 75 is good, 80 very good, over 85 makes you a whizz. Answers on page 99.

1. According to the theory of relativity, mass and ——— are equal and interchangeable.
2. On the basis of the chemical activity of metals, which metal is the most active?
3. The critical temperature of oxygen is ——— centigrade.
4. What do we call a compound which consists of two elements only?
5. Long waves are radio waves with frequencies less than ——— kilocycles.
6. What is the chief component of protoplasm?
7. Carbon, hydrogen, oxygen and ——— are always present in proteins.
8. ——— light vibrates on only one plane.
9. What is the name of the chemical process in which a solid substance changes directly to vapor without going through a liquid state?
10. Ozone is ——— times heavier than oxygen by weight.
11. What have quaternion, tensor and vector in common?
12. Which radioactive rays cannot have their direction changed by a magnetic field?
13. Pressure in the ocean increases one atmosphere for ——— feet of depth.
14. What is the name given to the process of joining together a number of molecules of the same kind to form a single larger molecule?
15. Inertia ——— as velocity approaches the speed of light.
16. A nuclear particle intermediate between an electron and a proton is called a ———.
17. A siderite is a meteorite composed entirely of ———.
18. Heat energy is liberated by the decomposition of radium at a rate of about ——— calories per hour for each gram.
19. Which radioactive rays have the lowest velocity?
20. The photic zone of the ocean where there is sufficient light for photosynthesis of sea plants exists only to a depth of about ——— feet.

Illustrated by Paul Orban

Wellesley was ordered to check on deviants or mutants. But the evidence was often subtle, and he knew he couldn't afford to take a chance . . .

the scamperers

BY CHARLES A. STEARNS

THE EARTHMAN, Wellesley, came to Ophir in the season of aphelion, when the binary suns of that remote planet were cold serpent's eyes, dimly seen above the chill mists that shrouded its fern forests and craggy, young mountains, its silent oceans and magnificent organ pipe cities of legend.

From space one might look down upon the vista of these latter prominences and imagine a vast, exotic civilization spread over the face of the equinoctial swamps, but Wellesley knew that the giant towers were mere calcareous shells, hollow as the expectations they had inspired in the first

planeteers to arrive here two hundred years ago—they were the work, in fact, of small, mindless crustaceans.

His own destination, a small, shabby, corporate plantation, was less impressive in appearance. Its name was Aidennsport. It consisted of a hundred buildings, including a commissary and a hulking communal storehouse. The primordial jungle was all about it.

To Wellesley, yellow-cheeked from too many years in space, cynical from the paucity of human values in his life, Aidennsport was the despised prototype of colonial stagnation about the galactic rim. For he was a dour, lanky pessimist among that immense, invaluable, but nondescript order of men, the Rift constabulary, whose beat is the emptiness between the stars, and which enforces the name of law throughout the vast reaches of the firmament beyond Sol's sprawling civilization.

Wellesley's ship was accustomed to describe an elliptical orbit which brought it near the system containing Ophir once every seventh sidereal month. It never stopped. Its course was an inexorable as a comet's; nevertheless, he had lately received the commission of an errand here for the omnipotent Department of Genetics and Genealogical Records.

And so he was forced to make landfall in a rocket tender in a meadow by Aidennsport, while the ground quaked dangerously beneath the settling blasts of the tiny vessel. He located the single course of the village without difficulty. Half a dozen ragged children were playing there, and stopped to stare. Women peered at his dark uniform from behind curtains in the stained, milk-colored bungalows. Quaintly dressed men, tending the auto-pickers in nearby fields of drug-plant, shaded their eyes to gaze with silent menace, though there was no sun.

He was able to find the house of the agent by the frayed company flag flying over it. To the right of it was the warehouse where the annual crop of senna-like leaves of the drug-plant were stored for drying. This was Aidennsport's meagre industry. Beyond lay the swamp, and far across its desolate surface, the multi-colored towers of the pipes fingered the sky, aloof and sinister in aspect.

A boy of no more than ten, dark eyed but with that startling, burnished-gold complexion so often found in the systems of twin or multiple suns, sat upon the steps before the cottage. He was playing with a furry animal not unlike a Martian ferrax, which sprang up, scarlet-eyed and bristling, at the sight of Wellesley.

"Here, boy," said Wellesley, who neither liked nor trusted children. "Is this the house of Amos Sealilly, the factor of Aidennsport?"

"Sure. That's my pa. Say, are you a spaceman?"

"Never mind that. Where is your father?"

"In the warehouse," the boy said. "I'll show you how to get inside. My name's Joseph, and I have a spaceship in the back yard. I call it the *Stygia,* after the pirate ship of

the twenty-eighth century. Do you want to see my crew?"

"Later, perhaps," said Wellesley dryly. "Come along, now."

They found tall, aluminum doors which slid back at the wave of a hand, and entered into a vastness of cool gloom, permeated by a spicelike odor of curing leaves.

A figure emerged from the drying racks at the other end of the warehouse.

"Is that you, Joseph?"

"That's pa," Joseph said.

"Damn you, Joseph!"

"I guess he's drunk," Joseph said.

Wellesley advanced. "I am Lieutenant Wellesley of the Rift police," he said.

Amos Sealilly was a great, craggy ruin of a man, with seamed face and heavy grey brows that shadowed intense blue eyes. Eyes that glared just now. "What do you want here?" he bellowed.

"My mission is to perform an ethnic census for the Bureau of Genetics. I shall require your cooperation."

"There are three hundred and twelve people in Aidennsport," Sealilly said. "Write that down and get out. Go back to your space castle and leave us alone."

Wellesley sighed. "I am afraid that an ethnic census is never quite that simple. However, since you are required by law to assist me, you may as well know the truth. This community is suspected of inbreeding."

Inbreeding is not, of course, a crime, except against nature. Nor is it ordinarily dangerous. Combined, however, with the environmental influences of certain Rim planets, it may cause genuine, true-breeding mutations within the species, such as monsters, impressiono-telepaths, psycho-variants and other undesirables which, if allowed to multiply for a few generations, might become dominant. They are located and deported to A-type worlds.

It had been an anonymous tip that had brought Wellesley to Ophir, but in all the inhabited universe, he knew, the Bureau was the sole guardian of the classic blood strain, and it took no chances.

"What's 'inbreeding,' pa?" said Joseph, tugging solemnly at his father's sleeve.

"A naughty word of the middle ages," said Sealilly thickly. "A bugaboo of the mighty sky-chiefs. If we do not co-operate we bring their lightning upon our heads. Yet, what must we do?"

Wellesley did not smile. "You must inform the colonists that I wish to interview each member of every family and clan briefly, beginning tomorrow morning at seven. I do not mind in the least being *persona non grata,* but if any person fails to show up, or if there is any trouble, you will be held personally responsible. Moreover, I do not think you are as drunk as you would like me to believe."

Amos Sealilly bowed, took a flask from his pocket and drained it.

"One other thing. I shall need a place to sleep."

Sealilly smiled. "There is an abandoned native daub-hut behind my house. You are welcome to it."

"It will serve," answered Wellesley coldly. "There are natives in the area then?"

"Yes. Bipeds, though not mammalian, you will find. In fact, quite low in the scale of evolution. They are nearsighted and harmless by day, but you will be wise to keep to your hut after dark."

"I can take care of myself."

"I'll show you the place," Joseph offered. "I can carry your space kit, too."

"Over there is my ship," Joseph said, pointing. "We are making ready to put out for Arcturus."

There was a bright constancy about Joseph that clutched at the heart. Not Lieutenant Wellesley's heart, of course, he reminded himself. The "ship" was indeed the rusty, peaked foretank from some ancient freighter, complete with hatch. It was set on end at the edge of the swamp. To any boy it would have been a starship.

It was already dusk. The Ophirian daub-hut was not so bad as he expected. It was massive. The orifice had been enlarged into a door. Windows had been added. The only furnishing was the rude couch. It was a measure of Sealilly's hostility.

Joseph spied the ferrax-thing scuttling across the lawn and dived at it. The two of them rolled over and over, Joseph laughing, the animal growling and spitting.

Wellesley went in, closed the door and removed his official log from its case. The next two hours were spent in a carefully worded account—for space logs are part of the permanent records of the Galactic Court, among others—of the events of the day, including a bleak and perhaps prejudiced account of the character of Aidennsport and of Amos Sealilly.

Afterwards he lay back on the couch and smoked several cigarettes in lieu of the food capsules that he did not crave. He was far from imaginative; nevertheless, the character of the place crept at last into his consciousness. He was used to cramped, machinery-filled spaces and the sterile smells of hot metal and ozone; here was an aura of decaying organic matter—and of something else. A faint, but unmistakable reptilian odor, attesting to the nature of past inhabitants.

The vault of darkness was absolute, unabated by the dim patches of light that were the fenestrations above where he lay.

And presently someone very stealthily opened the door and entered.

Only for an instant was the figure silhouetted there before the door closed and darkness reigned supreme once more. Yet that instant was long enough to tell him that it had been a woman. And though her features had not been discernible, he had gotten the impression of exceptional beauty.

For a time there was no movement; no sound save her faint breathing. "Who's there?" he said. "What do you want?"

And then she came nearer and stood so close to him that the perfume of her breath was upon his face. Suddenly he groped, caught

her arm and pulled her to him. The warmth of her body was against him. He felt her tremble. But she did not try to pull away.

He laughed. "Perhaps I may revise my opinion of Ophir," he said.

"No light!" she whispered. Her voice was low and vibrant.

"Why not?"

"I must not be seen here. But I had to warn you. It would not have been right not to warn you about Aidennsport."

"What of Aidennsport?"

"It is a dreadful—an evil place. There are forces here which you would not understand. Leave at once while you are still able to go!"

"You forget that I am a policeman. To leave without completing the census would be dereliction. I remind you that the Empire is inexorable in these things. And who are you, anyway?"

She did not answer, but drew away so quickly that he could not grasp her. In a moment, from across the room her voice came. It was less intimate, even matter-of-fact.

"If you will not leave," she said, "lock this door behind me and do not, as you value your life, step outside this hut until daylight."

She was suddenly gone and he was alone in mystification and wonder, and a dull, stirring anger that he could not account for.

But he could make nothing of it and after a time he put the incident resolutely out of his mind and tried to sleep. This was not accomplished at once. Curious sounds had begun to filter in through the fenestrations. Some were the night sounds of birds or insects. Other sounds, faint hissings and gruntings, were unidentifiable. Once he thought he heard the slap-slap of bare feet running past his door.

At last he was forced to employ a mild form of auto-suggestion, learned long ago and employed often during those first lonely years in space. He slept.

But once, in the early hours of morning, he was awakened by a tumult. There was much loud hissing and the scampering of many feet outside the daub-hut, as though some intricate and riotous game might be in progress out there, the nature of the game—or for that matter, the players—unguessed at. But he was half asleep, and thought little of it until he awoke again at daybreak.

THE AUTHORITY of the Rift constabulary is acknowledged universally, though sometimes grudgingly. The men of Aidennsport, therefore, sullenly reported to Wellesley, and brought their families.

It is a singular thing, but almost every birth and death in the galaxy is recorded by the Empire. The laws concerning this are old and stringently enforced. Therefore Wellesley already had a fairly accurate estimate of the true population of Aidennsport, and it came close to the number offered by Amos Sealilly.

Following the seldom-used manual of the Bureau, he received vital statistics, made micro-photos and dermal prints, and endeavored a minute scrutiny of every man,

woman and child that passed before him. He was finished by mid-afternoon.

Evidence of ingeneration he found in plenty, in the marked similarity of features among certain families, but nothing which could be called deviation or mutation. Not even polydactylism, which is one of the earlier manifestations. Still, he knew that the physical impress of the mutant was often subtle, and that he might have overlooked something.

In none of the females could he identify the girl of last evening. If she had failed to appear—was hiding in the village—might not others be hiding too?

The only recourse was to study the natives and try again. In many cases deviation among *homo sapiens,* who had colonized the Rim planets, simulated the natural characteristics of native races. The relationship between mutation and environment was obvious.

The chief magistrate, factor, or leader of any colony with an official grant was required by law to assist and obey any member of the Rift police in the capacity of a deputy.

Wellesley called Amos Sealilly, who had been avoiding him all day. "Is there a tribe of the dominant native species near here?" he asked.

Sealilly was still drinking, and saluted stiffly. "In the swamp, Lieutenant."

"Guide me there."

"You can go to hell," Sealilly said, "and I will guide you *there.*"

"You refuse?"

"I do. It's too dangerous for a spaceman. Full of bog-fever. You've no natural resistance. Besides, I'm busy inventorying."

"Very well," Wellesley said, struggling to hold his temper in check, "I'll find them alone."

"In which case," said Sealilly, "you will not come back, and that will be an irreparable loss to the Empire."

Wellesley left him and made his way toward the swamp. Joseph was playing near his ship, and calling orders to an imaginary crew inside. When he saw Wellesley he came running.

"We were just blasting off for Earth," he said, "but I heard you and Pa talking. If you want to go in the swamp, I'll show you the way. I've been there lots. The Ophirians hang out on the shores of the black lake, where the organ pipes are." He pointed to the towering pinnacles in the distance. "They catch shellfish there."

"You know them?"

"Everybody has seen them. They are kind of green and slimy, but they won't hurt you. They can't see in the day-time. Only smell. Anyway, I'm not afraid of them."

"Done," said Wellesley, "and in return for the favor I promise to put in a word for you at the nearest spaceman's hiring hall."

"You won't have to do that," Joseph said. "My crew and I are going to be space pirates."

Then Wellesley laughed aloud, and felt better afterward than he had felt in many a long month.

The trail through the swamp was damp and primitive. Everywhere the cycads, giant ferns and reeds

overhung the path. There were great, blood-colored flowers which snapped at twigs that Joseph put into their corollas.

Meanwhile, the ferrax-beast labored behind them, following with its proboscis to the ground, until the boy, taking pity, picked it up and carried it. Wellesley asked its name.

"His name is Omur," Joseph said. "I caught him in the mountains when he was little and raised him. But now Omur is too fat to walk."

Eventually they emerged into an open swale, with a stretch of dark water before them. On the other side of the slough lay a sight well worth a day's march. Dozens of giant pipes, some two hundred feet or more in height, stood braced against the sky, pastel blue, pink, and gold in the mists.

But Wellesley was less interested in these than the creatures which moved like grubs about their base, at the edge of the lake—squat, grotesque forms that waded the shallow water, scavenging for shellfish and crustaceans, and took no notice of the humans.

On coming nearer, however, Wellesley observed a very curious fact. The Ophirians were of two varieties. The ones in the mud were gross and toadlike in appearance. Whenever they found an especial delicacy they would run, with their webbed feet making smacking sounds in the shoal water, and lay it at the feet of an Ophirian who sat in a wallow of peat moss and mud, and did nothing. He was a much smaller variety, but, Wellesley noted, with considerably greater frontal development to his skull. Also his thin body bore a long, green tail. The tails of the workers were vestigial.

"The chief?" Wellesley asked.

"No," Joseph said. "It's something else."

"Are they a clan, then, or brothers?"

"Closer than brothers," Joseph said, scratching Omur's head.

"I have it—*avatars!* I should have guessed!" He had heard of this odd genetic arrangement before, but never witnessed it. In such cases a dozen or more individuals were born of a single nucleus in a single egg. Of these, one developed more fully than the rest and controlled his mentally-stunted avatars with a mental vinculum far more fundamental and powerful than mere telepathic union. On the other hand, the avatars were his hands and feet, and had larger bodies.

The large-headed Ophirian sat in his wallow and accepted the food offered him with long, leathery fingers. He crunched noisily. Once he turned to stare at them briefly with great, owl eyes. Eleven avatars turned simultaneously to stare. It was like looking into a multiple mirror.

"They sense us," Joseph said, "but they can't see us. Come on."

From nearby, the pipes were even more awe-inspiring. Besides the massive old towers there were smaller ones in every stage of development. It was incredible to think that they were actually growing; pushing up out of the lake.

In one of them a jagged hole, five or six feet in circumference, had been broken at the base. Joseph, with his furry pet under his arm, went to investigate it.

A moment later there came a shout from him that brought Wellesley running. "What's the matter?"

"Omur went up the pipe," Joseph said, "but *you* can get him." There were tears in his eyes. Beseeching tears.

"We'll see," said Lieutenant Wellesley brusquely. He put his head inside the pipe. A tiny circle of light far above him showed at what an awesome height was the upper rim. The inner surface, however, was very rough, and there were plenty of holds for hands and feet. He could not see Omur; only the circle of light, and around it, blackness. Suppose the damned thing bit him when he tried to rescue it! A faint, moaning sound emanated from the vast funnel, doubtless from the updraft.

