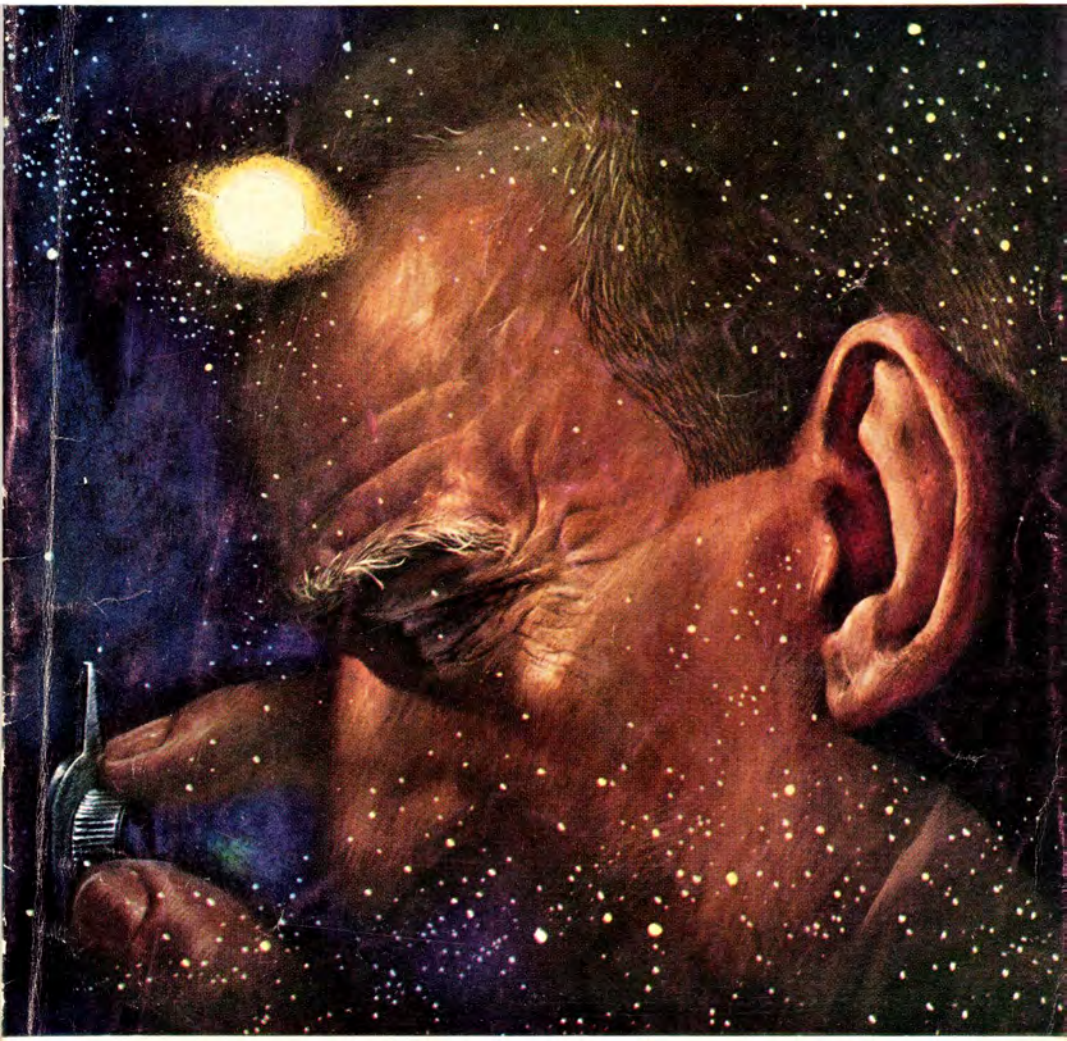
July • 50 cents

analog

SCIENCE FACT — SCIENCE FICTION



LISTEN! THE STARS! by John Brunner

"Voices from outer space... a half-heard mystery."

Discover new shaving comfort!

New Norelco® 'flip-top' SPEEDSHAVER
with Rotary Blades

This Spring, discover the smooth shaving comfort you get with a new Norelco 'flip-top' Speedshaver. Self-sharpening rotary blades stroke off whiskers clean and close. And . . . no nicks, no irritation.

Norelco's exclusive 'flip-top' feature offers pushbutton cleaning. The rugged brush type motor is self-lubricating, runs on 110 volts, AC or DC.

Get the world's largest selling electric shaver — or hint for a Norelco 'flip-top' Speedshaver for your next birthday or other gift occasion.

North American Philips Company, Inc.
100 East 42nd Street, New York 17, N.Y.

analog

SCIENCE FACT — SCIENCE FICTION

VOL. LXLX NO. 5 • JULY 1962

NEXT ISSUE ON SALE JULY 17, 1962

JOHN W. CAMPBELL
Editor

KAY TARRANT
Assistant Editor

HERBERT STOLTZ
Art Director

ROBERT E. PARK
Business Manager

WALTER J. McBRIDE
Advertising Manager

Editorial and Advertising office: 420 Lexington Avenue, New York 17, N. Y.

COVER BY SCHOENHERR

Analog Science Fact—Science Fiction is published monthly by The Conde Nast Publications Inc. Editorial and advertising offices: 420 Lexington Avenue, New York 17, N. Y. Executive and publishing offices: Greenwich, Connecticut. I. S. V.-Patcevitch, President; Alfred W. Cook, Treasurer; Mary E. Campbell, Secretary. Second class postage paid at Greenwich, Connecticut, and at additional mailing offices, under the Act of March 3, 1879. Subscriptions: In U.S., possessions and Canada, $5 for one year, $9 for two years, $12 for three years. Elsewhere, $7.50 for one year, $15 for two years. Payable in advance. Single copies: In U.S., possessions and Canada, 50¢. Six weeks are required for change of address. In ordering a change, write to Analog Science Fact–Science Fiction, Boulder, Colorado. Give both new and old address as printed on last wrapper.

POSTMASTER: SEND FORM 3579 TO ANALOG SCIENCE FACT • SCIENCE FICTION, BOULDER, COLO.

What's Wrong With Science

■ When I was first taking physics, way back before the neutron had been discovered, there were so many mutually contradictory theories of atomic structure that there was no Officially Authorized Version—and man, were they making progress, but fast, in understanding and gaining insights!

Of course, it was confusing, and a scientist had no way of feeling certain that he was right . . . but some magnificent experimental work was done, despite the limited equipment available to the researchers.

Today, the situation is very different, and is dominated by one overbearing consideration: The Government pays for most major research programs. Whether the research is done in direct government laboratories—the Atomic Energy Commission's facilities, for instance—or in private industrial or university labs under contract, the government is *the* sponsor and bill-payer.

Now this is an era of Social Welfare, and Cradle-to-Grave Security, and Investigations, and it may not ruin a man's career to be caught with the wrong wife, but it will ruin him to be caught making a decision without the approval of at least two staffs and a highly authoritative Committee. Even if the decision is right, he's wrong because it wasn't approved by a committee.

And when a scientific program is proposed, it must be shown that it is safe, sane, certain, and spectacular. Above all, that it is *certain* to succeed, and not waste Public Funds on an untried, uncertain, dubious, project.

Unfortunately, in any area where men can be certain—there is no room for research. If you already know the answer, there's nothing there to be learned.

There is, too, a very poorly recognized difference between "guilty" and "responsible"; responsible means "he

AN EDITORIAL BY JOHN W. CAMPBELL

did it," and does not, of itself, imply either good or ill. A man may be *responsible* for either a great discovery or a great tragedy. The immediate cause of George Washington's death appears to have been the fact that his doctors bled him so heavily that he did not have the vitality necessary to fight the infection he had; the doctors were *responsible* for his death.

Guilty, on the other hand implies that "he did it, it was an evil thing to do, and he did it intending ill." Washington's doctors were not *guilty* of his death, for they lacked the knowledge of germ disease, and lacked knowledge of the true function of blood. (N.b.: Modern medicine also lacks knowledge of the *true* function of blood; we just know a little more than the late Eighteenth Century doctors did.) Therefore, they did not know that they were doing an ill thing.