He found a place for his foot; drew himself up a step; then another. Joseph's white face was staring up at him from below. *And suddenly the circle of light was blotted out!*

THERE WAS a rustling sound like dry leaves in the wind, and a sudden, sharp pain in his temple. Then another at the base of his neck. He fell back and sprang out into the open. The aperture, in an instant, was full of small, needle-like fluttering things.

"Stingbats!" Joseph screamed. "Run!"

Wellesley fled after him, but he was already beginning to feel a sick, draining weakness. Within a few steps his legs had become rubbery. Joseph was out of sight. Perhaps gone for help. But then Joseph did not know that he had been stung.

After a while he came to a small, black pond in his path. He had gotten off the trail. He sank down, there, beneath a fern tree, cursing.

He was sure that he was dying, for a numbness, an absence of feeling, had stolen up from his feet and possessed his legs. He essayed a bitter smile. He was more chagrined than afraid, for this was an ignominious way to pass, here in a nameless swamp, alone, not even beset by one worthy enemy. And perhaps when he thought he smiled, he was merely baring his teeth in that manner that certain neurotoxins leave their corpses always . . .

Someone was shaking him brutally and insistently, and someone was repeating his name, over and over. He knew the voice at once, for it had been lately in his thoughts.

"Get up!" she said.

"I can't."

"You must—or die. Get up now and try to walk. Come, I'll help you."

She did help him, and with her support he managed to get to his knees and then to his feet. He walked.

Afterward, there was a kind of delirium. He remembered bitter tasting capsules which she made

him swallow later on in the daubhut, but he did not recall having arrived there. He only knew that it was pleasant to have her cool hands on his forehead. The hands seemed to fill a vast, fundamental need. And this was out-of-character for Lieutenant Wellesley.

After a while he was lucid, and was surprised to note that, as at their other meeting, the darkness was absolute. "It's night," he said. "Very dark."

"Yes."

"Give me your hand."

He held it for a time in both his own. It was a firm, capable hand with long, tapering fingers. "Believe that I am grateful," Wellesley said, "even though I must be grateful to a benefactor whom I have yet to see for the first time. Let me look at you. I cannot command you to tell me who you are, as an officer of the Rift constabulary, but I ask it as your friend."

"You ask the impossible," she said. "The worst is over for you, but there may be still another shock to come. You must stay here until you are stronger, and then I will help you escape. Now I had better go, before—before I am missed."

He heard her retreating footsteps and the closing of the door.

Escape from what? he wondered vaguely. The poison, or the antidote seemed to have brought about some curious psychological change in him. He could not think with the old, clear incisiveness. The drive was gone, the purposefulness of his mission to Ophir. He was like Samson shorn—or a man taken with void amentia whose mind becomes as a child's.

And it was so dark. A horrible suspicion arose in his mind. He searched for, and found the torch that was in his kit. He turned it on. Nothing happened. No beam of light shot out to illuminate the ceiling. He clicked the switch several times, then held the lens against his cheek. It was warm, all right.

He was stone blind.

WELLESLEY was not unlearned in the physiological sciences. He guessed that the blindness might be temporary—a result of neural shock, but that was scant consolation.

Now it seemed to him that since his arrival an invisible pattern of ill-will had been forming up around him. An ugly something lurking beneath the sullen surface of this strange village. A malignant force, beyond doubt, that well knew his true mission on Ophir.

Now he was helpless, incapable of concerted action. He could not even retreat, but only lie and listen and wait. Now it was *their* move. The terrors of the blind were apt to be blind terrors indeed.

The sounds were not long in beginning. At first an indistinct murmur. Then something—or someone—scampered swiftly past his door. He got up and locked it; then lay back, spent by the exertion. Presently the running and scampering began in earnest. And a hissing and squealing such as might have emanated from all the fiends in Hell. Once there came a scratching at the door.

An hour passed like a century. The sounds had gradually died away into an absolute silence that was much worse. He waited.

There came a knock at the door.

He sat up quickly. "Who is it?"

"It's me—Joseph."

He unlocked the door and the boy came in with light, eager tread. "You all right?" he said.

"Yes—yes, I'm all right. But I can't see. Tell me, what time is it?"

"It's nearly morning."

"Thank God! Now listen carefully. Do you know what a strategic withdrawal is?"

"Sure, everybody knows that. Every spaceman, I mean."

"Good. It is time for me to withdraw to my patrol monitor in space and make a radio report. Will you guide me to the rocket? There may be danger."

"I'm not afraid," Joseph said. "Come on, I know a short cut."

Wellesley slung his space kit over his shoulder and followed, with his hand on Joseph's collar. They went out into the night air which smelled fresh and clean after the daub-hut, and revived him a little.

At first he walked easily, for the ground was level, but after a minute or two the growth became heavy underfoot, causing him to stumble, and reeds were whipping against his face.

Presently they halted.

"Why have we stopped?" Wellesley asked.

"Here we are," Joseph said.

"We couldn't have gotten there in such a short time. Not even by a short cut."

"Put your hand out before you," Joseph commanded. "You'll see. I guess we can blast off any time." There was a sound of feet, scrambling up a steel ladder. A moment later he could hear Joseph's voice from inside, echoing hollowly.

He put his hand out and touched the ladder. The rungs were flaked with heavy rust beneath his finger. *"This is not my rocket!"*

"It's *my* rocket," said Joseph's disembodied voice, from somewhere above his head.

Wellesley cursed him.

"It's the fastest ship in the universe," Joseph said. *"Where you going?"*

Black anger possessed him, but the keen instinct of orientation common to men who have lived in interstellar space worked for his salvation. He might have blundered into the swamp, but he did not. Instead he came up, after a terrible half-hour, against the wall of a building which, by its immense extent, could only have been the warehouse. He moved along its sheer, featureless side until he came to a door, which reoriented him, then struck out in the direction that he guessed the daub-hut to be.

He bumped against it at last, located its door, flung himself in and thankfully bolted it behind him.

But he was not alone. She was there, waiting for him. He started when she spoke.

"Where have you been?" she breathed. "I have been terrified. I found the hut empty and I was sure that you were dead."

"Like a bad penny," he said, "I return. But your being here is good

fortune. I am certain that *you* will consent to leading a blind man to his ship without resorting to childish trickery. In fact, I shall make sure of it."

"Not now," she said. "It is too dangerous. We could never get through the swamp. Besides, you must still be weak from the effects of the poison. Let us wait until morning."

He seized her wrists and squeezed.

"You're hurting me!" she cried.

"Then waste no time. And if you try to break way, or lead me into a trap, I'll snap your wrist like a straw!" He dragged her to the door.

"Through the village is best," she said. "They are sure to see us, but in the open we may be able to outrun them."

"*Who* is sure to see us?"

"Never mind that now. Follow me!"

Their flight had a rather dream-like quality because nothing impeded them, even beyond the village. Miraculously she seemed to guide him where no underbrush or tangling grasses caught his feet, so that not once did he fall.

"There it is, just ahead," she said. "The rocket tubes appear to have sunk into the mud two or three feet, though. Do you think you will be able to take off?"

"It will not matter in the least," he said. "But tell me, is it still dark?"

"Yes."

"Quite dark?"

"Very dark," she said.

"That's all I wanted to know. Open the airlock and climb up. I'll follow."

Once aboard, he found the controls and set them for take-off. Then he pressed a small button. The port began to swing shut. He heard her run toward it, but he caught her and held her until the heavy hatch had banged shut with a hiss of escaping air.

"Let me go," she whimpered. "What are you going to do to me?"

"You are under civil arrest," he said harshly.

"But I haven't done anything. I have helped you."

"Of course. But you forget that I represent law—not justice. Once I told you that I could be ruthless. You see, whoever you are, you are what I came here to find. I have suspected all along; now I am certain."

"What do you mean?"

"You brought me here without losing the way. Then, from a hundred feet away you saw that this rocket tender had settled two feet into mud. *All this in absolute darkness.* That must mean that you have night sight—like the natives, a sure sign of abnormality. Besides that, you have consistently avoided me in daylight. Meaning that I must not get a glimpse of you, even though you were able to see me quite well. You were the reason for Sealilly's hostility. He wanted to get rid of me before I found out about you. Joseph, the normal child, was used as a decoy to mislead me. But Joseph's sister was a mutant."

She fell to the deck, sobbing, as he throttled full power for the blast-off.

WELLESLEY left Ophir a small, grey-green globe in the vastness of black space and set an automatic course for the mother ship, where he intended to submit a detailed report by radio to Regional Headquarters on Rigel Twelve.

So far as he was concerned, the case was closed, once they were aboard the patrol ship, but it was three weeks to the vicinity of Rigel, and in that time a curious sequel had developed.

The girl (her name turned out to be Laura) had stopped crying, and had begun to take an interest in life once more. In fact, he sensed that she was studying him a great deal of late.

They were standing before the viewport, she looking at the great angry mass of Rigel, magnified in the glass, but actually still two days ahead, he listening to every sound aboard the huge ship as he had learned to listen since the darkness closed in on Ophir.

She spoke. "How will it be on Rigel Twelve? Will I ever see you again?"

"Will you care?" he said.

"Perhaps I ought to hate you, but it is only because you are blind that you can not understand. On Ophir I was not happy, but at least it was home. Out there they may laugh at me. It is exciting and wonderful, but terrifying."

"They will not laugh at you. You will be allowed to live on any approved planet that you wish, and choose your own profession. You will be trained at the expense of the Empire. And in a few years you may be allowed to visit your father and brother on Ophir. Only *visit,* I mean. Does that sound so bad?"

"But if they laugh—"

"*I* am not laughing," said Wellesley, with a strange lump in his throat.

"You might if you could see me. I'm too dark. My eyes are too big. My ears are too small."

"I *can* see you," he said.

"Is it true!" She clasped his shoulders. "But when—how long?"

"Since this morning, a little. The effect of the venom is passing. Now I can see you perfectly, and you are beautiful. Strange, and—and beautiful."

And she was.

"Do not go to Rigel Twelve. Stay with me," he said. (It was Wellesley's misfortune that he always sounded like a policeman making an arrest, but she kissed him anyway.)

And he thought what a fool Amos Sealilly had been.

But Amos Sealilly had had troubles of his own. It was the evening after Wellesley had taken leave of Ophir forever. Sealilly dreaded the coming night, as he always did, and had fortified himself against it. He was drunk, but not drunk enough.

The warehouse was locked for the day. He was walking toward the house, lurching a little, and mumbling curses as he did so. Then he spied Joseph.

Joseph, a small figure in the dusk, had just climbed out of the rusty old peak-tank at the edge of

the swamp. He had furnished it with a bunk, as befit a well-found spaceship, and often slept there.

The fact was that he had been sleeping there all day, having been up all night. Joseph did not go to school. He yawned and stretched.

Amos Sealilly went on to the house, and started to shut the door behind him, but Joseph, coming up behind him, pushed it open and came in. He was breathing hard, having hurried to catch up with his father. He asked:

"What about the spaceman?"

"What about him?"

"Was he lost in the swamp?"

"Where did you get that idea?" Sealilly said. "He made it. Took off before you were up this morning, just before dawn."

"I *was* up," Joseph said. "I thought it was a meteorite. Damn!" He stamped his small foot.

Sealilly grinned thinly. "Laura went with him."

Joseph's face whitened. *"Laura?* Damn him! Damn her too."

"You always hated her," said Seallilly, taking the bottle out of his pocket and sucking it. "She was too normal for you to stomach, I guess."

"I would've got him if he hadn't run away like a yellow dog," Joseph said. "The stingbats would have done it if she hadn't interfered. And then this morning I had him, too." He was thoughtful for a moment. "Who do you suppose tipped him off?"

And he watched his father's pasty face.

"Who?"

Sealilly laughed.

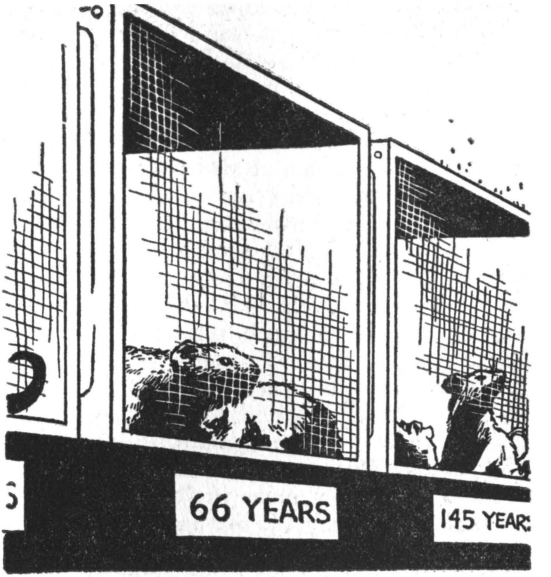
"All right," Joseph hissed. "I'll get you for that. You wanted to get rid of *me,* I'll bet. But you got rid of her instead."

But Sealilly continued to laugh, inside, because this was almost as good as getting rid of Joseph, having Laura out of his clutches at last.

"Me and my crew will fix you for that," Joseph said bitterly.

And with that, his avatars came crowding in behind him, squat, powerful and ugly, their saucer eyes intent upon Sealilly.

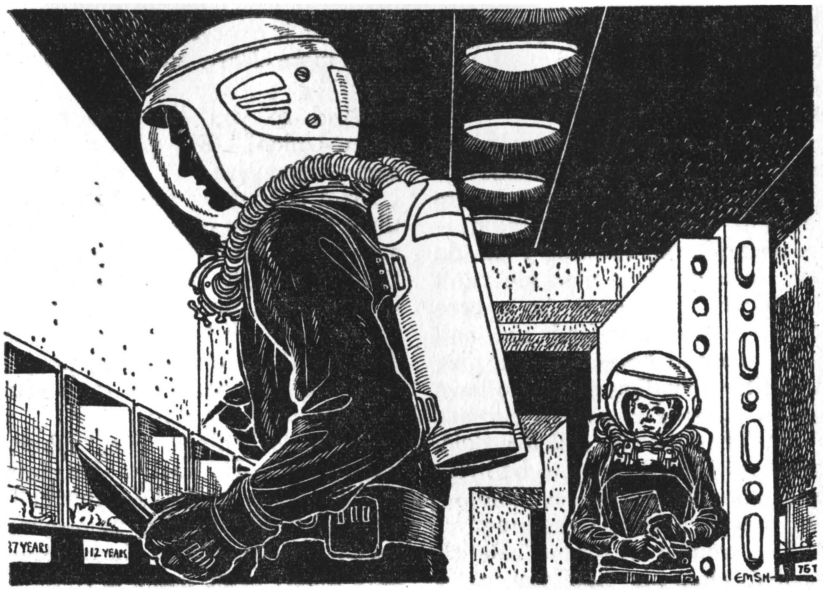
He had been through it several times before, but this time he screamed a little bit before it was over. He could not get away from Joseph, of course. There was too many of him. • • •



What Shall It Profit?

"If you would build a tower, sit down first and count the cost, to see if you have enough to finish it." . . . The price may be much too high.

BY POUL ANDERSON



Illustrated by Ed Emsh

"THE CHICKENS got out of the coop and flew away three hundred years ago," said Barwell. "Now they're coming home to roost."

He hiccoughed. His finger wobbled to the dial and clicked off another whisky. The machine pondered the matter and flashed an apologetic sign: *Please deposit your money.*

"Oh, damn," said Barwell. "I'm broke."

Radek shrugged and gave the slot a two-credit piece. It slid the whisky out on a tray with his change. He stuck the coins in his pouch and took another careful sip of beer.

Barwell grabbed the whisky glass like a drowning man. He *would* drown, thought Radek, if he sloshed much more into his stomach.

There was an Asian whine to the music drifting past the curtains into the booth. Radek could hear the talk and laughter well enough to catch their raucous overtones. Somebody swore as dice rattled wrong for him. Somebody else shouted coarse good wishes as his friend took a hostess upstairs.

He wondered why vice was always so cheerless when you went into a place and paid for it.

"I am going to get drunk tonight," announced Barwell. "I am going to get so high in the stony

sky you'll need radar to find me. Then I shall raise the red flag of revolution."

"And tomorrow?" asked Radek quietly.

Barwell grimaced. "Don't ask me about tomorrow. Tomorrow I will be among the great leisure class—to hell with euphemisms—the unemployed. Nothing I can do that some goddam machine can't do quicker and better. So a benevolent state will feed me and clothe me and house me and give me a little spending money to have fun on. This is known as citizen's credit. They used to call it a dole. Tomorrow I shall have to be more systematic about the revolution—join the League or something."

"The trouble with you," Radek needled him, "is that you can't adapt. Technology has made the labor of most people, except the first-rank creative genius, unnecessary. This leaves the majority with a void of years to fill somehow—a sense of uprootedness and lost self-respect—which is rather horrible. And in any case, they don't like to think in scientific terms . . . it doesn't come natural to the average man."

Barwell gave him a bleary stare out of a flushed, sagging face. "I s'pose you're one of the geniuses," he said. "You got work."

"I'm adaptable," said Radek. He was a slim youngish man with dark hair and sharp features. "I'm not greatly gifted, but I found a niche for myself. Newsman. I do legwork for a major commentator. Between times, I'm writing a book—my own analysis of contemporary historical trends. It won't be anything startling, but it may help a few people think more clearly and adjust themselves."

"And so you *like* this rotten Solar Union?" Barwell's tone became aggressive.

"Not everything about it no. So there is a wave of antiscientific reaction, all over Earth. Science is being made the scapegoat for all our troubles. But like it or not, you fellows will have to accept the fact that there are too many people and two few resources for us to survive without technology."

"Some technology, sure," admitted Barwell. He took a ferocious swig from his glass. "Not this hell-born stuff we've been monkeying around with. I tell you, the chickens have finally come home to roost."

Radek was intrigued by the archaic expression. Barwell was no moron: he'd been a correlative clerk at the Institute for several years, not a position for fools. He had read, actually read books, and thought about them.

And today he had been fired. Radek chanced across him drinking out a vast resentment and attached himself like a reverse lamprey—buying most of the liquor. There might be a story in it, somewhere. There might be a lead to what the Institute was doing.

Radek was not antiscientific, but neither did he make gods out of people with technical degrees. The Institute *must* be up to something unpleasant . . . otherwise, why all the mystery? If the facts weren't uncovered in time, if whatever they were brewing came to a head, it

could touch off the final convulsion of lynch law.

Barwell leaned forward, his finger wagged. "Three hundred years now. I think it's three hundred years since X-rays came in. Damn scientists, fooling around with X-rays, atomic energy, radioactives . . . sure, safe levels, established tolerances, but what about the long-range effects? What about cumulative genetic effects? Those chickens are coming home at last."

"No use blaming our ancestors," said Radek. "Be rather pointless to go dance on their graves, wouldn't it?"

Barwell moved closer to Radek. His breath was powerful with whisky. "But are they in those graves?" he whispered.

"Huh?"

"Look. Been known for a long time, ever since first atomic energy work . . . heavy but nonlethal doses of radiation shorten lifespan. You grow old faster if you get a strong dose. Why d'you think with all our medicines we're not two, three hundred years old? Background count's gone up, that's why! Radioactives in the air, in the sea, buried under the ground. Gamma rays, not *entirely* absorbed by shielding. Sure, sure, they tell us the level is still harmless. But it's more than the level in nature by a good big factor—two or three."

Radek sipped his beer. He'd been drinking slowly, and the beer had gotten warmer than he liked, but he needed a clear head. "That's common knowledge," he stated. "The lifespan hasn't been shortened any, either."

"Because of more medicines . . . more ways to help cells patch up radiation damage. All but worst radiation sickness been curable for a long time." Barwell waved his hand expansively. "They knew, even back then," he mumbled. "If radiation shortens life, radiation sickness cures ought to prolong it. Huh? Reas'nable? Only the goddam scientists . . . population problem . . . social stasis if ever'body lived for centuries . . . kept it secret. Easy t' do. Change y'r name and face ever' ten, twen'y years—keep to y'rself, don't make friends among the short-lived, you might see 'em grow old and die, might start feelin' sorry for 'em an' that would never do, would it—?"

Coldness tingled along Radek's spine. He lifted his mug and pretended to drink. Over the rim, his eyes stayed on Barwell.

"Tha's why they fired me. I know. I know. I got ears. I overheard things. I read . . . notes not inten'ed for me. They fired me. 'S a wonder they didn' murder me." Barwell shuddered and peered at the curtains, as if trying to look through them. "Or d'y' think—maybe—"

"No," said Radek. "I don't. Let's stick to the facts. I take it you found mention of work on— shall we say—increasing the lifespan. Perhaps a mention of successes with rats and guinea pigs. Right? So what's wrong with that? They wouldn't want to announce anything till they were sure, or the hysteria—"

Barwell smiled with an irritating

air of omniscience. "More'n that, friend. More'n that. Lots more."

"Well, what?"

Barwell peered about him with exaggerated caution. One thing I found in files . . . plans of whole buildin's an' groun's—great, great big room, lotsa rooms, way way undergound. Secret. Only th' kitchen was makin' food an' sendin' it down there—human food. Food for people I never saw, people who never came up—" Barwell buried his face in his hands. "Don' feel so good. Whirlin'—"

Radek eased his head to the table. Out like a spent credit. The newsman left the booth and addressed a bouncer. "Chap in there has had it."

"Uh-huh. Want me to help you get him to your boat?"

"No. I hardly know him." A bill exchanged hands. "Put him in your dossroom to sleep it off, and give him breakfast with my compliments. I'm going out for some fresh air."

The rec house stood on a Minnesota bluff, overlooking the Mississippi River. Beyond its racket and multi-colored glare, there was darkness and wooded silence. Here and there the lights of a few isolated houses gleamed. The river slid by, talking, ruffled with moonlight. Luna was nearly full; squinting into her cold ashen face, Radek could just see the tiny spark of a city. Stars were strewn carelessly over heaven, he recognized the ember that was Mars.

Perhaps he ought to emigrate. Mars, Venus, even Luna . . . there was more hope on them than Earth had. No mechanical packaged cheer: people had work to do, and in their spare time made their own pleasures. No civilization cracking at the seams because it could not assimilate the technology it must have; out in space, men knew very well that science had carried them to their homes and made those homes fit to dwell on.

Radek strolled across the parking lot and found his airboat. He paused by its iridescent teardrop to start a cigaret.

Suppose the Institute of Human Biology was more than it claimed to be, more than a set of homes and laboratories where congenial minds could live and do research. It published discoveries of value—but how much did it not publish? Its personnel kept pretty aloof from the rest of the world, not unnatural in this day of growing estrangement between science and public . . . but did they have a deeper reason than that?

Suppose they did keep immortals in those underground rooms.

A scientist was not ordinarily a good political technician. But he might think he could be. He might react emotionally against a public beginning to throw stones at his house and consider taking the reins . . . for the people's own good, of course. A lot of misery had been caused the human race for its own alleged good.

Or if the scientist knew how to live forever, he might not think Joe Smith or Carlos Ibáñez or Wang Yuan or Johannes Umfanduma good enough to share im-

mortality with him.

Radek took a long breath. The night air felt fresh and alive in his lungs after the tavern staleness.

He was not currently married, but there was a girl with whom he was thinking seriously of making a permanent contract. He had friends, not lucent razor minds but decent, unassuming, kindly people, brave with man's old quiet bravery in the face of death and ruin and the petty tragedies of everyday. He liked beer and steaks, fishing and tennis, good music and a good book and the exhilarating strain of his work. He liked to live.

Maybe a system for becoming immortal, or at least living many centuries, was not desirable for the race. But only the whole race had authority to make that decision.

Radek smiled at himself, twistedly, and threw the cigaret away and got into the boat. Its engine murmured, sucking 'cast power; the riding lights snapped on automatically and he lifted into the sky. It was not much of a lead he had, but it was as good as he was ever likely to get.

He set the autopilot for southwest Colorado and opened the jets wide. The night whistled darkly around his cabin. Against wan stars, he made out the lamps of other boats, flitting across the world and somehow intensifying the loneliness.

Work to do. He called the main office in Dallas Unit and taped a statement of what he knew and what he planned. Then he dialed the nearest library and asked the robot for information on the Institute of Human Biology.

There wasn't a great deal of value to him. It had been in existence for about 250 years, more or less concurrently with the Psychotechnic Institute and for quite a while affiliated with that organization. During the Humanist troubles, when the Psychotechs were booted out of government on Earth and their files ransacked, it had dissociated itself from them and carried on unobtrusively. (How much of their secret records had it taken along?) Since the Restoration, it had grown, drawing in many prominent researchers and making discoveries of high value to medicine and bio-engineering. The current director was Dr. Marcus Lang, formerly of New Harvard, the University of Luna, and— No matter. He'd been running the show for eight years, after his predecessor's death.

Or had Tokogama really died?

He couldn't be identical with Lang—he had been a short Japanese and Lang was a tall Negro, too big a jump for any surgeon. Not to mention their simultaneous careers. But how far back could you trace Lang before he became fakeable records of birth and schooling? What young fellow named Yamatsu or Hideki was now polishing glass in the labs and slated to become the next director?

How fantastic could you get on how little evidence?

Radek let the text fade from the screen and sat puffing another cigaret. It was a while before he demanded references on the biology of the aging process.

That was tough sledding. He couldn't follow the mathematics or the chemistry very far. No good popularizations were available. But a newsman got an ability to winnow what he learned. Radek didn't have to take notes, he'd been through a mind-training course; after an hour or so, he sat back and reviewed what he had gotten.

The living organism was a small island of low entropy in a universe tending constantly toward gigantic disorder. It maintained itself through an intricate set of hemostatic mechanisms. The serious disruption of any of these brought the life-processes to a halt. Shock, disease, the bullet in the lungs or the ax in the brain—death.

But hundreds of thousands of autopsies had never given an honest verdict of "death from old age." It was always something else, cancer, heart failure, sickness, stroke . . . age was at most a contributing cause, decreasing resistance to injury and power to recover from it.

One by one, the individual causes had been licked. Bacteria and protozoa and viruses were slaughtered in the body. Cancers were selectively poisoned. Cholesterol was dissolved out of the arteries. Surgery patched up damaged organs, and the new regeneration techniques replaced what had been lost . . . even nervous tissue. Offhand, there was no more reason to die, unless you met murder or an accident.

But people still grew old. The process wasn't as hideous as it had been. You needn't shuffle in arthritic feebleness. Your mind was clear, your skin wrinkled slowly. Centenarians were not uncommon these days. But very few reached 150. Nobody reached 200. Imperceptibly, the fires burned low . . . vitality was diminished, strength faded, hair whitened, eyes dimmed. The body responded less and less well to regenerative treatment. Finally it did not respond at all. You got so weak that some small thing you and your doctor could have laughed at in your youth, took you away.

You still grew old. And because you grew old, you still died.

The unicellular organism did not age. But "age" was a meaningless word in that particular case. A man could be immortal via his germ cells. The micro-organism could too, but it gave the only cell it had. Personal immortality was denied to both man and microbe.

Could sheer mechanical wear and tear be the reason for the decline known as old age? Probably not. The natural regenerative powers of life were better than that. And observations made in free fall, where strain was minimized, indicated that while null-gravity had an alleviating effect, it was no key to living forever.

Something in the chemistry and physics of the cells themselves, then. They did tend to accumulate heavy water—that had been known for a long time. Hard to see how that could kill you . . . the percentage increase in a lifetime was so small. It might be a partial answer. You might grow old more slowly if you drank only water made of pure isotopes. But you wouldn't be immortal.

Radek shrugged. He was getting near the end of his trip. Let the Institute people answer his questions.

THE FOUR Corners country is so named because four of the old American states met there, back when they were still significant political units. For a while, in the 20th century, it was overrun with uranium hunters, who made small impression on its tilted emptiness. It was still a favorite vacation area, and the resorts were lost in that great huddle of mountains and desert. You could have a lot of privacy here.

Gliding down over the moon-ghostly Pueblo ruins of Mesa Verde, Radek peered through the windscreen. There, ahead. Lights glowed around the walls, spread across half a mesa. Inside them was a parkscape of trees, lawns, gardens, arbors, cottage units . . . the Institute housed its people well. There were four large buildings at the center, and Radek noted gratefully that several windows were still shining in them. Not that he had any compunctions about getting the great Dr. Lang out of bed, but—

He ignored the public landing field outside the walls and set his boat down in the paved courtyard.

As he climbed out, half a dozen guards came running. They were husky men in blue uniforms, armed with stunners, and the dim light showed faces hinting they wouldn't be sorry to feed him a beam. Radek dropped to the ground, folded his arms, and waited. The breath from his nose was frosty under the moon.

"What the hell do you want?"

The nearest guard pulled up in front of him and laid a hand on his shock gun. "Who the devil are you? Don't you know this is private property? What's the big idea, anyway?"

"Take it easy," advised Radek. "I have to see Dr. Lang at once. Emergency."

"You didn't call for an appointment, did you?"

"No, I didn't."

"All right, then—"

"I didn't think he'd care to have me give my reasons over a radio. This is confidential and urgent."

The men hesitated, uncertain before such an outrageous violation of all civilized canons. "I dunno, friend . . . he's busy . . . if you want to see Dr. McCormick—"

"Dr. Lang. Ask him if I may. Tell him I have news about his longevity process."

"His what?"

Radek spelled it out and watched the man go. Another one made some ungracious remark and frisked him with needless ostentation. A third was more urbane: "Sorry to do this, but you understand we've got important work going on. Can't have just anybody busting in."

"Sure, that's all right." Radek shivered in the thin chill air and pulled his cloak tighter about him. "Viruses and stuff around. If any of that got loose— You understand."

Well, it wasn't a bad cover-up. None of these fellows looked very bright. IQ treatments could do only so much, thereafter you got

down to the limitations of basic and unalterable brain microstructure. And even among the more intellectual workers . . . how many Barwells were there, handling semi-routine tasks but not permitted to know what really went on under their feet? Radek had a brief irrational wish that he'd worn boots instead of sandals.

The first guard returned. "He'll see you," he grunted. "And you better make it good, because he's one mad doctor."

Radek nodded and followed two of the men. The nearest of the large square buildings seemed given over to offices. He was led inside, down a short length of glow-lit corridor, and halted while the scanner on a door marked; LANG, DIRECTOR observed him.

"He's clean, boss," said one of the escort.

"All right," said the annunciator. "Let him in. But you two stay just outside."

It was a spacious office, but austerely furnished. A telewindow reflected green larches and a sun-spattered waterfall, somewhere on the other side of the planet. Lang sat alone behind the desk, his hands engaged with some papers that looked like technical reports. He was a big, heavy-shouldered man, his hair gray, his chocolate face middle-aged and tired.

He did not rise. "Well?" he snapped.

"My name is Arnold Radek. I'm a news service operator . . . here's my card, if you wish to see it."

"Pharaoh had it easy," said Lang in a chill voice. "Moses only called the seven plagues down on him. I have to deal with your sort."

Radek placed his fingertips on the desk and leaned forward. He found it unexpectedly hard not to be stared down by the other. "I know very well I've laid myself open to a lawsuit by coming in as I did," he stated. "Possibly, when I'm through, I'll be open to murder."

"Are you feeling well?" There was more contempt than concern in the deep tone.

"Let me say first off, I believe I have information about a certain project of yours. One you badly want to keep a secret. I've taped a record at my office of what I know and where I'm going. If I don't get back before 1000 hours, Central Time, and wipe that tape, it'll be heard by the secretary."

Lang took an exasperated breath. His fingernails whitened on the sheets he still held. "Do you honestly think we would be so . . . I won't say unscrupulous . . . so *stupid* as to use violence?"

"No," said Radek. "Of course not. All I want is a few straight answers. I know you're quite able to lead me up the garden path, feed me some line of pap and hustle me out again—but I won't stand for that. I mentioned my tape only to convince you that I'm in earnest."

"You're not drunk," murmured Lang. "But there are a lot of people running loose who ought to be in a mental hospital."

"I know." Radek sat down without waiting for an invitation. "Anti-scientific fanatics. I'm not one of them. You know Darrell Burkhardt's news commentaries? I sup-

ply a lot of his data and interpretations. He's one of the leading friends of genuine science, one of the few you have left." Radek gestured at the card on the desk. "Read it, right there."

Lang picked the card up and glanced at the lettering and tossed it back. "Very well. That's still no excuse for breaking in like this. You—"

"It can't wait," interrupted Radek. "There are a lot of lives at stake. Every minute we sit here, there are perhaps a million people dying, perhaps more; I haven't the figures. And everyone else is dying all the time, millimeter by millimeter, we're all born dying. Every minute you hold back the cure for old age, you murder a million human beings."

"This is the most fantastic—"

"Let me finish! I get around. And I'm trained to look a little bit more closely at the facts everybody knows, the ordinary commonplace facts we take for granted and never think to inquire about because they are so ordinary. I've wondered about the Institute for a long time. Tonight I talked at great length with a fellow named Barwell . . . remember him? A clerk here. You fired him this morning for being too nosy. He had a lot to say."