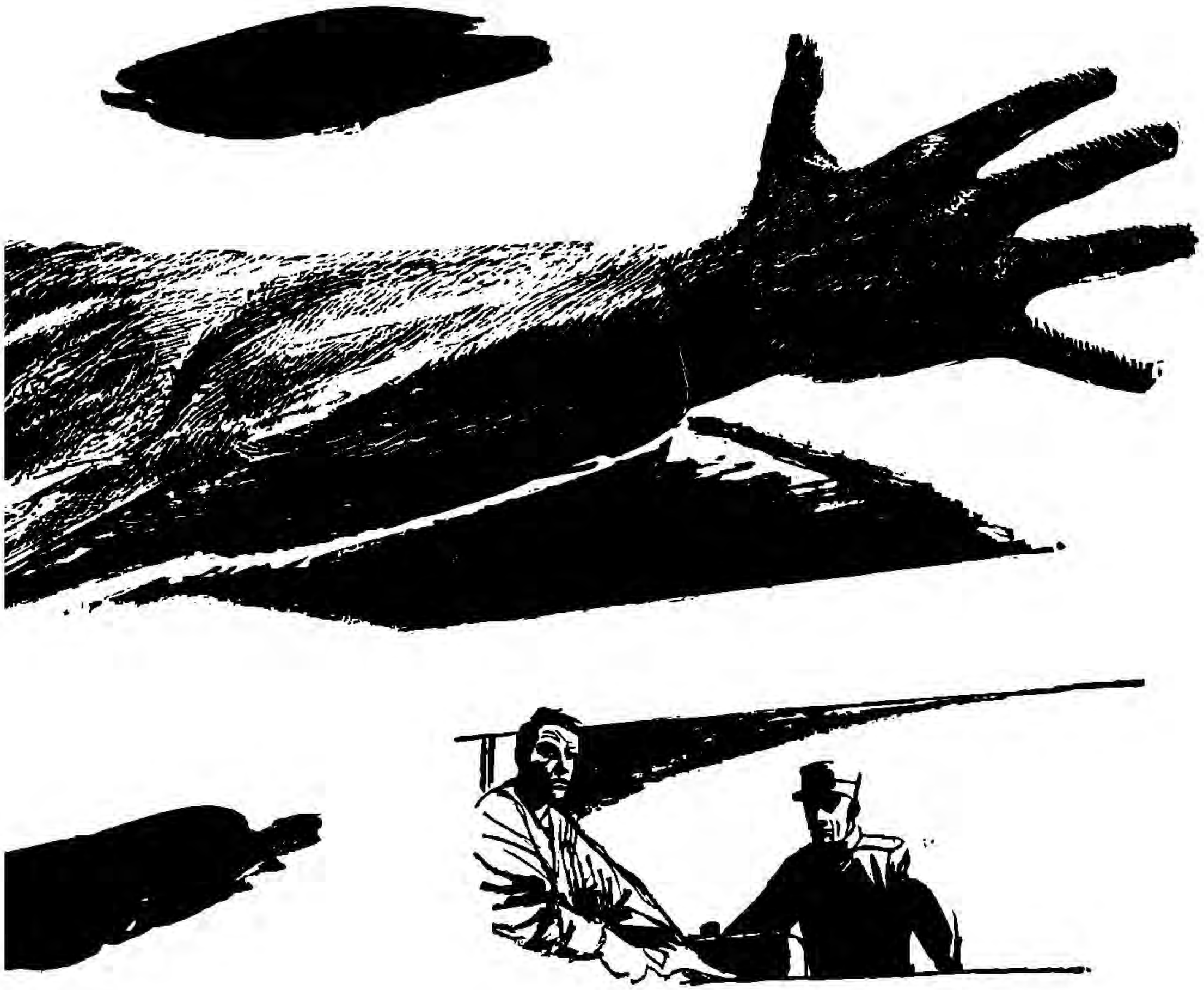
The tendency of J. Q. Citizen is, unfortunately, to hold that if he has been hurt due to the acts of someone else, that someone else must be *guilty*. People fail to distinguish between guilt and responsibility because there's a strong desire to "make someone pay for this" in the vengeful sense. And, if it can be shown, that Bill Blow was *responsible* for the painful act, then that immediately proves Bill Blow was *guilty* and must be made to pay for it.

Result: in order to prove a true proposition, "I am not guilty," it becomes necessary to establish a lie, "I am not responsible."

The interaction of all these factors —government science, the demand for certainty and security, the insistence that responsibility equals guilt if things don't go right—makes ideal conditions for the growth of Orthodoxy.

Utter folly, blessed by the Highest

« *Continued on page 172* »



Listen! The Stars

Making sense out of a message half-lost in noise, in an unfamiliar language can be the most maddening, tantalizing experience a man can have—
and the pull of such a message is irresistible...

by John Brunner

Illustrated by Schoenherr

■ "Stardropper?" said the dark-uniformed customs officer. He could have meant Dan himself, or the instrument slung over his shoulder. Either way the answer was yes. Dan nodded.

"So am I," the customs officer said. "Just taken it up."

"Ah-hah?" Dan looked interested. "What model do you have? This is a hand-assembled job. A guy makes them in LA."

"Wish I could spare time to look at it," the customs officer said with real envy. "Powerful, is it?"

"One of the best!"

From outside came the choking roar of a Mach Three express taking off under rockets. The customs officer slashed quick chalked crosses on Dan's three bags.

"Hope you enjoy your stay in Britain, sir," he said, and moved on. Dan kept his long-jawed face impassive, but behind it his mind was very busy. It was one thing to be told that the stardropping craze had a tighter hold here than at home; it was another to run up against proof within minutes of his arrival.

One more minute—one more proof. Standing by the door labeled TRANSIT LOUNGE AND EXCHANGE FACILITIES was a wild-eyed young man, hair untidy, shirt filthy at the cuffs, one cheek smeared with grime. As the newly arrived passengers filed past him he was saying fiercely to each of them, "Klatch remoo! Listen to me, will you? *Klatch remoo!*"

The passengers scowled and tried to avoid him. Nearby Dan saw a policeman and a member of the airport staff, watching the young man with serious faces. But they did not interfere.

The instant the young man saw Dan's stardropper he seized Dan by his lapels and thrust his face close. "You!" he barked. "Klatch remoo! What does that mean to you?"

"Nothing," Dan said shortly. "Take your hands off me."

"It *must*. Listen again. Klatch—"

Dan tugged the clawing hands free of his jacket and shot a glare at the policeman, who came forward at last.

"Mr. Gray!" he said sharply. "If you're going to be a nuisance, I shall have to turn you out—understand?"

A tear squeezed out of Gray's left eye and mingled with the grime on his cheek. Hopelessly, he turned away from Dan.

"What does he have to do to be classed as a nuisance?" Dan demanded of the policeman.

"Well, he's expecting someone he says he heard of through his stardropper, sir. You can hardly blame him, can you?"

"But there's a time and a place for everything!"

The policeman shrugged. "He's no great trouble, sir. And the slightest chance, you know—always worth taking."

Dan was not clear what the remark meant, but he did not want to make himself conspicuous by saying so. He shrugged, and crossed the

lounge to an exchange counter. While waiting his turn to be served he had plenty more reminders of the grip the stardropper craze had here. There were many vivid posters advertising instruments or kits of parts, and on one of the padded benches nearby a girl sat with the earpiece of a stardropper half-hidden in her bright fair hair.

Building up a charge like the man Gray? Dan hoped not. She looked too pretty to go mad.

As his taxi spun down the Great West Road towards London, Dan opened his own instrument and stared at it for the twentieth time. What *were* these things all about, anyway?

About half the contents of the shallow square box made sense—the earpiece on its cord, the transistorized amplifier, the power source, too. You could run a stardropper off flashlight cells, house current, solar batteries, but this—as he'd told the customs officer—was an expensive handmade model and used a fuel cell and a little tank of butane gas. So far, so good.

What could be made of the rest? An alnico magnet on a brass slide, toothed to engage with a worm. A calibrated plastic knob on the same shaft as the worm, with a ratchet to hold it on a chosen setting. An ultra-hard vacuum in a little aluminum box. There was a getter in the box to keep the vacuum swept, but about once a month you had to trade it for a fresh one. The butane tank—a standard cigarette-lighter refill—was guaranteed for a year and might last three times as long.

Add it up, and you got nonsense. But . . .

Dan put in the earpiece and twisted the plastic knob at random. A susurrus of noise began, like waves on a distant beach. He closed his eyes to concentrate.

True enough, the sound was attractive. It hinted at meaning, like a voice speaking a foreign language. Or, more nearly, like music, able to conjure up ideas without communicating them.