"Hm." Lang sat quiet for a while. He didn't rattle easily—he couldn't be snowed under by fast, aggressive talk. While Radek spat out what clues he had, Lang calmly reached into a drawer and got out an old-fashioned briar pipe, stuffed it and lit it.

"So what do you want?" he asked when Radek paused for breath.

"The truth, damn it!"

"There are privacy laws. It was established long ago that a citizen is entitled to privacy if he does nothing against the common weal—"

"And you are! You're like a man who stands on a river bank and has a lifebelt and won't throw it to a man drowning in the river."

Lang sighed. "I won't deny we're working on longevity," he answered. "Obviously we are. The problem interests biologists throughout the Solar System. But we aren't publicizing our findings as yet for a very good reason. You know how people jump to conclusions. Can you imagine the hysteria that would arise in this already unstable culture if there seemed to be even a prospect of immortality? You yourself are a prime case . . . on the most tenuous basis of rumor and hypothesis, you've decided that we have found a vaccine against old age and are hoarding it. You come bursting in here in the middle of the night, demanding to be made immortal immediately if not sooner. And you're comparatively civilized . . . there are enough lunatics who'd come here with guns and start shooting up the place."

Radek smiled bleakly. "Of course. I know that. And you ought to know the outfit I work for is reputable. If you have a good lead on the problem, but haven't solved it yet, you can trust us not to make that fact public.

"All right." Lang mustered an answering smile, oddly warm and

charming. "I don't mind telling you, then, that we do have some promising preliminary results—but, and this is the catch, we estimate it will take at least a century to get anywhere. Biochemistry is an inconceivably complex subject."

"What sort of results are they?"

"It's highly technical. Has to do with enzymes. You may know that enzymes are the major device through which the genes govern the organism all through life. At a certain point, for instance, the genes order the body to go through the changes involved in puberty. At another point, they order that gradual breakdown we know as aging."

"In other words," said Radek slowly, "the body has a built-in suicide mechanism?"

"Well . . . if you want to put it that way—"

"I don't believe a word of it. It makes a lot more sense to imagine that there's something which causes the breakdown—a virus, maybe—and the body fights it off as long as possible but at last it gets the upper hand. The whole key to evolution is the need to survive. I can't see life evolving its own anti-survival factor."

"But nature doesn't care about the individual, friend Radek. Only about the species. And the species with a rapid turnover of individuals can evolve faster, become more effective—"

"Then why does man, the fastest-evolving metazoan of all, have one of the longest lifespans? He does, you know . . . among mammals, at any rate. Seems to me our bodies must be all-around better than average, better able to fight off the death virus. Fish live a longer time, sure—and maybe in the water they aren't so exposed to the disease. May flies are short-lived; have they simply adapted their life cycle to the existence of the virus?"

Lang frowned. "You appear to have studied this subject enough to have some mistaken ideas about it. I can't argue with a man who insists on protecting his cherished irrationalities with fancy verbalisms."

"And you appear to think fast on your feet, Dr. Lang." Radek laughed. "Maybe not fast enough. But I'm not being paranoid about this. You can convince me."

"How?"

"Show me. Take me into those underground rooms and show me what you actually have."

"I'm afraid that's impos—"

"All right." Radek stood up. "I hate to do this, but a man must either earn a living or go on the public freeloading roll . . . which I don't want to do. The facts and conjectures I already have will make an interesting story."

Lang rose too, his eyes widening. "You can't prove anything!"

"Of course I can't. You're sitting on all the proof."

"But the public reaction! God in Heaven, man, those people can't *think!*"

"No . . . they can't, can they?" He moved toward the door. "Goodnight."

Radek's muscles were taut. In spite of everything that had been said, a person hounded to desperation could still do murder.

There was a great quietness as he neared the door. Then Lang spoke. The voice was defeated, and when Radek looked back it was an old man who stood behind the desk.

"You win. Come along with me."

They went down an empty hall, after dismissing the guards, and took an elevator below ground. Neither of them said anything. Somehow, the sag of Lang's shoulders was a gnawing in Radek's conscience.

When they emerged, it was to transfer past a sentry, where Lang gave a password and okayed his companion, to another elevator which purred them still deeper.

"I—" The newsman cleared his throat, awkwardly. "I repeat what I implied earlier. I'm here mostly as a citizen interested in the public welfare . . . which includes my own, of course, and my family's if I ever have one. If you can show me valid reasons for not breaking this story, I won't. I'll even let you hypnocondition me against doing it, voluntarily or otherwise."

"Thanks," said the director. His mouth curved upward, but it was a shaken smile. "That's decent of you, and we'll accept . . . I think you'll agree with our policy. What worries me is the rest of the world. If you could find out as much as you did—"

Radek's heart jumped between his ribs. "Then you do have immortality!"

"Yes. But I'm not immortal. None of our personnel are, except — Here we are."

There was a hidden susurrus of machinery as they stepped out into a small bare entryroom. Another guard sat there, beside a desk. Past him was a small door of immense solidity, the door of a vault.

"You'll have to leave everything metallic here," said Lang. "A steel object could jump so fiercely as to injure you. Your watch would be ruined. Even coins could get uncomfortably hot . . . eddy currents, you know. We're about to go through the strongest magnetic field ever generated."

Silently, dry-mouthed, Radek piled his things on the desk. Lang operated a combination lock on the door. "There are nervous effects too," he said. "The field is actually strong enough to influence the electric discharges of your synapses. Be prepared for a few nasty seconds. Follow me and walk fast."

The door opened on a low, narrow corridor several meters long. Radek felt his heart bump crazily, his vision blurred, there was panic screaming in his brain and a sweating tingle in his skin. Stumbling through nightmare, he made it to the end.

The horror faded. They were in another room, with storage facilities and what resembled a spaceship's airlock in the opposite wall. Lang grinned shakily. "No fun, is it?"

"What's it for?" gasped Radek.

"To keep charged particles out of here. And the whole set of chambers is 500 meters underground, sheathed in ten meters of lead brick and surrounded by tanks of heavy water. This is the only place in the Solar System, I imagine, where cosmic rays never come."

"You mean—"

Lang knocked out his pipe and left it in a gobboon. He opened the lockers to reveal a set of airsuits, complete with helmets and oxygen tanks. "We put these on before going any further," he said.

"Infection on the other side?"

"We're the infected ones. Come on, I'll help you."

As they scrambled into the equipment, Lang added conversationally: "This place has to have all its own stuff, of course . . . its own electric generators and so on. The ultimate power source is isotopically pure carbon burned in oxygen. We use a nuclear reactor to create the magnetic field itself, but no atomic energy is allowed inside it." He led the way into the airlock, closed it, and started the pumps. "We have to flush out all the normal air and substitute that from the inner chambers."

"How about food? Barwell said food was prepared in the kitchens and brought here."

"Synthesized out of elements recovered from waste products. We do cook it topside, taking precautions. A few radioactive atoms get in, but not enough to matter as long as we're careful. We're so cramped for space down here we have to make some compromises."

"I think—" Radek fell silent. As the lock was evacuated, his unjointed airsuit spreadeagled and held him prisoner, but he hardly noticed. There was too much else to think about, too much to grasp at once.

Not till the cycle was over and they had gone through the lock did he speak again. Then it came harsh and jerky: "I begin to understand. How long has this gone on?"

"It started about 200 years ago . . . an early Institute project." Lang's voice was somehow tinny over the helmet phone. "At that time, it wasn't possible to make really pure isotopes in quantity, so there were only limited results, but it was enough to justify further research. This particular set of chambers and chemical elements is 150 years old. A spectacular success, a brilliant confirmation, from the very beginning . . . and the Institute has never dared reveal it. Maybe they should have, back then —maybe people could have taken the news—but not now. These days the knowledge would whip men into a murderous rage of frustration; they wouldn't believe the truth, they wouldn't dare believe, and God alone knows what they'd do."

Looking around, Radek saw a large, plastic-lined room, filled with cages. As the lights went on, white rats and guinea pigs stirred sleepily. One of the rats came up to nibble at the wires and regard the humans from beady pink eyes.

Lang bent over and studied the label. "This fellow is, um, 66 years old. Still fat and sassy, in perfect condition, as you can see. Our oldest mammalian inmate is a guinea pig: a hundred and forty-five years. This one here."

Lang stared at the immortal beast for a while. It didn't look unusual . . . only healthy. "How about monkeys?" he asked.

"We tried them. Finally gave it

up. A monkey is an active animal—it was too cruel to keep them penned up forever. They even went insane, some of them."

Footfalls were hollow as Lang led the way toward the inner door. "Do you get the idea?"

"Yes . . . I think I do. If heavy radiation speeds up aging—then natural radioactivity is responsible for normal aging."

"Quite. A matter of cells being slowly deranged, through decades in the case of man—the genes which govern them being mutilated, chromosomes ripped up, nucleoplasm and cytoplasm irreversibly damaged. And, of course, a mutated cell often puts out the wrong combination of enzymes, and if it regenerates at all it replaces itself by one of the same kind. The effect is cumulative, more and more defective cells every hour. A steady bombardment, all your life . . . here on Earth, seven cosmic rays per second ripping through you, and you yourself are radioactive, you include radiocarbon and radiopotassium and radiophosphorus . . . Earth and the planets, the atmosphere, everything radiates. Is it any wonder that at last our organic mechanism starts breaking down? The marvel is that we live as long as we do."

The dry voice was somehow steadying. Radek asked: "And this place is insulated?"

"Yes. The original plant and animal life in here was grown exogenetically from single-cell zygotes, supplied with air and nourishment built from pure stable isotopes. The Institute had to start with low forms, naturally; at that time, it wasn't possible to synthesize proteins to order. But soon our workers had enough of an ecology to introduce higher species, eventually mammals. Even the first generation was only negligibly radioactive. Succeeding generations have been kept almost absolutely clean. The lamps supply ultraviolet, the air is recycled . . . well, in principle it's no different from an ecological-unit spaceship."

Radek shook his head. He could scarcely get the words out: "People? Humans?"

"For the past 120 years. Wasn't hard to get germ plasm and grow it. The first generation reproduced normally, the second could if lack of space didn't force us to load their food with chemical contraceptive." Behind his faceplate, Lang grimaced. "I'd never have allowed it if I'd been director at the time, but now I'm stuck with the situation. The legality is very doubtful. How badly do you violate a man's civil rights when you keep him a prisoner but give him immortality?"

He opened the door, an archaic manual type. "We can't do better for them than this," he said. "The volume of space we can enclose in a magnetic field of the necessary strength is already at an absolute maximum."

Light sprang automatically from the ceiling. Radek looked in at a dormitory. It was well-kept, the furniture ornamental. Beyond it he could see other rooms . . . recreation, he supposed vaguely.

The score of hulks in the beds hardly moved. Only one woke up.

He blinked, yawned, and shuffled toward the visitors, quite nude, his long hair tangled across the low forehead, a loose grin on the mouth.

"Hello, Bill," said Lang.

"Uh . . . got sumpin? Got sumpin for Bill?" A hand reached out, begging. Radek thought of a trained ape he had once seen.

"This is Bill." Lang spoke softly, as if afraid his voice would snap. "Our oldest inhabitant. One hundred and nineteen years old, and he has the physique of a man of 20. They mature, you know, reach their peak and never fall below it again."

"Got sumpin, doc, huh?"

"I'm sorry, Bill," said Lang. "I'll bring you some candy next time."

The moron gave an animal sigh and shambled back. On the way, he passed a sleeping woman, and edged toward her with a grunt. Lang closed the door.

There was another stillness.

"Well," said Lang, "now you've seen it."

"You mean . . . you don't mean immortality makes you like that?"

"Oh, no. Not at all. But my predecessors chose low-grade stock on purpose. Remember those monkeys. How long do you think a normal human could remain sane, cooped up in a little cave like this and never daring to leave it? That's the only way to be immortal, you know. And how much of the race could be given such elaborate care, even if they could stand it? Only a small percentage. Nor would they live forever—they're already contaminated, they were born radioactive. And whatever happens, who's going to remain outside and keep the apparatus in order?"

Radek nodded. His neck felt stiff, and within the airsuit he stank with sweat. "I've got the idea."

"And yet—if the facts were known—if my questions had to be answered—how long do you think a society like ours would survive?"

Radek tried to speak, but his tongue was too dry.

Lang smiled grimly. "Apparently I've convinced you. Good. Fine." Suddenly his gloved hand shot out and gripped Radek's shoulder. Even through the heavy fabric, the newsman could feel the bruising fury of that clasp.

"But you're only one man," whispered Lang. "An unusually reasonable man for these days. There'll be others.

"What are we going to *do?*"

• • •

The fullest use of science for human well-being will only be possible when our knowledge of material resources is supplemented with a genuine scientific knowledge of human needs. —*Lancelot Hogben*

Mankind is at the very beginning of its existence, and has only just begun to notice the cosmos. It is hardly likely to interpret it right in the first few moments its eyes are open. —*Sir James Jeans*

SATELLITE

(Continued from page 39)

ESTABLISHING a satellite in its orbit is an extremely critical operation, which if improperly carried out could result in an orbit so eccentric that even though the satellite had the correct orbital velocity, it could re-enter the earth's atmosphere in less than one revolution around the earth. This of course, would result in its destruction. In fact, there are an infinite number of orbital paths possible depending on the attitude of the rocket while it is achieving its orbital velocity. Common sense therefore dictates that it be possible to make corrections in its course *after* it has arrived at the proper altitude.

It seems likely that if an instrumented third stage is used as the Satellite, the control and sequencing mechanism for all three stages will be carried in the third stage. This will include, besides a stabilized platform which acts as a point of reference for the guidance system, an integrating accelerometer. This device integrates the acceleration achieved by each stage, so that after a predetermined amount of velocity has been gained, the fuel is shut off and the stage is dropped. This is extremely important in order that the final stage will arrive at maximum altitude with the proper orbital velocity.

As each stage is exhausted, it is dropped and the control will be transferred to the next higher stage which will then carry on through its programmed flight until it has contributed its part to the altitude/velocity/attitude picture. It would be of great advantage if the Stage III could arrive in its orbit with enough fuel left in its tanks so that observers on the ground could use its radio receiver to make minor adjustments in its course and velocity. It would then be possible to more nearly approach an optimum orbit, which would prolong the satellite's stay in space.

It is possible that Stage I, which will be a huge and costly affair, might be recovered by parachute; since it will be spent at an altitude of somewhere between ten and twenty miles. Stage II, however, will go so high and attain such velocity that frictional heat developed as it re-enters the atmosphere will destroy it. As announced, the three stage rocket will be launched at the Government's long distance rocket proving grounds on the Florida coast. This location will provide a good 5,000 miles of practically unobstructed ocean for the spent rockets to fall into, as well as a number of strategically placed islands which are already equipped with the instrumentation for tracking long distance military rockets.

It is practically impossible to do more than briefly touch on the immense technical complexities involved in getting such a small unmanned vehicle into space even temporarily. However, the second article, which will appear in the next issue of IF, will discuss in considerable detail the probable make-up of the third-stage Satellite Vehicle itself, as well as instrumentation of monitor stations. • • •

Alan's plan might save the race from extinction—but he was the clan's only husband and had to be protected from his own folly . . .

AFTER SOME TOMORROW

BY MACK REYNOLDS

BEFORE THE first shots rang out, Alan had been sitting with some twenty young people of the Wolf clan in a grove of aspen approximately half way between the fields and the citadel on the hilltop. He had been teaching them myth-legend and, as usual, the girls were bored and unbelieving, the boys open mouthed.

He realized, even as he spoke, that the telling had changed even since his own youth. As a boy of ten, before it was definitely known whether or not he was a sterilie, he had sat at the feet of the Turtle clan's husband as open mouthed as those who sat at his feet now. But the telling was different. Now, had he spoken openly of when men bore weapons and women lived at home with the children, he would have crossed the boundaries of decency. It hadn't been so in his own youth, but then, when he was a boy, they had been one

Illustrated by Ed Emsh

generation nearer to the old days, which weren't so far back after all.

Helen complained, "This is so silly, Alan. Why don't you tell us something about . . . well, about hunting, or true fighting?"

He looked at her. Could this be a daughter of his? Tall for her fourteen years and straight, clear of eye, aggressive and brooking of no nonsense. The old books told of the femininity of women, but . . .

The shots went *bang, bang, bang,* from below, faint in the half mile or more of distance. And then *bang, bang* again and several *booms* from the new muzzle loading muskets.

Helen was on her feet first, her eyes flashing. Instantly she was in command. "Alan," she snapped. "Quick, to the citadel. All of you boys, hurry! To the citadel!"

She whirled to her older classmates. "Ruth, Margo, Jenny, Paula. Get stones, sharp stones. You younger girls go with Alan. See if you can help at the citadel. We'll come last. Hurry Alan."

Alan was already off, herding the boys before him. Possibly all of them were sterilies and so wouldn't count. But you never knew.

As they climbed the hill, he looked back over his shoulder. Down in the fields he could see the workers scattering for their weapons and for cover. One stumbled and was down. In the distance he couldn't make out whether she had fallen accidentally or been wounded. Further beyond the fields he could see the smoke from a half dozen or more places where the shots had

originated. It didn't seem to be an attack in force.

Not far up the hill from the field workers, on a overhanging boulder in a lookout position, he could make out Vivian, the scout chief. She sat, seemingly in unconcerned ease, one elbow supported on a knee as her telescoped rifle went *crack, crack, crack.* If he knew Vivian there was more than one casualty among the raiders.

Who could it be this time? Deer from the south, Coyote or Horse from the east? Possibly Eagles, Crows or Dogs from Denver way. The clan couldn't stand much more of this pressure. It was the third raid in six months. They couldn't stand it and put in a crop, nor could the drain on the arsenal be maintained. He had heard that the Turtle clan, near Colorado Springs, the clan of his birth, had got to the point where they were using bows and arrows even for defense. If so, it wouldn't be long before they would be losing their husband.

He was puffing somewhat by the time they reached the citadel. Helen and her four girls were coming much more slowly, watching the progress of the fight below them, keeping their eyes peeled for a possible break through of individual enemies. The stones in their hands were pathetically brave.

The rounded citadel building, stone built, loopholed for rifles, loomed before them. He swung open the door and hurried inside.

"Hello, honey," a strange voice said pseudo-pleasantly. "Hey, you're kind of cute."

Alan's eyes went from the two figures before him, automatic rifles cuddled under their arms, to the two Wolf clan sentries collapsed in their own blood on the floor. They had paid for lack of vigilance with their lives.

He could see that the strangers were of different clans by their kilts, one a Horse the other a Crow. This would mean two clans had united in order to raid the Wolves and that, in turn, would mean the Wolves were outnumbered as much as two to one.

"Relax, darling," the second one said, a lewd quality in her voice. "Nothing's going to happen to *you.*" Her eyes took in the dozen boys ranging in age from five to twelve. "Look like a bunch of sterilies to me," she sneered. "Get them up above, and those girls too. You stay here where we can watch you, honey."

The Crow went to a small window, stared down below. "Wanda is holding them pretty well but they're beginning to work their way back in this direction." She laughed harshly. "These Wolves never could fight."

Her companion fingered the Bren gun which lay on the heavy table top in the round room's center. Aside from four equally heavily constructed chairs the table was the large room's sole furniture. While Alan was ushering the boys and younger girls up to the second floor where they would be safe, the Horse said musingly, "We could turn this loose on them even at this distance."

The crow shook her head. "No.

It'll be better to wait until they're closer. Besides, by that time Peggy and her group'll be coming up from the arroyo. There won't be a Wolf left half an hour from now."

Alan, his stomach empty, stared out the loophole nearest him.

One of the women said, grinning, "You better get away from there, honey. Make you sick. That's a mighty pretty suit you've got on. Make it yourself?"

"No," Alan said. As a matter of fact one of the sterilies had made it.

She laughed. "Well, don't be so uppity. You're going to have to learn how to be nice to me, you know."

Both of them laughed, but Alan said nothing. He wondered how long the women of these clans had been without a husband.

Down below he could make out the progress of the fighting and then realized the battle plan of the aggressors. They must have planned it for months, waiting until the season was such that practically the whole Wolf clan, and particularly the fighters, would be at work in the fields. They'd sent these two scouts, probably their best warriors, to take the citadel by stealth. Only two of them, more would have been conspicuous.

They had then, with a limited force, opened fire on the field workers, pinning them down temporarily.

Meanwhile, the main body was ascending the arroyo to the left, completely hidden from the defending forces although they would have been in open sight from above had the citadel remained uncaptured.

Alan could see plainly what the next fifteen minutes would mean. The Wolf clan would draw back on the citadel, Vivian and her younger warriors bringing up the rear. When they broke into the clear and started the last dash for the safety of their fortress, they would be in the open and at the mercy of the crossfire from arroyo and citadel.

If only these two had failed in their attempt to . . .

The Crow woman said, "Look at this. Five young brats with stones in their hands. What do you say?"

It was Helen and her four girls.

Alan said, "They're only children! You can't . . ."

"You be quiet, sweetheart. We can't be bothered with you."

The Horse said, "Two years from now they'll all be warriors. Here, let me turn this on them."

Alan closed his eyes and he wanted to retch as he heard the automatic rifle speak out in five short bursts. In spite of himself he opened them again. Helen, his first born, Paula, his second. Ruth, Margo and Jenny, all his children. They were crumbled like rag dolls, fifty feet from the citadel door.

Now he was able to tell himself that he should have called out a warning. One or two of them, at least, might have escaped. Might have escaped to warn the approaching fighters of the trap behind them. Tradition had been too strong within him, the tradition that a man did not interfere in the business of the warriors, that war was

a thing apart.

Jenny's body moved, stirred again, and she tried to drag herself away. Little Jenny, twelve years old. The rifle spat just once again and she slumped forward and remained quiet.

"Little bitch," the Crow woman said.

The heavy chair was in his hands and high above his head, he had brought it down on her before the rage of his hate had allowed him to think of what he was doing. The chair splintered but there was still a good half of it in his hands when he spun on the Horse woman. She stepped back, her eyes wide in disbelief. As her companion went down, the side of her face and her scalp welling blood, the Horse at first brought up her rifle and then, in despair, tried to reverse it to use its butt as a club.

She was stumbling backward, trying to get out of the way of his improvised weapon, when her heel caught on the body of one of the fallen Wolf sentries. She tried to catch herself, her eyes still staring horrified disbelief, even as he caught her over the head, and then once again. He beat her, beat her hysterically, until he knew she must be dead.

He worked now in a mental vacuum, all but unconsciously. He ran to the stair bottom and called, "Come down," his voice was shrill. "Alice, Tommy, all of you."

THEY CAME, hesitantly, and when they saw the shambles of the room stared at him with as much disbelief as had the enemy women. He pointed a finger at the oldest of the girls. "Alice," he said, "you've been given instruction by the warriors. How is the Bren gun fired?"

The eleven year old bug eyed at him. "But you're a husband, Alan . . ."

"How is it fired?" he shrilled. "Unless you tell me, there will be no Wolf clan left!"

He lugged the heavy gun to the window, mounted it there as he had seen the women do in practice.

"Tommy," he said to a thirteen year old boy. "Quick, get me a pan of ammunition."

"I can't," Tommy all but wailed.

"Get it!"

"I can't. It's . . . it's *unmanly!*" Tommy melted into a sea of tears, utterly confused.

"Maureen," Alan snapped, cooler now. "Get me a pan of ammunition for the Bren gun. Quickly. Alice, show me how the gun is charged."

Alice was at his side, trying to explain. He would have let her take over had she been larger, but he knew she couldn't handle the bucking of the weapon. Maureen had returned with the ammunition, slipped it expertly into place. She too had had instructions in the gun's operation.

Alan ran his eyes down the arroyo. There were possibly forty of them, Horses and Crows—well armed, he could see. Less than a quarter of them had the new muzzle loaders being resorted to by many as ammunition stocks for the old arms became increasingly rare. The others had ancient arms, rifles,

both military and sport, one or two tommy guns.

He waited another three or four minutes, one eye cocked on the progress of the running battle below. Vivian, the scout chief, had dropped back to take over command of the younger warriors. She was probably beginning to smell a rat. The intensity of fire wasn't such as to suggest a large body of enemy.

The women in the arroyo were placed now as he wanted them. He forced himself to keep his eyes open as he pressed the trigger.

Blat, blat, blat.

The gun spoke, kicking high the dust and gravel before the Horse and Crow warriors advancing up the arroyo.

They stopped, startled. The citadel was supposedly in their hands.

They reversed themselves and scurried back to get out of their exposed position.

He touched the trigger again. *Blat, blat, blat.* The heavy slugs tore up the arroyo wall behind them, they could retreat no further without running into his fire.

They stopped, confused.

Alan said, "Maureen, get another pan of ammunition. I'll have to hold them there until Vivian comes up. Alice, run down to the matriarch and tell her about the warriors in the arroyo. Quickly, now."

Little Alice said sourly, "A husband shouldn't interfere in warrior affairs," but she went.

When Vivian strode into the citadel she had her sniper rifle slung over her back and was admiring a tommy gun she had taken from one of the captured Horses. "Perfect," she said, stroking the stock. "Perfect shape. And they seem to have worlds of ammunition too. Must have made some kind of deal with the Denver clans."

Her eyes swept the room and her mouth turned down in sour amusement. The Horse woman was dead and the Crow had by now been marched off to take her place with the other prisoners who were being held in the stone corral.

"What warriors," she said contemptuously. "A *man* overcomes two of them. *Two* of them, mind you." She looked at Alan, the reaction was upon his now and he was white faced and couldn't keep his hands from trembling. "What a cutie you turned out to be. Who ever heard of such a thing?"

Alan said, defensively, "They didn't expect it. I took them unawares."

Vivian laughed aloud, her even white teeth sparkling in the redness of her lips. She was tall, shapely, a twenty-five year old goddess in her Wolf clan kilts. "I'll bet you did, sweetie."

One of the other warriors entered from behind Vivian, looked at the dead Horse woman and shuddered. "What a way to die, not even able to defend yourself." She said to Vivian worriedly, "They've got an awful lot of equipment, chief."

Vivian said, "Well, what're you worrying about, Jean? *We* have it now."

The girl said, "They have three

tommy guns, four automatic rifles, twenty grenades and forty sticks of dynamite."

Vivian was impatient. "They had them, now they're ours. It's good, not bad."

Jean said doggedly, "These raids are coming more and more often. We've lost ten fighters in less than a year. And each time they come at us they're better equipped and there're more of them." She looked over at Alan. "If it hadn't been for this . . . this queer way things worked out, they'd have our husband now and we'd be done for."

"Well, it didn't happen that way," Vivian said abruptly, "and we still have our husband and we're going to keep him. This wasn't a bad action at all. They killed three of us, we've got more than forty of them."

"Not three, eight," Jean said. "You forget the five girls. In another couple of years they'd have been warriors. And besides, what difference does it make if we've got forty of them? There're always more of them where they came from. There must be a thousand women toward Denver without a husband between them."

Vivian quieted. "Let's hope they don't all decide on Alan at once," she said. "I wonder if the Turtles are having the same trouble."

"They're having more," Alan said. He had lowered himself wearily into one of the chairs.

The two warriors looked at him. "How do you know, sweetie?" Vivian asked him.

"I was talking to Warren, a few weeks ago. He's husband of the Turtle clan now, they traded him from the Foxes. Both clans were getting too interbred . . ."

"Get to the point, honey," Jean said, embarrassed at this man talk.

"The Turtles are having more trouble than we are. They have a stronger natural fortress at the center of their farm lands, but they've had so many raids that their arsenal is depleted and half their warriors dead or wounded. They're getting desperate."

"That's too bad," Vivian muttered. "They make good neighbors."

Jean said, "The matriarch told me to let you know there'd be a meeting this afternoon in the assembly hall. Clan meeting, all present."

"What about?" Vivian said, her attention going back to the beauty of her captured weapon again.

"About the prisoners. We've got to decide what to do with them."

"Do with them? We'll push them over the side of the canyon. Nobody thought we'd waste bullets on them did they?"

Alan said, mildly, "The question has come up whether we ought to destroy them at all."

Vivian looked at him in gentle annoyance. "Sweetie," she said, "don't bother your handsome head with these things. You've had enough excitement to last a nice looking fellow like you a lifetime."

Jean said, echoing her chief's disgust, "Anyway, that's what the meeting is about. Alan, here, has been talking to the matriarch and she's agreed to bring it up for discussion."

Vivian said nastily, "Sally is beginning to lose her grip. If there's anything a clan needs it's a strong matriarch."

"A wise matriarch," Alan amended, knowing he shouldn't.

Vivian stared at him for a moment, then threw her head back and laughed. "I'm going to have to spank your bottom one of these days," she told him. "You get awfully sassy for a man."

AS CHAIRMAN, Alan had a voice but not a vote in the meetings of the Wolf clan. He sometimes wondered at the institution which had come down from pre-bomb days. Why was it necessary to have a chair*man*. Of course, myth-legend had it that men were once just as numerous and active in society's economic (and even martial!) life as were women. But that was myth-legend. It all had a *basis* in reality, perhaps, but some of it was undoubtedly stretched all but to the breaking point.

Of course if all men *had* been fertile in the old days. But if you started with *if*, as a beginning point, you could go as far as you wished in any direction.

He called the meeting to order in the assembly hall which stood possibly a hundred feet below the citadel in one direction, another hundred from the stone corral which housed their prisoners, in the other. The Wolf clan was present in its entirety with the exception of children under ten and except for four scouts who were holding the prisoners. As chairman, Alan sat on the dais flanked by Sally, the matriarch, 35 years of age, tall, Junoesque, on one side and by Vivian the scout chief, on the other.

Before them sat, first, the active warrior-workers, some thirty-five of them. Second, the older women, less than a score. Further back were the sterilies, possibly twenty of these and quite young, only within recent memory had they been allowed to become part of the clan, in the past they had been driven away or killed. Further back still were the children above ten but too young to join the ranks of either warrior-workers or sterilies.

Alan called the meeting to order, quieted them somewhat and then invited the matriarch to take the floor.

Sally stood and looked out over her clan, the dignity of her presence silencing them where Alan's plea had not.

She said, "We have two matters to bring to our attention. First, I believe the clan should make it clear to Alan, our husband, that such interference in the affairs of women is utterly out of the question. I am speaking of his unmanly activities in the raid this morning."

There were mumblings of approval throughout the hall.

Alan came to his feet, his face bewildered. "But, Sally, what else could I do? If I hadn't overcome the enemy warriors and turned the Bren gun on the others you would all be gone now. Possibly none of you would have survived."

Sally quieted him with a chill look. "Let me repeat what is well

known to every member of the clan. We consist of less than sixty women, a few more than thirty-five of whom are active. There are twenty sterilies and twenty-five or so children. And one husband. A few more than one hundred in all."

Her voice slowed and lowered for the sake of emphasis. "All of our women—except for two or three—might die and the clan would live on. The sterilies certainly might all die, and the clan live on. Even the children could all die and the clan live on. *But if our husband dies, the clan dies.* The greatest responsibility of every member of any clan is to protect the husband. Under no circumstances is he to be endangered. You know this, it should not have to be brought to your attention."

There was a strong murmur of assent from those seated before them.

Alan said, "But, Sally, I saved your lives! And if I hadn't, I would have been captured by the Crows and Horses and you would have lost me at any rate."

This was hard for Sally Wolf, but she said, "Then, at least, *they* would have had you. If you had died, in your foolhardiness, you would have been gone for all of us. Alan, two clans, husbandless clans, united in this attempt to capture you from us. While we fought to protect our husband, the life of our clan, we hold no rancor against them. In their position, we would have done the same. Much rather would we see you taken by them, than to see you dead. Even though the Wolf clan might die, the race must go on." She added, but not very believably, "If they had captured you, perhaps we could have, in our turn, captured a husband from some other clan."

"The reason we probably couldn't," Vivian said mildly, "is that since we've turned to agriculture and settled, our numbers have dropped off by half. We had more than sixty warriors while we were hunter-foragers."

"That's enough, Vivian," Sally snapped. "The question isn't being discussed this afternoon."

"Ought to be," somebody whispered down in front.

"Order," Alan said. He knew it was a growing belief in the clan that giving up the nomadic life had been a mistake. From raiders, they had become the raided.

Sally said, "The second order of business is the disposal of the Horse and Crow prisoners captured in the action today."

Vivian said, "We can't afford to waste valuable ammunition. I say shove them into the canyon.

Most of those seated in the hall approved of that. Some were puzzled of face, wondering why the matter hadn't been left simply in the scout chief's hands.

Sally said, dryly, "I haven't formed an opinion myself. However, our chairman has some words to say."

Vivian looked at Alan as though he was a precocious child. She shook her head. "You cutie, you. You're getting bigger and bigger for your britches every day."

Two or three of the warriors echoed her by chuckling fondly.