But after a while the sound broke up in a gabble of shrill squawks, and he took out the earpiece and shut the case. Maybe he just wasn't getting the point. Plenty of his friends had taken up stardropping and talked him into trying their instruments, but what they found fascinating he'd found, at best, interesting. He'd taken the instruments for toys.

Now he knew they were more like loaded pistols, because at the end of the line might be a man like Gray, shouting crazy nonsense at strangers.

Asking what a stardropper *really did* seemed futile. Dan reflected that he'd had the benefit of an explanation from Berghaus himself, the only man with a theory to fit the facts, and even that had brought him no further ahead. Moreover, for a scientist Berghaus had been driven to some appallingly unscientific terms. "Psychic continuum," for example. It seemed that this was simply an unscientific sort of phenomenon.

Here were signals being generated without reasonable cause from the juxtaposition of a hard vacuum, a magnet and a power source. Signals that were *not* random noise, but at least as highly organized—and hence information-full—as human speech. Information, as Berghaus had stressed, was not *meaning;* it was a technical term related to degree of ordering. When the phenomenon was still a lab curiosity called "the Rainshaw effect" people naturally assumed the ordered nature of the signals was related to periodicity of atomic or molecular vibration in the matter composing the equipment.

It was Berghaus, after months of investigation, who found the extraordinary statistical resemblance between the signals and the output of living nervous systems. The evidence was too technical for Dan to follow, but Berghaus summed it up this way: "Just as, for instance, the Zeeman effect tells an astronomer that a magnetic field surrounds a star, so these signals have characteristics suggesting they originate in an organized, percipient nervous system."

About a year earlier Berghaus had proposed his now-famous theory of precognition. There was so much objective evidence that one was badly needed. To account for transfer of information future-to-past he invoked a space-equivalent for it to travel through, non-Einsteinian in that instantaneity there acquired a definite meaning, and permitting knowledge of an event at moment *x* to become available at moment *x-y*.

Reluctantly, Berghaus said, "It seems to me that these devices may tap the space-equivalent which I have called the 'psychic continuum' just as the mind of a man with ETP does."

What Berghaus said might be newsworthy. Reporters inquired why, if these signals originated in living minds, they should not be translated into words. Berghaus answered honestly that all living, aware beings, human and otherwise, might have access to this timeless channel of information.

"Human *and otherwise?*" the reporters pressed him. "You mean creatures on other planets, under other stars?"

"Why not?" shrugged Berghaus. "If they exist, and they very probably do."

To him, it was merely a possibility which could not be ruled out. But the reporters went away and coined the phrase "eavesdropping on the stars." Someone put out a cheap portable version of the puzzling device, purely as a gimmick. Someone else nicknamed it a stardropper.

And the world seemed suddenly to go insane.

II.

At ten to three Dan was almost alone in the lounge of his hotel, dawdling over an after-lunch coffee, and therefore it was already a warning when the burly man took the other chair beside the low table where he was sitting. Dan studied

him. He was big-boned, going bald, with a bristly brown mustache and red cheeks, and he smiled to see Dan's eyes on him.

"Special Agent Cross?" he said politely.

So someone had goofed. But there was no point in arguing.

"Just plain mister," Dan said after a pause. "The organization has a title. We don't."

The burly man flipped an ID card from his pocket. It had his photo pasted on it, and underneath was written *Hugo Samuel Redvers, Chief Inspector.* Dan sighed and gave it back.

"What can I do for you?" he said.

"Oh, answer some questions," Redvers said. He ordered black coffee and a cigar from a passing waiter, and leaned back. "In particular, what brings you here. Our man at the airport was puzzled to see a Special Agency operative with one of those gadgets on his shoulder." He indicated Dan's stardropper lying on the table between them. "Cross isn't your real name, I take it?" he added.

Dan shrugged. His real name was so far in the past it felt like just another of the dozen aliases he had had to use.

"Well, I won't press you," Redvers said. "I worry about what people do, not what name they choose to do it under. Well?"

The waiter brought his coffee and cigar, and he passed the cigar under his nose appreciatively before lighting it.

It was galling to have to declare any Agency interest to an outsider, but there it was. Fortunately there was no special secrecy attached to this trip—only what was necessary to preserve his future usefulness.

He said reluctantly, "Stardroppers."

Redvers nodded. "I thought so. I was wondering when you'd get into the act. Everyone else has been in it for months. Just fact-finding?"

"That's about the size of it."

"You're very welcome, then. By the way, I can save you some trouble. Your room isn't bugged—I had it checked. I knew which it was because one of my men made your reservation for you. All in all I'm rather pleased with myself today, which is why I'm treating myself to this cigar. I imagine Havanas are something of a forgotten luxury as far as you're concerned."

"For a guy who knows all the answers, you're trying very hard to needle me," Dan said.

"I suppose I am. Sorry—I'll get to the point. People are interested in stardroppers for various reasons. Commercial rivalry, for example. The things were invented here and became highly profitable almost overnight. Then we get troubled with addicts who are convinced someone has found out how to turn the signals into plain English and is hiding things from them. Rubbish, of course. And there's this idiotic rivalry between the great powers to secure from stardroppers some mystic knowledge that will make them masters of the world. The Special Agency

is the most fanatically internationalist of the UN organizations, so unless you've turned your coat we can rule that out. Which means that you're looking for someone you don't expect to find. Right, Mr. Cross?"

"You do know all the answers," Dan said at length. "I apologize."

"I wish we did!" Redvers said heavily. "One of the policemen at the airport said you were taken aback by Gray. I can assure you that even if he was acting, he's fairly typical."

"Acting? The guy yelling nonsense at the passengers?"

"Oh, yes. He's one of my best men. We've been living by our wits in this country for the past decade, Mr. Cross. We've got pretty good at it."

Professional admiration was getting the better of Dan's dismay. He said, "Maybe I shouldn't have troubled to fly over. I could just have called you up and asked you."

"No, we're too close to the problem to make sense of it. What I'd like most is advice from one of these alien creatures people claim to hear by stardropping. Failing that, the view of an outsider like yourself. First visit?"

"Yes."

"But you'll have been thoroughly briefed—I know your people. And like them, I might say. We appreciate your insistence on being on everybody's side instead of one side or the other. Of course, that's how we regard ourselves nowadays. And we know it isn't easy. Since we opted out of the arms race and adopted our neutralist policy, both the great powers have been treating us like a sort of overgrown Tangier—a strategic zone where everybody and his uncle seems to be plotting a *coup d'état*. This elderly continent of Europe is the battleground of the late twentieth century, and we're right in the firing line."

"Not that anyone would know, just looking."

"It's deeper than you can see. It's in the mind. But of course we're certain of one thing. If the world ever does blow up, both sides are going to hit this island on the principle of denying ground to the enemy. That's where independence gets you! Oh, life isn't dull here. But it's a strain. In fact, you know, the psychologists say that's why we took so avidly to stardropping. People are desperate for security, and they'll grab even so slim a chance as the hope of knowledge from the stars."

"I've heard that theory. Is it sound?"

"Perhaps. On the other hand, the country where stardropping is most widespread, after Britain, is India. It appeals to the religious and mystical sense of the people there. You can take your pick of explanations. There are plenty to go around."

He gulped down his cup of coffee all at one go.

"I gather the craze in the States is about six months behind ours," he went on after a pause.

"About that. It has a hold on the West Coast, as one might expect.

But we have nothing like your student problem yet."

"Ye-es . . . Unfortunately it's mainly sensitive, intelligent young people that stardropping appeals to. Students, as you say. Some get addicted, as though to a drug. Some go insane. But what's worst, of course, is that people do disappear."

Redvers spoke so casually Dan could not prevent a start of surprise.

"Yes, Mr. Cross!" Redvers affirmed. "From your reaction, I deduce that's what brought you here. We've documented twenty cases where we can't shake the witnesses. Usually they vanish with a noise like a door slamming. I hope you've only heard rumors, because up to now we've prevented any reputable news agency from picking up the stories. It's been difficult."

"What sort of rumors?" Dan said.

"That these people had discovered mystic alien abilities through stardropping and gone to put them to use."

"That matches up," Dan nodded. "And you? Are you convinced?"

"No. Not yet. But I have a suspicion I will be eventually. And if this is true, it's explosive! A power of instantaneous displacement, if it can be controlled, could be used as a weapon. Even if it weren't, it might frighten someone in a position of power so badly he might lose his head. And that, of course, is where you come in and why I'm glad you're here."