Alan said nothing to that, needing to maintain what dignity and prestige he could muster.

He stood and faced them and waited for their silence before saying, "You feminine members of the clan are too busy with work and with defense to pursue some of the studies for which we men find time."

Vivian murmured, "You ain't just a whistlin', honey. But we don't mind. You do what you want with your time, honey."

He tried to smile politely, but went on. "It has come to the point where few women read to any extent and most learning has fallen into the hands of the men—few as we are."

Sally said impatiently, "What has this got to do with the prisoners, Alan dear?"

It would seem that he had ignored her when he said, "I have been discussing the matter with Warren of the Turtle clan and two or three other men with whom I occasionally come in contact. At the rate the race is going, there will be no men left at all in another few generations."

There was quiet in the long hall. Deathly quiet.

Sally said, "How . . . how do you mean, dear?"

"I mean our present system can't go on. It isn't working."

"Of course it's working," Vivian snapped. "Here we are aren't we? It's always worked, it always will. Here's the clan. You're our husband. After we've had you for twenty years, we'll trade you to another clan for their husband—prevents interbreeding. If you have a fertile son, the clan will either split, each half taking one husband, or we'll trade him off for land, or guns, or whatever else is valuable. Of course, it works."

He shook his head, stubbornly. "Things are changing. For a generation or two after bomb day, we were in chaos. By time things cleared we were divided as we are now, in clans. However, we were still largely able to exist on the canned goods, the animals, left over from the old days. There was food and guns for all and only a few of the men were sterilies."

Vivian began to say something again, but he shook a hand negatively at her, pleading for silence. "No, I'm not talking about myth-legend now. Warren's great-grandfather, whom he knew as a boy, remembers when there were four times or more the number of men we have today and when the sterilies were very few."

WHAT IS YOUR SCIENCE I.Q.?

ANSWERS: 1—Energy. 2—Cesium. 3—Minus 118.8. 4—Binary. 5—550. 6—Water. 7—Nitrogen. 8—Polarized. 9—Sublimation. 10—1½. 11—All higher complex numbers. 12—Gamma. 13—33. 14—Polymerization. 15—Increases. 16—Meson. 17—Stone. 18—118-120. 19—Alpha. 20—300.

Vivian said impatiently, "What's this got to do with the prisoners? There they are. We can kill them or let them go. If we let them go, they'll be coming back, six months from now, to take another crack at us. Alan is cute as a button, but I don't think he should meddle in women's affairs."

But most of them were silent. They looked up at him, waiting for him to go on.

"I suppose," Sally said, "that you're coming to a point, dear?"

He nodded, his face tight. "I'm coming to the point. The point is that we've got to change the basis of clan society. This isn't working any more—if it ever did. There's such a thing as planned breeding . . ." it had been hard to say this, and the younger women in the audience, in particular, tittered ". . . and we're going to have to think in terms of it."

Sally had flushed. She said now, "A certain dignity is expected at a clan meeting, Alan dear. But just what did you mean?"

Vivian said, "This is nonsense, I'm leaving," and she was up from the speaker's table and away. Two or three of her younger girls looked after, scowling, but they didn't follow her out of the hall.

"I mean," Alan said doggedly, "that one of those Crow women has been the mother of two fertile men. To my knowledge she is the only woman within hundreds of miles this can be said about. We men have been keeping records of such things."

Sally was as mystified as the rest of the clan.

Alan said, "I say bring these women into the clan. Unite with the Turtles and the Burros so that we'll have three clans, five counting the Horses and Crows. Then we'll have enough strength to fight off the forager-hunters, and we'll have enough men to experiment in selective breeding."

Half of the hall was on its feet in a roar.

"Share you with these . . . these desert rats who just raided us, who killed eight of our clan?" Sally snapped, flabbergasted.

He stood his ground. "Yes. I'll repeat, one of those Crow women has borne two fertile men children. We can't afford to kill her. For all we know, she might have a dozen more. This haphazard method of a single husband for a whole clan must be replaced . . ."

The hall broke down into chaos again.

Sally held up a commanding hand for silence. She said, "And if we share you with another forty or fifty women, to what extent will the rest of us have any husband at all?"

He pointed out the sterilies, seated silently in the back. "It would be healthier if you gave up some of this superior contempt you hold for sterile males and accept their companionship. Although they cannot be fathers, they can be mates otherwise. As it is, how much true companionship do you secure from me—any of you? Less than once a month do you see me more than from a distance."

"Mate with sterilies?" someone gasped from the front row.

"Yes," Alan snapped back. "And

let fertile men be used expressly for attempting to produce additional fertile men. Confound it, can't you warriors realize what I'm saying? I have reports that there is a woman among the Crows who has borne two fertile male children. Have you ever heard of any such phenomenon before? Do you realize that in the fifteen years I have been the husband of this clan, we have not had even one fertile man child born? Do you realize that in the past twenty years there has been born not one fertile man child in the Turtle clan? Only one in the Burro clan?"

He had them in the palm of his hand now.

"What—what does the Turtle clan think of this plan of yours?" Sally said.

"I was talking to Warren just the other day. He thinks he can win their approval. We can also probably talk the Burros into it. They're growing desperate. Their husband is nearly sixty years old and has produced only one fertile male child, which was later captured in a raid by the Denver foragers."

Sally said, "And we'd have to share you with all these, and with our prisoners as well?"

"Yes, in an attempt to breed fertile men back into the race."

Sally turned to the assembled clan.

A heavy explosion, room-shaking in its violence, all but threw them to the floor. Half a dozen of the younger warriors scurried to the windows, guns at the ready.

In the distance, from the outside, there was the chatter of a machine gun, then individual pistol shots.

"The corral," Jean the scout said, her lips going back over her teeth.

Vivian came sauntering back into the assembly hall, patting the stock of her new tommy gun appreciately. "Works like a charm," she said. "That dynamite we captured was fresh too. Blew 'em to smithereens. Only had to finish off half a dozen."

Alan said, agonizingly, "Vivian! You didn't . . . the prisoners?"

She grinned at him. "Alan, you're as cute as a button, but you don't know anything about women's affairs. Now you be a honey and go back to taking care of the children."

• • •

NIGHT COURT

With a new cast nightly, it was the best show in town. Gay crowds mobbed the box office for tickets; but few went back more than twice . . .

BY NORMAN ARKAWY

THE OLD courthouse was in the unreconstructed part of town. No buses ran out here, and the only way that Stan and Julie could reach the court was on foot, threading their way through the debris of neglect and vandalism that littered the narrow streets.

This was a part of New York that Julie had never seen. Twentieth century tenements, dimly illuminated by ancient incandescent lamps, lined the rubble-filled streets, where garbage and the decaying carcasses of poisoned rats lay stinking in the gutters. The night was warm, but Julie shivered. She hurried along at Stan's side,

Illustrated by Paul Orban

trying to hold her breath to shut out the unpleasant smells.

They stopped at the edge of the sidewalk across the street from the court and watched a crowd of people milling about the entrance, anxiously pressing to the box office to try to get hard-to-get tickets.

"Look at that mob!" Julie said. "We'll never get in!" She tried to sound disappointed, but she knew that she could not hide her feeling of relief. She didn't want to go in. She wanted to go away, back to the clean, pretty city she knew.

Stan smiled and patted her hand. "You underestimate me, honey. Little Stanley knows how to take

care of himself. I knew there'd be a crowd tonight, so . . ." He drew two tickets from his pocket. "If you don't reserve 'em, you don't deserve 'em, I always say!"

He took her hand, and they started across the street toward the courthouse. It was a bleak, gray, stone-faced building whose ornate sculptured trim was weather worn and darkened with age. Once an aspiration to architectural beauty, it was pathetically ugly, a melancholy reminder of a bygone and possibly better era.

A modern theater marquee had been incongruously added to the old structure and, atop the shiny new addition, huge letters of light spelled out NIGHT COURT. Smaller cast aluminum letters protruded upward from the metal rim of the arcing canopy and formed the words of a motto: "Judge not, that ye be not judged". Bold type plastered across the gleaming glass facade of the marquee loudly proclaimed: "NEW SHOW NIGHTLY".

Stan and Julie pushed through the congestion outside the entrance of the court. A dizzying confusion of elbows and backs and sweating, eager faces surrounded them. Stan squeezed through the seething mass of people and, holding tightly to his hand, Julie followed. For the tenth—or hundredth—time, she was sorry that she had come. But it was too late to turn back now.

Stan showed his tickets to the guard at the door, and they were ushered politely inside where a uniformed woman with a military bearing guided them to their seats.

"Your ID cards, please," the young woman said.

Julie was startled by the request, and alarmed. A confiscated ID card meant trouble—police trouble! "Why?" she asked, nervously, "What did we do?"

Stan smiled knowingly. "It's just a formality," he assured her. "They give it back to you when you leave." He handed the usher his card.

"And yours, miss?"

Hesitantly, Julie took out her wallet. A cold premonition urged her to stop, to leave now, before it was too late. Then she saw Stan's amused eyes grinning at her and she reminded herself that it was already too late for her to leave. She gave the girl her ID card.

The usher smiled mechanically. She handed them each a program and hurried away up the aisle.

"Don't worry, honey," Stan said, "you'll get it back." He held his program up for her to admire. "Pretty snazzy, huh?"

Julie nodded half-heartedly and silently leafed through her own program. It was a four page souvenir booklet. On the first page, or front cover, was the seal of justice with a perfectly balanced scale and a few words of Latin. Above the seal, NIGHT COURT OF THE CITY OF NEW YORK was embossed in black on the slick yellow paper, and below it, the legend "Judge not, that ye be not judged". Beneath the seal, in red italics, was the inscription: *"For with what judgment ye judge, ye shall be judged: and with what measure ye mete, it shall be measured to you again.*—Matthew, 7:2."

The page was set up attractively but, Julie thought, the quotations seemed inappropriate. What was the purpose of the court, if not to judge?

"I still can't figure it out," Stan said, as if he had read her thoughts. He reached over and tapped Julie's program with his finger. "This is the third time I've been here, and you can believe me, honey, they both judge and mete out justice in this place!" He grinned at her. "This 'judge not' business doesn't make sense!"

Julie said nothing. There was nothing to say.

The room was rapidly filling up now, and she watched the people slowly filing in. She was fascinated by the looks of anticipatory pleasure in their faces, the whole place tingled with barely repressed excitement.

The spectators packed into the room until every seat was taken and they were standing, eight deep, in the rear of the court. Scanning their faces, Julie could feel—could almost taste—the many varied emotions that radiated from them: amusement, lust, hatred, curiosity, vengeance. It was a puzzling combination.

"Now, *this* quotation makes some sense," Stan was saying. Julie turned her attention back to him. He had opened his program booklet to the centerfold, and he pointed to an inscription printed across the top of the two inner pages. "An eye for an eye, a tooth for a tooth," he recited. "That's what this place really stands for!" He said it with relish.

Julie began to feel sick. She did not like the hungry look on Stan's face or the merciless atmosphere in the courtroom. Why had she come?

She stifled a shudder. She knew why she had come. She had come because Stan wanted her to and, to be honest, because she had been curious to see what the Show was like. Now that she was here, she could not call the whole thing off just because her curiosity was satisfied or because she was too squeamish to enjoy what many people considered the best entertainment in town. She had no right to ruin Stan's evening.

She tried to assume a casual interest in the impending events. "What are all these lines for?" she asked weakly, indicating the horizontal lines that crossed the inner pages and were bisected by three vertical lines into four columns of uneven width. "It looks like a ledger."

"It is, sort of," Stan said. "Y'see, honey, this is a scorecard. In the first column, you put the name of the accused; in the second, the offense he's charged with; in the third, his plea; and in the fourth, the disposition of the case. Up here," he explained, showing her the appropriate place, "you fill in the name of the presiding magistrate. And here," he continued, "you put in the date. It makes a nice souvenir. If you fill it out right, you can look at it six months from now and remember all the fun, just as if it were happening all over again."

"Fun?" Julie's voice cracked.

"Sure!" Stan said with enthusiasm. "It's a terrific show! Everyone has a good time. Well, anyhow . . ." and he chuckled, "everyone but the bums!" He laughed.

A man in the row in front of them turned around and looked at Julie. Perspiration glistened in an oily film on his round, pudgy moon-face. A lewd grin twisted his mouth. "First timer?" he asked.

Stan grinned back at him, sharing a comradeship of common experience. "Yeah. I kept telling her she didn't know what she was missing. Finally convinced her to give it a try. I've been here twice before, myself," he added proudly.

"Yeah? Me too!" the man said. "Guess that makes us real old pros: third timers!" He laughed and mopped his face with a crumpled handkerchief. "Damn! it's hot in here!"

Mild embarrassment and a violent dislike for the oily-skinned man combined to redden Julie's face in a hot blush. She shifted uncomfortably in her seat.

"Y'know, I never thought of it before," Stan said to the man in front, "but now that you mention it, I don't know of anybody who's been here three times." A smile of accomplishment spread onto his face. "I'll bet I'm the first one in my sector!"

A growing anger blended into Julie's feeling of disgust. "I don't see that it's anything to be proud of," she said coldly.

Stan's laugh was a derisive bray. "She talks just like a first timer, doesn't she?" The man in front of them nodded knowingly, again sharing with Stan the common bond of experience.

"The next thing you know," Stan jeered kiddingly, "she'll be preaching to us like one of those crackpot reformers."

The revulsion that Julie felt must have been clearly evident now. Stan smiled fondly and put his arm around her shoulder. "I'm only kidding, honey," he half-apologized.

"What's so wrong about the reformers?" Julie demanded, angrily shrugging away his arm. "Why shouldn't men be given another chance? What . . . ?"

"Men?" The man with the moon face burst into loud laughter. "Wait'll you see these bums, kid! They're not men, they're *things!*"

"He's right, honey," Stan said. "These joes don't have any homes or jobs or families or friends. They don't even have ID cards."

"No ID cards?" That was impossible! But Julie was beginning to learn that many impossible things could happen in a world that most citizens knew nothing about. "Then how can they be expected to get jobs? You've got to have an ID card in order to be assigned . . ."

"That's the general idea, lady," someone nearby said in a loud voice. Several people laughed. "You don't wanna put the court out of business, do ya?"

Julie's lips trembled as she opened her mouth to voice the word that shouted emphatically within her: yes! yes!

"Here they come!" someone shouted, and excited conversation

buzzed throughout the room. Julie's voice was never heard. She stared silently at the people near her, then turned to the front of the room to see what they were all watching so avidly.

A straggling line of bedraggled, dirty, unshaven men shuffled into a wire enclosure set along the right wall of the courtroom. Crushed men—weary, lifeless, resigned to a life without hope—they filed into the pen and slumped onto the wooden benches that were placed lengthwise in three rows in the oblong cage. Their shoulders drooped in beaten curves. Their heads were bowed.

The man in front turned around and nudged Julie's knee. His triumphant smile was an obscenity. "Call those men?" He laughed and winked at Stan, then turned back to the front of the court to watch the preliminary proceedings.

An incipient convulsion crawled about in Julie's stomach. Her knee felt cold and clammy where the moon-faced man had touched it. Her skin was prickly and tight. She began to itch.

"Get up, honey," Stan was saying. "Here comes the judge."

She stood, numbly, her eyes riveted on the men in the wire enclosure.

"Julie!" She felt a hand tugging at her arm. "You can sit down now, Julie," Stan said. "Sit down!"

Mechanically, she sat down. Woodenly, she stared at the tableau before her—the judge perched on his elevated throne, the stone-faced attendants at each side of the dais, the wire pen filled with misery. Through the almost tangible excitement and glee of the spectators, the misery reached her, held her.

THE COURT was in session: the people of the City of New York against . . . against an assortment of outcasts—drunks, derelicts, cripples, beggars—the "undesirables" that had been rounded up by the police in the past twenty-four hours. The people of the City of New York against a pen full of men whose only crimes, for the most part, were sickness, lack of hope and failure to possess the ID cards which everyone needed and which, somehow, they had been denied.

How? Julie wondered. How could anyone not have an ID? Even if you lost your card you could get a new one simply by paying a fine. Even if you had been in prison you got a new card when you were released. You had to have a card! Everyone had to . . .

A court attendant called out: "Garcia, Miguel!" and a small, dark-complexioned man walked out of the detention pen and stood meekly before the judge.

The clerk of the court read the charge, rattling it off in the singsong jargon of court clerks, his words slurred together into one almost unintelligible burst of sound. There was a pause, and silence in the courtroom.

"Well?" said the magistrate, "how do you plead?" His voice sounded kindly. He sat high on his bench, hunched into his black robe, and looked down with apparent be-

nignancy on the little man who stood silently before him.