Dan nodded. The Agency had one sole purpose: to identify threats to the peace of the world and ruthlessly cancel them out. There had been two sensational political assassinations, for instance, not long before. Social psychologists had plotted graphs and said, "Such a man is not sane, and a lunatic in his position could start a war."

So . . .

"How would you like the opportunity of meeting the man who started all the trouble?" Redvers suggested after a moment.

"You mean Rainshaw? I guess I wouldn't object."

"Fine, I'll arrange it. And I'll keep in touch during your visit. Maybe I can give you help towards a solution." He got to his feet and held out his hand.

Feeling slightly numb, Dan shook with him and watched him stride away towards the exit.

I was never so politely told I was incompetent.

Gradually he began to relax. There was a man you could respect for being clever without suspecting him for being cunning. That trap at the airport, for instance—with the man Gray. Brilliant. Dan had never considered how closely Gray could study his face, hear his voice and even feel his clothes while howling his nonsense.

And Redvers *did* know all the answers. It was exactly the rumors that stardropper enthusiasts were vanishing which had brought Dan across the Atlantic. Redvers had just informed him that they were more than rumors, and he was clearly wor-

ried. Which implied that even if they had opted out of the arms race, these people—by turning stardroppers loose on the world—had lit the fuse on a sizable bomb.

Dan shook his head and picked up the gaudy-covered magazine on which his stardropper was lying. He had spent the flight from New York reading a pile of such magazines; the stardropper craze had set a record for the speed with which it had produced hobby magazines and clubs of enthusiasts.

This one was called *Starnews* and was published in California. What interested Dan about it was not the chatty news of personalities, nor the reviews of new equipment, nor the letters from enthusiasts recommending their favorite settings on various instruments, nor the turgid and semi-mystical articles forming the meat of the issue. What had struck him was a full-page advertisement inserted by an Oxford Street, London, store. If it advertised like that in a magazine from Los Angeles, it would be a good place to begin his inquiries.

III.

Behind curved nonreflecting glass a six-foot star turned slowly in mid-air, above a dozen recent-model star-droppers displayed on red velvet. In place of a door there was an air-curtain. Dan stepped through.

Her feet hushing on deep-piled carpet, an attractive girl in black came up to ask what she could do for him.

Dan lifted his stardropper. "I think my vacuum's gone soft," he lied. "Do you keep trade-in tanks for this model?"

The girl looked the instrument over and nodded. "Oh, yes. If you'll come to the counter, I'll get you one."

"Thank you."

He followed her slowly, looking around. This was certainly a profitable business. The whole store had a *rich* look. Even the shelves at the rear were covered in red velvet like that in the window. Four other customers were present. A man and a woman of middle age sat side by side in the corner farthest from the door, listening to portable stardroppers. Neither moved visibly while Dan was in the store. And at the counter two young Chinese were asking technical questions of an equally youthful clerk. Dan knew that a great many Chinese tourists were visiting Britain nqwadays, but according to his briefing stardroppng was considered antisocial and time-wasting in eastern countries, so it was surprising to find them here.

The girl came back with a fresh tank of vacuum. "Shall I fit it for you?" she asked.

"Well . . . thanks very much."

She attended to the job deftly. "We haven't seen you before, have we?" she said conversationally. "You're American?"

"That's right. I saw your spread in *Starnews* and figured I should call in. Say . . . uh . .how can I get to meet some people working in the

field while I'm in London? I'm new to this."

The girl shut the case. "That's thirty shillings, please." she said. "Well, we can certainly help you there. We run a club for our regular customers who want to do research, and our manager—Mr. Watson—is the chairman. You should talk to him."

"I'd very much like to," Dan said.

"I'll ask if he can see you right away. Perhaps you'd care to glance through our catalogue while you're waiting?" She put a fat loose-leaf binder in front of him.

He hefted it, surprised at the size of it. "How many different models do you stock, for heaven's sake?" he demanded.

"Around sixty. But there are a hundred or more in production."

Impressed, Dan carried the catalogue over to a chair by the wall, and opened it. There was a blurb on the first page:

We live in a strange era. Until recently death was our closest neighbor; we walked with him day and night. He has not gone from us, but since the discovery of the stardropper we have learned that life is as close as death.

Some people seek in the sounds of a stardropper new knowledge of the universe and of man. Others ask no more than the comfort of experiencing for themselves the signals which, scientists tell us, indicate that other beings in the universe live, and think, and perhaps love.

Whichever class you fall into, we are at your service.

COSMICA LTD.

Well, that was one way of looking at it . . .

Behind him, a voice said, "One of Harry Binton's handbuilt jobs!"

Dan turned. The speaker was a man of forty-odd, smart in maroon and black. "Mr. Watson?" he said, getting to his feet.

"That's right. Sit down, sit down. That is one of Harry's instruments, isn't it, Mr.—?"

"Cross. Dan Cross. You're quite right. Do you know them?"

"Oh, yes. We're agents for Harry in this country. Very fine work he does, too. There's no more powerful model you can carry on a strap. Have you tried many other instruments?"

"As a matter of fact, no. I got hooked by a friend, just recently, and he recommended me to get a Binton."

Watson cocked his head on one side. "A little too powerful for a novice, possibly. Let me just try you with a Gale and Welchman. It's one of the cheapest we stock, but there's a setting on it which can be a revelation."

He fetched a large plain instrument in a white case and set it on his knee. Passing the earpiece to Dan, he said, "Tell me when I get the setting right, will you? It does vary from one instrument to another, of course. Getting anything?"

Obediently Dan closed his eyes to concentrate. Somewhere at the back of his mind a drum was beating. A

slow rhythm built up from it, quickened, grew louder. A melodic instrument joined in—or was it a voice singing? No, it was more like a joyful shout. The drumbeat was changing to a tramp of feet—changing, or had he mistaken it at the start? Yet it wasn't marching feet at all. It was the pumping of a huge heart, and signified life, awareness, vigor. Even violence! For it was the rumble of an earthquake at work on the building of mountains, and the shouting was the scream of rocks being ground upwards past their ancient bedfellows—

It stopped, and he opened his eyes. He was shaking all over.

"Well?" Watson said, grinning like a Cheshire cat.

"You're right, it's amazing." Dan wiped his sweating palms.

"*That's* what stardropping is all about, you realize." Watson patted the instrument he held. "This model has an excellent repertoire. I've known people who've gone on to big fixed home installations and haven't been able to part with their original Gale and Welchman, they liked it so much."

A reference spotted in a magazine crossed Dan's mind. "You can't get that on any other instrument, then?" he suggested.

"Oh, no. Why, even Gale and Welchman turn out the occasional failure which lacks the setting I just demonstrated. But I wouldn't sell one here; it would be deceiving the customer." He turned to put the instrument aside.

"Our club does a lot of work trying to match up signals received on different instruments and establish a proper system of calibration, by the way. I gather you were inquiring about it."

"That's right. There's obviously a lot for me to learn, and I want to meet some people doing real work in the field."

Watson took a card from his pocket. "You're welcome to join us," he said. "We meet every Wednesday, as you'll see—and of course it's Wednesday tomorrow."

The card said CLUB COSMICA and gave an address in the center of London. Dan pocketed it, getting to his feet. "Thanks very much," he said. "What time should I arrive?"

"About eight. We have a demonstration this week, so it'll pay to be prompt."

Outside the store Dan almost fell over a girl sitting on the sidewalk. She had the earpiece of a stardropper in and her eyes were closed. She was chalking a series of spiral lines on the ground. Presumably she hoped that someone would recognize the meaning of the pattern and speak to her. But no one did.

In a drugstore window shortly afterwards he saw single earplugs on sale, labeled TO AID CONCENTRATION WHILE STARDROPPING.

Waiting to cross the street at a stop light, he heard one teen-ager hail another: "Dropped any good stars lately?"

And then a man of sixty or more went by, pushing an old handcart. On the cart was a huge shiny stardropper. From the speaker oozed a sound like something flat and clumsy being moved about in thick mud, sucking and plopping.

Following the cart were five or six youths and girls. One of the girls had a look on her face like a saint in ecstasy, and her boy-friend had to lead her by the hand. But next to her was another girl who was clearly getting nothing from the sound, and kept shooting envious glances at the luckier ones. She had short-cut black hair and a peaked gamine face with a sullen mouth, and she wore the leisure clothes currently popular with both sexes—a high-collared shirt and check pants.

What attracted Dan's attention to her he did not know. But what attracted her attention to him was obvious. His stardropper.