The audience was hushed. It watched hopefully and waited.

Julie could sense the intense excitement in Stan as he leaned forward, straining to catch every detail of the scene, anxious not to miss a thing.

She heard a giggle, then Stan's hearty laugh, then a loud burst of laughter. She opened her eyes.

The defendant was shrugging his shoulders in bewilderment. He turned half-way around to look at the laughing audience, a sheepish grin on his face.

The magistrate smiled his appreciation of the humorous response to his question. "So, you can't make up your mind?" he said in a seemingly friendly and sympathetic way. "Well, I'll tell you what I'll do, Miguel. I'll give you thirty days in the city's hotel to think it over."

Laughter and applause filled the room. The judge nodded his head in a little bow of acknowledgement. Miguel Garcia was led away, still smiling, obviously ignorant of what was happening. Miguel Garcia apparently did not understand English.

Stan was happily filling in the first line of his scorecard. His face was flushed. His eyes were bright. A satisfied smile lingered on his lips.

"Stan, let's leave," Julie said.

Stan laughed in disbelief. "Are you kidding? The fun's just starting."

"Please, Stan. I . . . I don't feel well."

"Oh? I'm sorry, honey." It was a formality, like saying 'I beg your pardon' to a stranger you bump into in a crowd. There was no concern in Stan's voice. The second case was being presented, and his attention was rapt upon the clerk and the object of the proceedings, an old white haired derelict.

"Stan, please!" Julie insisted.

"Look, honey," Stan said impatiently, "we can't leave now, even if we wanted to. They don't give back the IDs until after it's all over."

A sharp burst of laughter brought his attention abruptly back to the action up front. The old man had dropped his hat and an attendant had kicked it away from him. The white haired castoff shuffled across the room to retrieve it.

"I missed something!" Stan said, testily. He turned to his neighbor and was hurriedly filled in on what had happened.

"Well, *I'm* leaving!" Julie said. She got up and edged her way out to the aisle. Stan made no protest. He was concentrating on the performance up front.

Julie hurried up the aisle and pushed through the pack of people standing in the back of the room. She found the usher at the door. "I'd like to leave," she told the girl. "May I please have my ID?"

The usher's face was expressionless, her voice efficiently official. "ID cards will be returned at the conclusion of the session."

"But I want to leave now!" Julie protested. "I don't want to see any more of this!"

"No cards can be returned until the session is concluded," the usher

recited. It was a final decree of official policy. There could be no arguing, no appeal from the decision. There was no alternative but to abide by it.

Julie returned to her seat. She squeezed past a barricade of knees, rousing disgruntled comments from several of the spectators.

Stan glanced up at her as she settled back into the seat at his side. It was only a glance, and then his eyes were fixed once again on the magistrate, the attendants, and the "undesirable" being judged.

Minutes passed. Hours. Julie suffered the time in silence. She saw and heard, but could hardly believe, the unrestrained sadism of the giggling, laughing, applauding, cheering, jeering audience. What kind of people were these, who laughed at the pain and humiliation of others? What did they find amusing in the ruin of human life?

They laughed when a partially paralyzed hunchback limped before the judge and pleaded guilty to a charge of ogling girls in a public park. They roared with hilarity when the magistrate suspended sentence and commented that a more appropriate charge would have been that of defacing public property. They applauded lustily when he said to the arresting officer, "Bring him in on that one tomorrow and I'll throw the book at him!"

They laughed when an alcoholic appeared, twitching and brushing imaginary creatures from his torn jacket. They howled gleefully when he whimpered and sobbed like a small boy having a nightmare.

They laughed when the magistrate said his fountain pen had run out of ink and, looking into the detention pen, inquired, "Would any of you blue bloods care to make a donation?"

They laughed when a court attendant read a complaint which charged that the defendant, a small skinny man, had attacked the arresting officer, and that the officer (six-three, two hundred and ten pounds) had used reasonable force in defending himself. The man's broken arm was in a sling and bandages covered twelve stitches in his scalp.

The audience laughed. They gloated. They sat in judgment of their fellow men and called for punishment—the more severe, the better.

At last, the detention pen was empty. The last "undesirable" was brought before the bench. He was a small, pathetic looking man dressed in sailor's dungarees. He spoke Norwegian and clumsily tried to explain his predicament with the few words of English that he knew.

"Stop gibbering!" the judge shouted at him. The magistrate's facade of kindliness had long since disappeared. He turned to the arresting officer. "Do you speak that language?" He made it sound like a disgrace to be able to speak Norwegian.

The officer shook his head.

"Neither do I," the magistrate said, with obvious pride that he was not contaminated by such knowledge. He arbitrarily ordered

the man held until he learned to make himself understood; the hearing to take place when that had been accomplished. The sailor was led away.

The Show was over.

"That's the end of it, folks," the judge said, genially. He tapped his gavel and rose from his seat. The courtroom rang with lusty applause.

The judge hurried through the door to his chambers and the applause died out. The people started to leave. Their animated discussions of the evening's events dinned through the room in a babble of noise.

JULIE'S head throbbed painfully and there was a queasy feeling in her stomach. She thirsted for fresh air.

Slowly, the mob of spectators formed a procession in the aisle. Slowly, the column of people moved toward the exit. Slowly, slowly, Julie was pushed along with the crowd.

The line paused as each person stopped at the door and waited until his ID card was located and returned to him. Then the procession would take another step forward. And pause again. And again. Occasionally, an ID could not be found and its owner was requested to step aside and allow the line to move on while the search for his card continued. And there was another step forward.

Stan held Julie's hand to prevent the pressing crowd from separating them. "How'd you like it?" he asked. He was aglow with satisfaction, tired by the long evening's excitement but with a pleasant weariness of accomplishment. "It's a terrific show, isn't it?"

Julie did not answer him. She wanted to break away and run and run and run and run! She inched along with the rest of the procession.

At last they reached the door. They told the usher their names and she methodically checked through the cards in her file. The procession behind them waited.

Julie's ID card was quickly found and returned to her, but the usher reported some difficulty in finding Stan's card. He was asked to step aside, please, and let the line go through. He protested at the inconvenience, then sullenly joined a few other people waiting for their cards in the rear of the court.

Julie stood impatiently in the doorway. She watched Stan strike up a grumbling conversation with another detained person. It was the moon-faced man who had been sitting in front of them. For a fleeting moment she thought of the old adage about "birds of a feather".

She waited. People filed past her in a steady stream, from the courtroom, across the lobby, out through the street door. Watching them—smiles and pleasant conversation, civilized small talk and serious debate of the merit of the evening's fare, as if it were a dramatic work of art. She clenched her teeth and prayed that Stan would hurry up.

Soon the flow of people stopped. Still no Stan. Julie waited.

Some twenty minutes later, an attendant came out of the court-

room. He went past Julie, then paused at the door, turned and came over to her. "Waiting for someone, miss?"

"Yes. My friend. They seem to have misplaced his ID card."

The attendant smiled and shook his head. "You might as well go on home, miss. If he's still in there, he won't be coming out for some time."

"I'll wait," Julie said.

"You don't understand, miss. He won't be out tonight."

"What are you talking about? He's just waiting till they find his ID, and it couldn't have gotten up and . . ."

"Seventeen IDs were lost," the attendant explained. "Those people in there can't get them back. They're going to have to go to Caracas or Milan to apply for new cards."

"Don't be silly!" Julie scoffed. "You don't have to go to another city to apply for a new card! All you have to do is file a claim and pay the fine."

"These are special cases," the attendant said uneasily. He seemed reluctant to talk about it.

Julie frowned. "What's special about them? Their ID cards were lost, weren't they?"

"Look, miss, all I know is every time an ID is lost in there," he nodded toward the courtroom, "they've gotta go out of the country to apply for a new one. That's all I can tell you."

"But why out of the . . .?"

"The reassignment orders are being drawn up right now," the attendant said. He led Julie to the street exit. "So you'd better go home and forget that fellow."

Confusion and a vicarious fear made Julie shiver. "Will he . . . will they get new cards?"

The attendant shrugged. "They might—some day." He touched her arm. His voice was low, barely audible. "Was this your first time at the Show?"

Julie nodded.

"How did you like it?"

"I . . . I . . ." She shook her head.

The attendant smiled at her gently. "Don't ever be a third-timer." He released her arm and hurried away down the street.

Julie puzzled over his parting remark as she went out into the foul smelling night and walked away from the courthouse. Suddenly, the street before her dimmed as the lights on the huge marquee blinked out. She turned and looked back at the entrance of the court, now dark and deserted. And then she understood.

She remembered the moon-faced man's observation about the scarcity of third-timers. She understood how the "undesirables" lost their ID cards and why so many could not speak English. She understood the apparent cruelty of the sentences meted out to them, too.

The answer was on the marquee. As she looked back at it, only the raised letters on the canopy were visible, shining luminously in the darkness: *"judge not, that ye be not judged"*. And she recalled the quotation on the program: *"For with what judgement ye judge, ye shall be judged."* • • •

THE CRACKPOTS

(Continued from page 33)

did Darfla take you off your rounds in the first place?"

Darfla looked up. She had been idly running her toe through the mud near the pool. "I went through his dossier. He was too brilliant for the Corps. His record indicated any number of check-points of upper-level intelligence. So I went and found him. He didn't react as most Stuffs would have, when I applied a few stimulii, such as ruining his dicto-box."

Themus winced at the memory of the dicto-box.

"But what made you look up his dossier?" demanded Furth.

Darfla hesitated, and a gold blush crept up her cheeks. "I saw him get off the ship from Penares-Base. I—well—I rather liked his appearance. You know." She looked down again, embarrassed.

Deere made a gun with thumb and forefinger, pointed it at her, "If you don't stop taking these things into your own hands! There's a group who looks into things like that. We'd have gotten to him in time."

Themus rubbed his nose in amazement. "I—I just can't believe all this. It's so fantastic. So unreal."

"No more unreal to believe every man is a single brain with individual thoughts than to believe he's a member of a group mind with the same thoughts for all."

He clapped the Watcher on the back.

"Are you prepared to drop your life as a Watcher and become one of us? I think you'll be quite a find. Your five acts were the maddest we've seen in a long time."

"But I'm not a Crackpot. I'm a Stuffed-Shirt. I've always been one."

"Bosh! You were brought up to think you were one. We've shown you there are other ways to think, now use them."

Themus considered. He'd never really had anything, as a member of the Kyben race—the rulers of the universe—but a constant unease and a fear of the Mines. These people all seemed so free, so clever, so—so—He was at a loss for words.

"Can you take me out of sight of the Corps?" he asked.

"Easiest thing in the world," said Furth, "to make you drop out of sight as Themus, the Watcher, and make you re-appear as—let's say —Gugglefish, the Crackpot Mountebank."

Themus' face broke into the first full, unreserved smile he could recall. "It's a deal, I suppose. I've always wanted to live in a madhouse. The only thing that bothers me is Uncle Boolbak. You fool the Stuffs by pretending madness, and well—*you* consider Boolbak mad, so perhaps—"

He stopped when he saw the perplexed looks that came over the Crackpot's faces. It *was* a germ of thought.

"Welcome home, maniac," said Deere. • • •

Hope of making milk a disease-germ-fighting substance—so that all who drink it would have immunity to a host of ailments—is held out for the future by researchers at the University of Minnesota. The method would be to inject vaccines for disease-causing bacteria and viruses into the cow's udders. In response to this kind of vaccination, cows produce large quantities of antibodies. This would give milk drinkers passive immunity, which is not as long lasting as the kind one gets from an attack of a disease or a vaccination. However, by continuing to drink the milk the passive immunity could be continued.

Science minded folks of the future may soon be adding two new words to their vocabulary of measurements. Timekeeping with atomic clocks has produced the word "essen" to designate a second as measured by atomic vibrations, to distinguish it from the word used to designate astronomical seconds. "Roof" is a new unit described as the quantity of energy that would fall on the actual roof area of a small house about 33 feet square during a day when the sun shines at the rate of a million calories per minute. Architects of tomorrow who will be thinking less in terms of insulation to keep out the sun's heat and more in terms of using the roof as part of the heating system will be making this new unit a common household term to replace "gallons" of oil and "tons" of coal.

The marriage of the engine of the future with the fuel of the future was described recently at the first unclassified public discussion of nuclear gas turbines. Such nuclear gas turbine plants will have their greatest application in ships and in areas where other power plants cannot be used. With a gas turbine as the ideal power take-off for the nuclear reactor, they could be used in remote areas where power is now unavailable, where storage of conventional fuels is a problem, and during wartime where both storage and refueling for long lifelines are important. The gas turbine power plant takes up less space and operates at a higher efficiency than do power plants run on water or fossil fuels. Perhaps their greatest advantage over existing power plants is the fact that they can be transported from one place to another. Although there are still refinements to be made, nuclear gas turbine plants are a fact, and will come into use in the not too distant future.

Housewives may have to go to the frozen food counter for a loaf of bread in tomorrow's supermarket. Bakers are looking hopefully toward the commercial freezing of

bread, a practice that promises to reduce staling, loss of unsold loaves and costly night baking. Experts have probed into the technical problems, and learned that the maximum storage temperature for top quality bread is 10 degrees Fahrenheit for periods of about a week. Zero degrees is needed for extended storage. Moisture distribution, firmness, and taste are essentially the same as in freshly baked bread and will remain that way for four to seven weeks at zero degrees Fahrenheit.

Aircraft of the future may have to be designed to last for only a few hours, and then be scrapped. The problems created by the thermal barrier are triggering this new design philosophy. The two problems that must be mastered before Man's missiles can break through the earth's atmosphere at supersonic speed are: heat and creep (the softening of materials under increased stress). At five times the speed of sound at sea level temperatures are sufficient to melt the best aluminum alloys known. This, coupled with a weight penalty due to weakening of materials brought on by aerodynamic heating, may limit sustained flight to a region below three and a half times the speed of sound.

A national astronomical observatory, long the dream of astronomers, will become an accomplished fact in about five years. The first of its kind in the United States, the observatory will probably be run jointly by several institutions. It will give astronomers from all over the country much better research facilities than their institutions can separately afford. A grant of $279,000 has been made to the University of Michigan to look for an appropriate site and begin construction of a 36-inch telescope.

A mass trial of a vaccine against a special type of infectious cold is expected to get under way within a year. It will be similar to the trials of the polio vaccine; but instead of grade school children, military recruits will be lining up for shots. A vaccine for the grippe-like virus colds has already been tried on prison volunteers. It prevented the sickness in about 70% of the susceptible volunteers when the vaccine was "challenged" by doses of live virus swabbed into the eye. It is expected to give even greater protection against naturally caught disease, since a person is not likely to get such a big dose of virus that way. The vaccine caused no reaction among the volunteers and takes effect within ten days to two weeks. It will probably protect for a year or more, although this fact has not yet been proved.

There may be a whole new concept of music for the listeners of tomorrow. R.C.A. recently announced a "music synthesizer"—electronic equipment that can imitate any known musical sound or instrument and also create a multiplicity of sounds for which there is no known mechanical means of generation. The device also has an

endless capacity for rhythmical variation.

Jet planes may soon be able to land on runways only one-third as long as those now needed. Engineers have been experimenting with a new type of built-in brake for jet craft known as thrust reversers. The reversers scoop up the jet blast, diverting it to the opposite direction. The devices can potentially reduce ground roll far more efficiently than the parachutes used at present. The idea behind them is not only to slow down the jets on landing, but to brake them in mid-air.

Totally automatic defense of North America by guided missiles automatically directed to their target by giant electronic "brains" is only a matter of time. This is foreseen with the announcement of a new electronic system which controls aircraft flight and fires the plane's rockets at the proper instant after it is within 15 miles of its target. When the radar "eyes" spot the attacking bomber, the pilot pushes a button, locking the radar on target. An electronic computer takes over, flying the plane on interception course no matter how the bomber maneuvers. At exactly the correct moment, the rockets are automatically launched.

The U.S. Army has developed a new radio transmitter powered by the voice of the sender alone. The one-and-one-half pound device requires no batteries or external source of power and may be able to transmit at a range of one mile. A tiny companion receiver now under development would use voice energy that had been stored up during transmission to power it. Together the two would make a battery-less walkie-talkie small enough to fit into a telephone mouthpiece.

A new experimental machine which can print, at the touch of a single key, any one of 42 eighteen-character words or phrases at the rate of 150 words per minute was recently announced by I.B.M. The model is a standard electric typewriter. Connected to it is a memory system set up in a control panel. The typewriter can be used normally, but a slight pressure on a foot switch converts it into the Wordwriter which types the stock phrases such as "Dear Sirs:", "In response to your request", "Yours truly", etc.