She fell out from among her companions, as though giving up in despair, and came up to the sidewalk where Dan was standing, fumbling in a pocket. She moved very swiftly as she went by.

When her hand came out of her pocket it held a knife. The knife slashed the strap of Dan's stardropper. She caught the instrument as it fell, tugged it loose, and took to her heels.

IV.

Half a dozen people saw her do it and tried to stop her, but, if she had picked on almost anybody else except a special Agency operative, she probably would have got away. As it was, Dan didn't catch up with her until he'd followed her across two dense lines of traffic, dodging cars like a doubling hare, and reached the edge of Hyde Park. There, it was simply a matter of wearing her down, and as soon as she saw he was still on her track she gave up all hope of escape.

He expected her to distract him by throwing the stardropper down and making off without it. But she just stopped, clearly exhausted even by such a short chase.

Wondering at the defiance in her dark eyes, he came up to her. She looked undernourished, a strange sight in this prosperous city. He studied her, but said nothing.

As though reading his mind, she said, "I wouldn't have thrown it away. It might have got broken."

Dan still said nothing, but went on looking at her.

A few seconds of that, and her self-control broke She thrust the stardropper violently towards him. "Here you are!" she said shrilly. "Go on—take it!"

He did not move. Not understanding, she bit down on her lip. A crafty look crossed her face. "You . . . uh . . . you aren't going to turn me in?" she suggested.

"No, I don't think so," Dan said.

The girl brightened visibly. "Would you let me . . . try it?" she ventured. "That's the only thing I wanted it for, I swear. I didn't mean

to sell it or anything. And"—she seemed to be screwing up her courage—"if you want anything, I mean I'll do whatever you want if you'll let me try your 'dropper. Is that what you were going to say?"

Dan moved his right arm like a striking snake and twitched the strap out of her grip. He brought the instrument up short on the end an inch before it hit the ground, watching her. It looked from her expression of alarm, followed by relief, as though she was telling the truth.

So here was one of the young addicts Redvers had mentioned, and whom he had learned about in his briefing.

"You louse," she said with a pathetic attempt at dignity. "Did you pull wings off flies when you were a kid, too?"

Dan began to knot the strap together. He said, "What's the problem? Don't you have a stardropper of your own?"

"I did have. My mother said I spent too much time with it, and she broke it, so I walked out. But I can't afford a new one, and it's sheer *hell* being without, because I was getting somewhere. I know I was."

"Haven't you friends who would lend you theirs?"

"Oh, I've tried that. None of them were right for me. I saw that yours wasn't any of the kinds I've tried, and I wanted to use it for a little. Maybe none of them will work except the kind I had before, but it's torture not to be certain. Look." She held one thin hand before her, and it shook like a wind-tossed leaf.

"What did you have?"

"A Gale and Welchman. Just a cheap one, but very good.

So this was the result of using Watson's pet model! How on earth had things been allowed to get so bad?

"What is it about stardropping that gets you this way?" Dan demanded.

"How can I tell you if you don't know? You're a fan yourself!"

"I could live without it. Apparently you couldn't."

She made a helpless gesture. "Suppose you had a dream," she said thinly. "And you saw something important. A vision of the future, maybe. And you woke up and remembered you'd seen it, but not what it was. And it's so important that if you don't see it again you might as well cut your throat."

Dan hesitated. "Have you eaten today?" he said finally.

"I don't remember. I don't think so. Nor yesterday."

Wondering if he was doing right, Dan said, "I'll make a deal with you. There's a stall over there. You eat something, I'll loan you my instrument for a while. And you answer my questions while you're eating. Fair?"

"If you're trying to make me ashamed of stealing your 'dropper, you've won your point," she said. "I think I'd better go and find my friends, and quit bothering you."

He sighed and took her by the arm. She didn't resist.

Even while eating she never took her eyes off the stardropper; she seemed scared that it might vanish. She ate the sandwiches he gave her with voracious speed, but not from hunger—from eagerness to get the tiresome job of eating out of the way.

"What's your name?" he said.

"Lilith Miles."

"What do you do?"

"Nothing."

"Literally?"

"I was at school. I had this bargain with my mother, that I'd keep up with my schoolwork if she let me go on stardropping. Not that it seemed important compared with what you learn from a 'dropper. Then she went back on her word and smashed it one time when I was out. So I left. I told you."

"What have you learned from your stardropper?"

"It doesn't go into words. It makes sense on its own, and no other way. Sometimes you get a little scrap that's quite clear, like a friend of mine had news his father would die in an accident. But that sort of thing isn't important."

"Some people go out of their minds, don't they?'

"Oh, plenty." The thought seemed not to disturb her, which Dan found more shocking than anything else so far. "They get impatient, I guess. One girl I know—she started fixing nonsense names on things and went around telling them to people, thinking they'd understand. Of course, they never did."

"Doesn't that upset you at all?"

"No. It's like death. Happens to other people."

In its way, of course, that was an acute remark. He said, "And how about the ones who disappear? You know about them?"

A note of envy crept into her voice. "They're the ones!" she said. "They've got it and gone!"

"You know where they go?"

"If I knew, I'd be there." She looked at him, puzzled. "How come you don't know all this? Are you playing games?"

"No, I'm asking questions to hear your personal answers. Has anyone you know disappeared—any of your friends?"

She shook her head.

"How do you know about such people, then?"

"Oh, everybody knows about them. You don't talk about it much. It's . . . well, scarey, follow? But that's the big thing."

"And nobody knows what really happens to them?"

"You can't know till it happens to you. Sometimes you almost get it, then it's gone again. It's like trying to catch a wriggling fish with bare hands. You miss a hundred times, but you have to keep trying. You have to be so hungry for fish you daren't get impatient. Can I try your 'dropper now?" She threw her paper coffee cup and sandwich wraps into a litter bin and reached for the instrument. Reluctantly, Dan let it go.

"This is a beaut!" she said, im-

pressed. "I never used a fuel-cell model before. How do you step up the power?"

He showed her the little sliding switch on the cell. She tucked the earpiece into position and closed her eyes.

The taut nervous lines beside her mouth faded. She began to smile a little. Watching, Dan felt an obscure sense of guilt—and yet it was pleasant to see the change come over her face.

She moved the adjuster knob with such patient care that at first he did not notice when she stopped moving it. Then he began to wonder how long he should let her continue. what she would say if he interrupted her, and even—the ridiculous thought crept eerily into his mind—whether she would here and now find what she was looking for, and vanish.

He shivered. It was growing cool as evening approached, but that wasn't why he shivered.

He lit a cigarette and compelled himself to be as patient as she. Almost half an hour had passed when she opened her eyes, looking vaguely disappointed.

"Didn't it work for you?" Dan said, rather relieved.

"Oh, it was great!" she contradicted. "It's much more powerful than mine was, so it's hard to sort out what matters. I just can't concentrate any more now—but can I try it again?"

Dan hesitated. It would be valuable to be able to question this girl who claimed to know what stardropping was all about. But then . . .

"I promise I won't pester you. I won't be a nuisance!"

She might have been reading his mind. He threw up his hands and nodded, and she pried his name and the address of his hotel out of him. Then she walked off across the grass. After a little she began to skip on every other step, from pure joy.

Out of curiosity, Dan put the earpiece in. The instrument was still on the setting that had given her so much pleasure. He listened. No, it was no good. It sounded like a dozen banshees having a party, a pattern of shrill acid whistling. He had already chanced across this setting, and disliked it.

She'd had a Gale and Welchman. As Watson had proved to him, that model had attractive qualities. But how could this unpleasant noise relate to what he'd heard in the Cosmica store? How could it possibly become meaningful?

He had learned a lot, there was no denying. It was of a piece with the whole curious muddle that the more he learned the more confused he became. He got up and began to walk slowly away.

V.

He was shaving next morning when Redvers phoned.

"Good morning, Cross," the chief inspector said. "I've arranged that meeting with Dr. Rainshaw, as I promised."

"Morning, Redvers. I don't want to seem ungrateful, but—is all this purely for the sake of being co-operative?"

"Partly. And partly because I need an outsider's view of things, as I told you. Tell me, did Watson talk you into going to the Club Cosmica to-night?"

"Is that store bugged, by any chance?"

"No—Watson simply talks everyone he can into joining his club. It's perfectly genuine, by the way. Not a racket."

"You're very interested in Watson, aren't you? Why?"

"For the same reason you are, of course. The biggest store of its kind in the country is a good place to keep in touch with what's going on. Look, I won't keep you from breakfast. Rainshaw is at a government research establishment in Richmond, on the fringe of London. I'll pick you up at ten—O.K.?"

Promptly at ten Redvers arrived, driving himself in a small electric blue convertible. Dan was waiting in the hotel foyer and came out to the sidewalk immediately the car stopped. He was making to get in when he heard his name called shrilly.

And there was the girl Lilith, hurrying towards him with a look of bitter disappointment on her face.

"Just a moment," he told Redvers under his breath. He turned to greet the girl with a smile.

"I'm very sorry," he said. "I have to go and see someone right now. Suppose you come around this afternoon instead."

"Ohhhh!" Lilith turned the corners of her mouth down in annoyance. "You did say I could, you know."

"I do know. But this is important business."

"What's the trouble?" Redvers called from the car. In a few words Dan explained about his promise to the girl.

While he was talking she turned away, looking so woebegone it was almost funny. He began to unsling his stardropper, thinking he might loan it to her for the morning, but Redvers guessed what was in his mind and shook his head.

"Not if you want to see it again," he said.

"You're probably right," Dan agreed reluctantly, and glanced back at her. Her face had suddenly brightened again.

"Can't you let me sit in the back of the car?" she said. "I'll be dead quiet, I swear, and then you'll know I can't run away with your 'dropper!"

Dan laughed and looked at Redvers. But Redvers was not amused. He said, "It's up to you Cross. I don't care provided I don't hear one squeak out of the instrument."

Dan shrugged and let Lilith get in. Delighted, she curled up in a corner and held out her hand for the stardropper. Reflecting that this was no crazier than anything else which had happened, he gave it to her and got in the car himself.

"You won't know I'm here, I'll be so quiet," Lilith said.

"I hope that's true," Redvers said grimly, and engaged forward drive.

Dan glanced over his shoulder when they had rolled for a few minutes. Already Lilith was far away, her face peaceful. Noticing his movement, Redvers grunted.

"Is cradle-snatching a hobby of yours?" he said.

"My latest craze. She tried to steal my stardropper yesterday."

"Addict?"

"I guess." Dan knew he sounded puzzled; he was. "It's not like any addiction I ever saw before. I questioned her about her attitude, and I'm still working on the answers she gave."

"Answers such as?"

Dan summarized them. "What fogs me worst," he finished, "is her open-eyed, cold-blooded acceptance of the risk involved."

"It could hardly be ignored," Redvers answered curtly.

"Is something wrong?" Dan demanded. Redvers' voice had shaken on the last remark; he held the wheel so tightly his knuckles were white, and sweat stood out on his forehead.

"She said she'd keep the power down," Redvers grunted. "If she's not going to, she gets out here."

Dan listened. At the edge of hearing was a buzzing noise like a swarm of bees, but it seemed to come from ahead of them, not from behind. He said as much.

"You're perfectly right," Redvers said with an effort. He halted the car for a stop light. "I'm sorry. It's that car ahead of us—see it?" He pointed at a big sedan on the other side of the intersection, with a loudspeaker showing through its open passenger window.

"Wired to a stardropper?" Dan said.

"Exactly." Redvers craned to read the sedan's license plate. "Hasn't any business to do that. Illegal. Noise Abatement Act."

He fumbled under the dashboard and produced a microphone and spoke briefly into it. The lights changed to green and he let the car roll again.

"Catch up with him in a few minutes," he said. "Can't help feeling sorry for him, though—can you?" He seemed to have recovered completely from his strange fit of shaking.

"Why does he do it?" Dan asked.

"Most likely, it *almost* means something to him. He's after someone to explain the rest of it. Quite common. Tell me, did Watson demonstrate his favorite setting to you?"

"On a Gale and Welchman? Yes, he did."

"Damnably attractive, isn't it? Any time you feel in danger of getting addicted yourself, I'll get one of our specialists to give you a posthypnotic against listening to stardroppers. I had to do that myself—that's why I was in such a state when the loudspeaker went by just now."

"So you have first-hand experience. I didn't realize."

Redvers shrugged. "I didn't *ask* to be put in charge of the stardropper problem. They picked me because I was involved."

"So it wasn't just my being an Agency operative that made you take notice of me," Dan said. "It was the stardropper."

"That's right. We like the Agency fine. Stardroppers on the other hand give us nightmares—and can you wonder?"

"Not after what I've already seen. But it surprises me that you already have a special department for the problem. What was the original reason—the wave of disappearances?"

"No, not at first. The incidence of insanity, then the addiction problem. Speaking of disappearances, though: Watch your step with Dr. Rainshaw. I meant to warn you."

"Why?"

"His son Robin was one of the first to disappear."

When they reached the research station where Rainshaw worked, Lilith was still motionless in the back seat. After pausing at the gatehouse for a security check, Redvers drove down the road signposted to the scientific block.

"You can leave the girl in the car quite safely," he said. "She doesn't look as if she's going to wake up in a hurry, and the perimeter is well guarded."

As he left the car Dan gave her a worried look, but she was perfectly content. Surely stardropping could not be wholly evil if it brought such an innocent expression to a girl's face.

He shrugged, and followed Redvers into the building.

Rainshaw, he knew, had never claimed his discovery was more than an accident. He had been working on the relationship between gravity and magnetism, which accounted for his having assembled a powerful magnet, a vacuum chamber into which he was introducing counted quantities of ionized and nonionized particles, and delicate instruments for trackng the latter whose signals required amplification before they were read.

He also had the research scientist's prime gift: the ability to see things when they happened. Finding signals being generated in a way he could not explain, he followed them up. It was a matter of a few weeks to eliminate the inessentials and package the Rainshaw effect in a box. It was a matter of months before Berghaus formulated a theory which fitted the facts. But it seemed only a matter of days thereafter that the Rainshaw effect was forgotten and the stardropper was part of man's way of life.

Dan's first impression was disappointing. He saw a hollow-cheeked man who looked as though he had worried himself into losing weight. He received them in an office adjoining a laboratory; through the half-open door between the rooms a man and a girl could be seen working on a breadboard device, and Rainshaw's eyes kept straying that way as though to show that he was enduring, not

enjoying, the intrusion of visitors.

For a while they conversed icily about stardroppers; Dan felt he would have been better occupied talking to Watson at Cosmica, for he was getting nowhere. Luckily, when he was resigned to wasting his time, he happened to mention Berghaus.

Rainshaw's frozen manner changed magically. "You know Berghaus?" he demanded. "You were a student of his?"

"In a sense, I guess," Dan exaggerated. "He taught me what little I know about stardroppers."