Spaceman's air domes may soon be dotting the countryside. Inflated fabric domes used for housing radar equipment have pointed the way for practical construction of such buildings. Structures such as these already in use can withstand wind velocities up to 100 miles per hour and varying temperature changes. Practical aspects of these inflated buildings include portability, safety, and unlimited space; commercial blowers being the only mechanical device necessary to maintain the pressure to keep them inflated. Researchers at Cornell are already constructing a hockey rink using this principle.

Dear Mr. Quinn:

As one of your silent readers who has bought your fine book ever since it came out without missing an ish, I've a gripe to give you. Why the heck have you gone bi-monthly? Good grief, with the hokum and bunk several other mags offer all the time without folding, you're at least as good as any of the rest pubbing monthly. The poorer mags as a rule are the ones pubbing less often or on a bi-monthly schedule. You've got a first class mag! Why bi-monthly then?

I like the idea of bringing back the letter department; also the other departments. But you could still use a few more. It's like the guy who gets a grade-A steak three times a day—he finally gets tired of it and wouldn't mind eating the humble bean or potato in between —not that there's anything humble about good non-fiction.

In the February ish, G.A. Kempner's letter is in part foolish. He argues that time travel is for the birds. So was atomic power 25 years ago, at least in theory. Then he really puts his foot into it re telepathy. ". . . no conclusive evidence is available at present". I wonder what Dr. Rhine would say to this, or what several scores of students and scientists who participated in conclusive telepathic experiments would voice in angry rebuttal? These people ain't a bunch of Rosicrucians bub! This can be considered answer enough to the rest in "Hue and Cry" who hold with Kempner's viewpoint.

How about having Cal Beck do some fanzine reviews, club reports, movie reviews and similar stuff, and get Miller or Knight for book reviews. With men like that in IF, you'd have about the best mag in SF, bar none.

—Bernard Krumpel
Newark, N. J.

See this issue for that non-fiction but this is definitely not *"the bean and potato" kind. As to the other suggestions . . . how about some reader comments?*

Dear Editor:

I have just finished reading Jim McConnell's very good story "Avoidance Situation" and can only say "he goofed". He refers to a C^2 drive and a C^2 radio. He neglects the fact that C^2 is not a velocity. Consider $c = 3 \times 10^{10}$ cm/sec. Then $c^2 = 9 \times 10^{20}$ cm/sec2. Obviously this is not a

velocity.

Now I suppose someone will say that he didn't mean to square the units, only the numerical magnitude. Let us see where this leads. Considering c^2 as a velocity we get: for $c = 3 \times 10^{10}$ cm/sec, $c^2 = 9 \times 10^{20}$ cm/sec; for $c = 1.86 \times 10^5$ miles/sec, $c^2 = 3.46 \times 10^{10}$ miles/sec, which is the same as 5.57×10^{15} cm/sec; for $c = 1$ (light-sec)/sec, $c^2 = 1$ (light-sec)/sec which is the same as 3×10^{10} cm/sec. Obviously the value of c^2 depends upon the units used in c.

Now Mr. McConnell says that the Terran ship can travel faster in subspace than the alien can using the c^2 drive. This implies that the alien uses the same system of units as we do. This is a statistical nightmare. The units we use are arbitrary. (This would not be the case if we used a distance of 1 light unit and a time of the same unit, but then c^2 is no faster than c.) I cannot see how the alien could have the same system.

—Stuart L. Anderson
Seattle 22, Wash.

It would be a coincidence; but how else could McConnell get the idea across for the non-mathematician?

Dear Editor:

As an old time "sfan"—if I may coin such a word at this late date in my science-fiction career—I find great interest in your articles by Forrest Ackerman, whom I knew well in the early thirties. His February comments on the origin of S-F terms particularly intrigued me.

While he did not mention the word "scientifilm", I've seen it used enough to make me take a small measure of pride in having created that hybrid. If I remember correctly, it first appeared in print in *The Time Traveller*, the earliest sfan paper, which I edited back in 1932. Since I don't have a single issue left for reference, FJA or some other old-timer may confirm my recollection.

Another word I coin around that time was "scientale", but apparently it never caught on. Now I wonder what "sfandom" will think of my latest creation, "sfan"? That term seems so natural and obvious I can hardly believe it's really new; but I haven't seen it anywhere else before.

—Allan Glasser
Brooklyn, New York

Any old timers who still have copies of The Time Traveller? *And how about "sfan"?*

Dear Mr. Q:

I'm getting a little tired of all the protesting that only in the liberal arts can the true gospel of Man be found and the tendency to make the scientists the scapegoats for all the ills of the modern world.

Too many of today's men of affairs are proud that they know nothing about science, and as a result the world has a philosophy that the men of science and engineering are narrowly materialistic and heedless of human values.

Please make the following observation: Complete understanding of the destructive possibilities of an atom bomb does not mean that one must be built—somebody has to want one.

The nature of their work being what it is, skilled scientists and technicians usually work for the men of affairs. Can there then be so much questioning of their motives and values by the "humanists"?

—J. R. Ryder
Chicago, Ill.

This has all the earmarks of a good controversy. Who's on who's side?

Dear Mr. Quinn:

I must air some comments on the delightful February issue. The Hunter cover and space satellite drawings were worth the price of the magazine itself. Have one question to ask. When did you change art editors? Since I missed the December issue, I don't know whether you changed then or with this issue.

And now to the inside. The short novel "Avoidance Situation" was extremely good. The writing some of the best I've seen in a long time. The Anderson novelette just didn't seem to click, though I usually like his stories very much. The rest of the stories were above average. The gem of the whole issue is "The Drivers" by Ed Ludwig. It's a most thought provoking story which takes today's reckless driving to perhaps the ultimate in story telling.

—Tom Driscoll
Cincinnati, Ohio

See what happens when you miss an issue? There's more to come on the satellite too. Better not miss any more.

Dear Mr. Quinn:

I haven't had a chance to read more than a couple of stories in the February IF—"The Drivers", incidentally was excellent—but as usual, I read the letter section and features first. May I dip a short oar into the controversy over G. W. Walton's viewpoint?

It's rather bold to say that anything is impossible. I can think of two circumstances under which time travel—physical, that is—would be conceivable. One is the Einsteinian theory of time as another dimension of space, on which present advanced science is based. Under this concept, the future exists and has existed just as the past and the present and no change can be made in it. A theoretical time traveler finds that his action changes nothing, because he was already back at the point to which he traveled in time and his influence there had a casual effect on circumstances before the backward jump—maybe even caused it. It is difficult to see, however, how a man could "skip" over a period of years in traveling either forward or backward in time.

The other possibility is one which has a part in African savage religions, the concept of the "fan-shaped" destiny. At every moment of choice, when the choice is evenly balanced, *both* courses are taken. This of course involves parallel time streams, and many parallel

worlds diverging from every possible point. A return to a parallel world then would involve no paradox. If we limit ourselves to proven facts in our themes, we have no science fiction.

—Charles Fontenay
Madison, Tennessee

See Mr. Fontenay's "Z" in this issue for one Einsteinian time concept . . . and tell us what you think.

Dear Sir:

Mel Hunter has goofed! Take a copy of February IF . . . turn to the inside front cover. Look in the upper left hand corner. We see a three stager taking off; Minimum Orbital Unmanned Satellite of Earth. But all three stages have wings! Only the first stage needs wings and they are just to enable it to navigate a shallow orbit (straight up is needless and, at present, impossible). However, there will be no air after Stage I falls to earth and Stage II takes over as far as airfoils are concerned. That is, there will not be enough air with which to glide. Sheer momentum and free fall will hold it up.

—Jerry Page
Decatur, Georgia

Mr. Page, you are right! Hunter and editor both goofed. The drawing of the satellite rocket on page 35 will bear you out. And don't miss the August issue!

Dear Editor:

Have read for years stories and articles on space travel that make the false assumption that a person on the Moon or other planet of lighter-than-Earth gravity would be able to leap over obstacles of a height greater than those he could clear on Earth, the height being figured as inversely proportional to the decrease in gravity. The gentlemen who write such "data" say a man can jump over a five-foot obstacle on Earth; on the Moon, gravity is only one-sixth as strong; therefore he can jump six times as high or clear a thirty-foot obstacle! Sounds logical, but overlooks some of the important facts about how people jump—and confuses clearing an obstacle with lifting the human C.G. A six-foot man, standing, has a C.G. roughly three and a half feet from the ground. In leaping over a five-foot barrier, his C.G. will clear it by a foot or less; therefore he lifted two and one half feet, the other two and one half feet for clearing the obstacle being obtained by tucking up the legs. If I haven't overlooked some factors, then a man on the Moon should be able to leap over a seventeen-to eighteen-foot obstacle, hoisting his C.G. 6 x 2½, or 15 feet pulling his legs in for the rest. There should be another way to calculate this: a man on the moon would weigh one sixth of, say, one hundred and eighty pounds—or thirty pounds. Now, if we knew how fast a man's legs muscles could push an object weighing thirty pounds with an inertia of one hundred and eighty pounds, we could calculate how long that six-foot per sec (approximate) gravity of the Moon would take to stop and retrieve it, and

how far it would travel before it stopped.

—J. E. Cherne
Hagerstown, Md.

How about jumping obstacles under an air dome on the moon?

Dear Mr. Quinn:

At present you are up with the other top magazines in maintaining a proper balance between fiction and the features. However, I disagree with Mr. Hallam of the Dec. '55 issue, regarding technical articles. IF has yet to produce articles as absorbing as those on Thiotimiline or the series Origins of Galactic Etiquette.

—K. H. Quinlem
Brisbane, Australia

Dear Mr. Quinn:

How about more stories such as Raymond Jones' "Human Error" and Ed Ludwig's "The Drivers"? These have the ring of reality and authenticity. If I could have one wish, I think I would like to live as long as Methuselah. Reincarnation wouldn't be the answer—I wouldn't want to miss the next nine hundred years.

How about some more letters from lady S.F. fans? Interest in S.F. isn't silly girls, it beats love stories all to pieces. Then too, some of our great scientists are women. I have been an S.F. fan for five years and I'm proud of it.

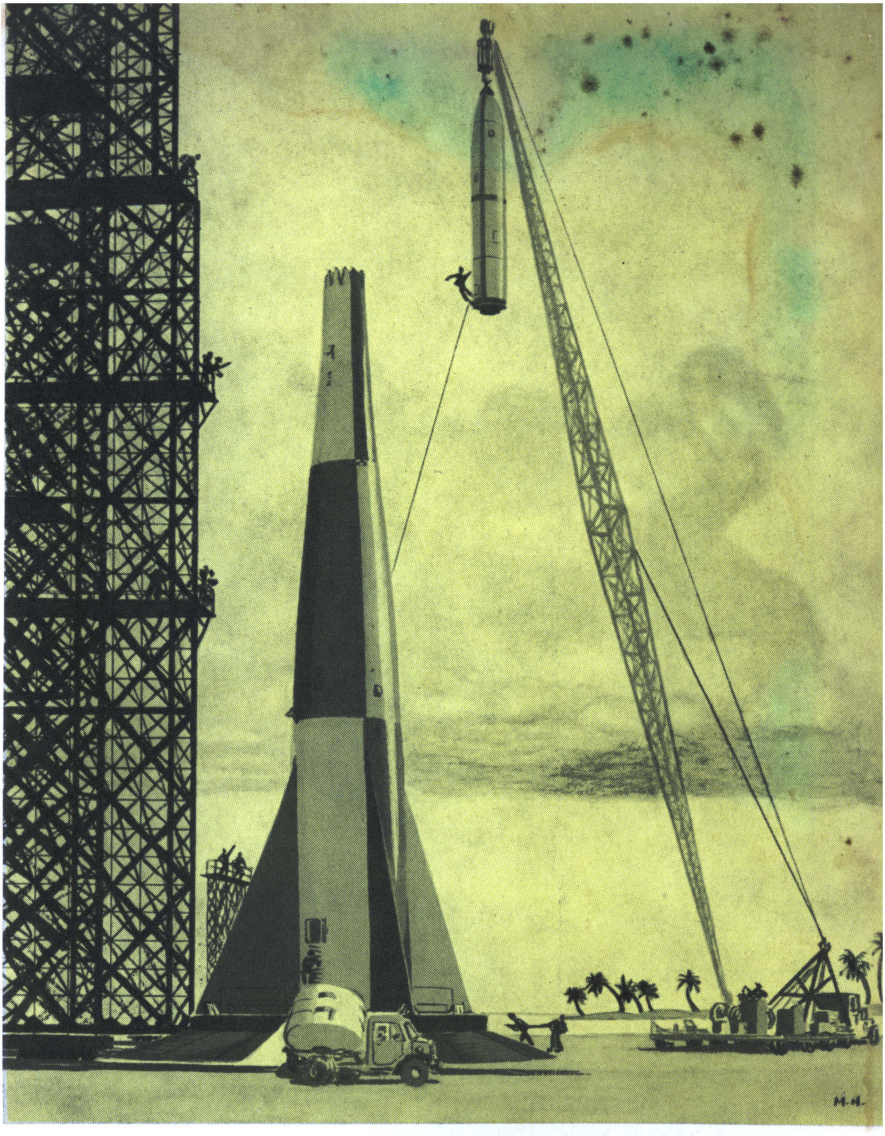
—Margaret Wilhelm
Freeland, Md.

EDITOR'S REPORT

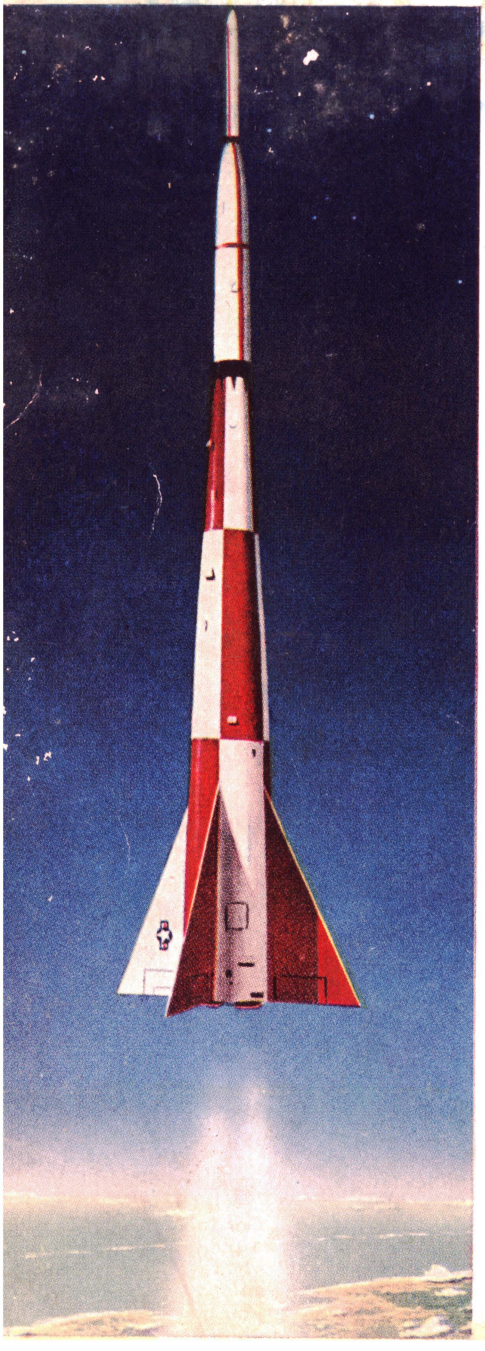
(Continued from page 3)

However, as you have no doubt surmised by now, their speculations on the Satellite are not idle conjecture but come from a wealth of working know-how and personal experience.

The first article (page 34) dismisses the "basketball" idea and presents the satellite as a giant needle, 19.5 feet in length and one foot in diameter, and discusses the requirements for getting it into space. The second article, which will appear in the August issue, goes into more detail and describes instrumentation, functioning, orbital behavior and transmission of intelligence. —jlq



HOISTING STAGE TWO INTO POSITION—Forty feet in length, Stage Two is shown being hoisted into position atop Stage One, one hundred feet high. The twenty foot Stage Three Satellite will be placed in position last. Monster gantry rig is built with adjustable crane arm to facilitate simultaneous rapid fueling of all three stages just prior to takeoff, in order to minimize boiloff of volatile oxidizer. Just before firing, tower will be pulled back to allow rocket to stand alone. Blockhouse is underground a half-mile away. Scene is near Patrick Air Force Base, Cocoa, Florida. *(Drawings by Mel Hunter)*



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