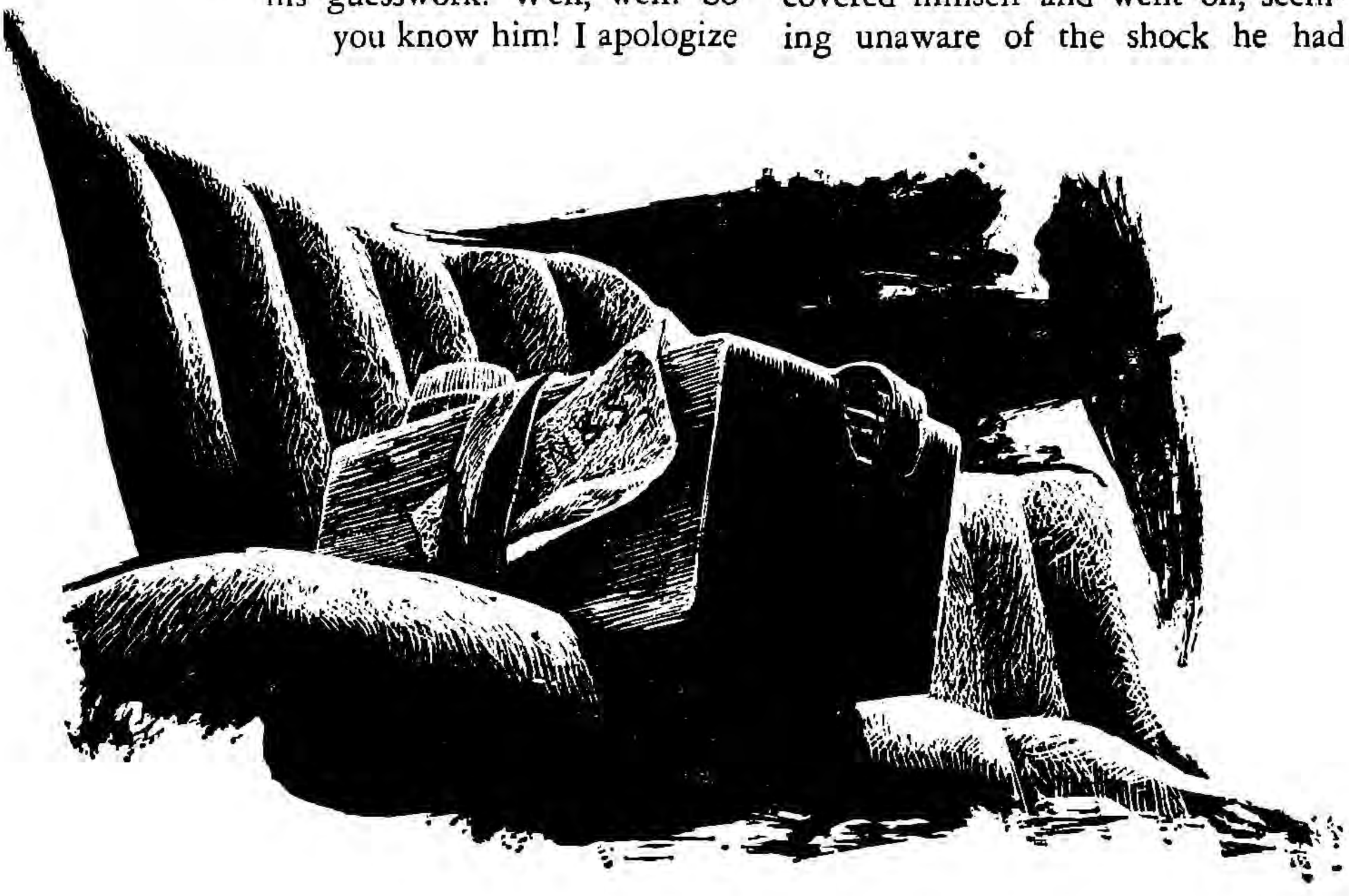
"He taught all of us, including me, what we know about them," Rainshaw said warmly. "The man's purely a genius. Linking his theory of prerecognition to my peculiar discovery was an inspired guess, and everything else we've turned up since then fits his guesswork. Well, well! So you know him! I apologize for my churlish manner up to now." He beamed. "How can I help you?"

Sighing with relief, Dan said, "Quite honestly, doctor, I want to know if you think the chance of gaining some useful knowledge from stardropping is enough to outweigh the suffering the habit can cause."

Rainshaw twisted his hands together. He said, "I sometimes wonder if I ought to feel guilty . . . Well, it was an accident, and I've never claimed otherwise. But as to your question, Mr. Cross—all I can say is that my son—"

He broke off. An extraordinary expression came to his face, shock, plus dismay, plus a kind of weary sadness. Redvers drew in his breath, as though to imply to Dan, "I warned you!"

But after a moment Rainshaw recovered himself and went on, seeming unaware of the shock he had



given his visitors. He said, "My son thought so. And I suppose in a way proved he was right."

He leaned back in his chair, staring at nothing. "He was never a gullible person, you know. He was very reliable to work with, and we were working together—on my effect—right until he . . disappeared. And he did believe there was knowledge to be had from stardropper signals."

"What kind of knowledge?" Dan ventured after a pause.

"I can only quote what he said, on the last evening he was with me. He said, 'It's so hard to capture in words, so remote from experience, I get the feeling it may really come from an alien mind.' I think it was actually painful for him not to be able to make clear what he thought he had learned. He even began to doubt himself, and went to his room to listen to the big stardropper he had built himself. When I went to call him to dinner, he wasn't there."

His voice was empty of emotion, dry and hard.

"You didn't hear anything?" Dan said. "No—noise?"

"No noise, Mr. Cross. I, too, have heard the stories about people who vanish in a clap of thunder, but Robin didn't. He simply went, and he didn't go any normal way out of the house. And he had nothing to run away from—he was working for his doctorate, doing research that fascinated him; he was engaged to marry a charming girl . . . I can only assume he did learn something from his stardropper, which enabled him to go—elsewhere. I haven't any hope of following him. Young minds are flexible, and I'm getting old."

Like all-too-obvious background music, a spray of rain rattled at the window and settled to a steady depressing downpour.

VI.

As they walked towards the way out, Redvers said abruptly, "You were asking if I believed these disappearance stories."

"I remember," Dan said.

"I didn't know Rainshaw's view. I suppose, now, I have to."

In the double-doored porch of the entrance Dan hesitated, looking towards Redvers' car on the nearby parking area. The top had gone up, of course, at the first drops of rain, and Lilith was hidden from them.

He said, gesturing, "Her, too—do you think?"

Redvers made a vague gesture. "You heard what Rainshaw thinks. Young minds are flexible. She can't be more than about sixteen, seventeen. But young ones go insane, too. I can't grapple with it any longer Cross. I just feel that the world is cracking apart and we're liable to drop into a bottomless fissure at any moment."

"We've felt that way for thirty years."

"This time it's different. You can point to the cracks and say they'll be *so* much wider tomorrow, and you look, and they are. It's one thing to

be scared of a lunatic in a position of power, or an incompetent government. That's *human*. I believe that's what's saved us for so long—the fact that people are people. You've got something new here. Alien knowledge, they tell us. It changes people, subtly. On the way down you were saying how that girl disturbs you because she doesn't care about the risk of going insane. That's not ordinary-human, Cross. Am I making sense, or just rambling?"

"I hadn't looked at it that way. But yes, you make sense."

"And we can't know what goes on in these changing minds," Redvers pursued. "Not unless we get involved ourselves. I did. I found you have to choose—quit cold and seek help, or decide that rewards you can't yet understand are worth more than staying ordinary. Let's go. I have work to do."

The rain had lightened. Their feet made blurry matt marks on the pavement as they approached the car. Dan opened the passenger door and glanced into the back seat.

His stardropper lay neatly on the padded cushions, a slip of paper tucked between two turns of the strap. On the paper was penciled one word: Thanks!

But Lilith wasn't there.

He looked at Redvers. Neither of them said a word. They drove to the gatehouse and spoke with the security officer in charge. She had not gone through the gate. She could not have crossed the perimeter fence. There was a procedure for checking whether she was in the grounds or the buildings. It was applied. But she was nowhere to be found.

During the drive back into the center of London, Redvers said one thing which remained enduringly in Dan's mind.

"This is where it really starts, Cross. Not when a young genius like Robin Rainshaw goes out. When it happens to a schoolkid who most likely took to stardropping because it was the thing everyone was doing. I expect it to rain for forty days. And I don't know where the *Ark* is, or even if one is being built."

It was the flood-image, Dan thought, that fixed that in his mind. He had just been comparing himself to a man who sets out to cross an apparently level street awash with rainwater, and finds himself up to his shoulders after five steps.

His assignment had seemed petty enough—to go to Britain, talk with stardropper fans, check rumors that more than one person has vanished, assess the social disruption it's causing and if anyone is exploiting that disruption say so; it's dangerous.

It was clear to him now that the Agency had fallen into a trap it had escaped in its twelve previous years of existence. It had assumed that a clearly visible threat was less menacing than a threat you had to hunt for.

It was not surprising that Dan, as an individual had mistaken stardropping for just another craze. He was otherwise occupied. But the Agency

with eyes and ears the world over, must have known about stardropping. Yet they'd left it till now to start worrying.

So they'd better start making up for lost time.

The car halted outside his hotel. He made to get out, and hesitated. He turned to Redvers.

"Which scares you most?" he demanded. "A rising wave of disappearances, or the spread of insanity, or—?"

"None of those," Redvers cut in. "It's the fear that matters. The fear of someone else getting there first."

"I saw two Chinese in Cosmica Limited yesterday. I wondered about that. Their government discourages stardropping."

"And has a crash research program staffed by brilliant university students. And Rainshaw is working at a government research station here, instead of his old university. Listen, Cross: I told you everyone else had got into the act before you, and I wasn't making with words. You imagine what will happen the day someone newsworthy vanishes in plain sight of reputable witnesses. Headlines—MIRACLE TALENTS FROM STARDROPPING! A few thousand people will kill themselves from disappointment. A few tens of thousands, already interested, will move over to the stage of real addiction. A few *millions* will go out and buy stardroppers hoping for the same results."

"Is just disappearing such a tempting thing?"

"Try looking at it less critically. Think of it as *performing a miracle*, and you'll see." Redvers beat on the steering wheel with his hands. "Because of Berghaus' theory the reasoning will go: Someone has alien talents I haven't got; someone can use them against me; I've got to prevent him. It's what we thought was going to happen with the arms race. But you can spy on another country's scientific progress, keep a precarious balance. Here's a slew of wild factors coming in, and you can't spy on the mind of one man with one stardropper. Cross, your Agency is bound not to do anything for any single nation or group, but to act when the world is in danger. I've been setting out facts for you. If they add up the same way for you as for me, you're going to put in an emergency report."

There was urgent appeal in Redvers' eyes. Dan nodded, his mouth dry, and got out of the car.

He put in the call from his hotel suite. The connection was made very quickly. He heard the three shrill pips which were a key to his personal code, and closed his eyes.

"Four," he said. "Equanimity is inversely by the cluster. When it was in the trivial four-by-four the virtue was imparted, but the wall fell between the crackle and the potiphar . . ."

It was a curious uplifting sensation to hear himself speak this way. During his first two years at the Agency, before he was operating on his own,

he had been analyzed. From the complex personal associations revealed by analysis they had built up a word-for-word code covering a hundred thousand words. New words and names could be spelt out with associated phrases for every letter. He learned the code, next, having it pumped into him under hypnosis. The Agency used hypnosis a good deal.

Now at the Agency there was a computer—number four—into which they would feed the tape of his report, and it would print out in clear.

It wasn't perfect. But because the equivalence depended on Dan's memories rather than on a process which could be attacked statistically it would probably take as long to break as it had taken to build up. Even Dan had to have the posthypnotic trigger before it was available to his mind.

Four pips on a lower tone followed his signing off, and he forgot again how to speak in the code. The sense of elation lingered, though. Sometimes it was very strong, like the aftermath of a vision—a feeling that he had been briefly in closer touch with reality. Ordinary language was a series of labels invented by others, but his code derived from events which had happened only to him.

He dropped into a chair and took his stardropper on his lap. Lilith's scrap of paper was still caught in the strap.

Had she slipped away like a mouse into a hole? Or had she gone as Robin Rainshaw went—miraculously? And did it matter? It seemed far worse not to be able to decide whether to pity her, or to envy her.

Which?

VII.

The Club Cosmica met in a big room over a smart modern bar. A curtain divided it into an antechamber with a bar and a meeting hall with rows of chairs and a dais. When Dan arrived there were some forty people standing around in little groups, talking. The sheer incongruity of it was disturbing—when else in all history had people joined chatty social clubs to meddle with something so dangerous?

Maybe they had fireworks parties in ancient China and amused themselves with the newly discovered substance, gunpowder.

Watson greeted him and took him to meet some of the members. As he was piloted from group to group he caught snatches of conversation which seemed terrifyingly remote from reality.

". . . But the whole question of objective-subjective comes in here, so let's not get metaphysical. Objective, so far as we are concerned, means you can make it do things. Postulate a field such that—"

". . . Concede that his installation uses a lot of power, but anyone could hook a 'dropper on a thirty-two-thousand-volt power line and the signals would be heard from here to

Yucatan. A waste of time, I think—"

Some of them serious young men illustrating their points with slipsticks; others struggling, their eyes haunted, to get across things there were no words to express.

". . . Nature of the signal in Berghaus' view. Identity of function isn't identity of nature. Department of truisms now open." This was a man of about thirty in an old suit, hair rumpled, eyes large and bright behind glasses. "To say this is what the signals are *like* tells us nothing!"

On his left a girl with fair hair, in expensive lounging slacks and a sleeveless tunic, gave a slow headshake. "You should try being more humble, Jerry. The first thing the signals say is what they are. You get an instinctive sense that you're eavesdropping on the minds of the universe at work."

"If it says this to you, Angel, you're that much more susceptible. Your imagination was caught by Berghaus' idea, and bang! It was revealed truth."

The girl called Angel raised one eyebrow. She was pretty, but her face was drawn and tired. "Jerry Berghaus-plus, I presume!" she said. "You know as well as I do Berghaus came to the problem with an open mind—"

"And leaped a mile ahead of concrete evidence!" Jerry snapped.

"Because the signals are self-identifying!" flared the girl.

Watson excused himself in a whisper and went through the curtain to the other half of the hall. Dan went on listening.

"Look," Jerry said. "He accounted neatly for precognition, true. When he came stardropping, in my view, he stretched his precog theory to include it simply because it was handy."

A lean, fiftyish man on the other side of Angel took a pipe from his mouth and frowned. "But is Berghaus what you'd call an enthusiast?" he said. "I gather he's not."

"He told me—" Dan coughed, because instantly all the eyes of the group were on him. Well, it was a fast way to get into the conversation. "He told me he thought that if the signals are of alien origin they're apt to be incomprehensible."

"You know Berghaus?" Angel said in a wondering voice.

"I've met him, and talked about this with him."

"And that louse Wally Watson didn't mention it to us!"

"I don't think I told him," Dan said. He felt an impressed mood permeate the group. Jerry spoke in a changed voice.

"Well . . . uh . . . I'm Jeremy Bartlett, and this is Angel Allen. And Leon Patrick"—the man with the pipe nodded. "And—"

The other two in the group muttered names Dan barely heard. Angel kept her eyes on his face.

"But he must take his theory seriously," she insisted.

He pins less faith to it than most people seem to."

"So much for your self-identifying bit, Angel," Jerry said.

She turned to him. "Not at all. Tell me how it feels to ride a bicycle."

"Be reasonable. You sit astride, you put one foot—"

"I didn't say explain the mechanics of it. I said tell me how it feels. You can't verbalize the balancing sensation. But you can learn it when it happens to you. Human beings *can* absorb nonverbal knowledge. We just aren't very good at it."

"You're not going for this supernatural wisdom bit, are you?" Jerry's bluster was beginning to return.

"Don't fall back on loaded words like 'supernatural'! If you don't want to be convinced, why are you here?"

"I'm a physicist. Stardropper signals are a phenomenon in my province—and I don't claim to know more than Berghaus about his own speciality!"

Angel sighed. "Did *I* claim to know more than Berghaus? I say he proposed his theory because the signals convey a hint of their nature. If he has reservations, that's simply a scientific attitude."

Watson's voice, raised loudly, called them to take their places for the demonstration. They joined a slow-shuffling procession into the other half of the room. Dan hoped the argument would resume later; it was getting interesting.

He took a place in the front row at Angel's invitation, between her and the pipe-smoking Leon Patrick. On the dais a roly-poly man was making final adjustments to a huge stardropper. Watson introduced him as their demonstrator, Jack Neill, and left him to it.

Neill talked fast, with a lot of jargon, and Dan followed little of what he said. He let his mind drift down the line of the argument between Angel and Jerry.

The girl's view that the signals were self-identifying was like a medieval schoolman's logic—satisfying, provided you could swallow the postulate behind it. She seemed convinced, but a long way from Lilith's terrible obsession-state. (Or was it merely that she was better equipped to put her feelings into words?)

Jerry, contrariwise, was an utter skeptic. He had claimed he was investigating something in his own province of physics—well, you could make out a good case that he was fooling himself. A stardropper was outside orthodox physics. Maybe that was why he was so aggressive.

Neill reached the end of his exposition. The lights went down and a vast busy noise suggesting a factory began to swell from the speaker. Dan went on frowning over his own thoughts.

Clearly, not everyone accepted the notion that stardropping was a key to mystic alien knowledge. Jerry had pooh-poohed it. And this man Leon Patrick seemed to incline to the same view.

There was a tremendous racket coming from the speaker now. He recalled the snatch of conversation he had heard about an installation that used a lot of power. If there was a linear relationship between power and range in the case of a stardropper, then the more power you used

the less likely you were to get signals from human sources which you might understand . . .

He was beginning to feel foggy. It was frustrating—like having a word on the tip of his tongue—to contemplate the improbability of a linear power-range ratio in a Berghausian continuum. Anyway, the fact that stardropper signals were conveniently presented through a loudspeaker was accidental. Words and mathematical symbols and variables in a computer went through the same motions as their counterparts and were not the same. Human beings were used to learning through ears first, eyes next . . .

With an effort he seized control of his mind. He had had the utterly shocking impression that he was thinking in several directions at once, radiating outward from a center.

For a few seconds he remembered where he was and what was going on. Then he was tugged back into his stream of speculation.

Look—it couldn't be that a stardropper consuming more power had a greater range. The whole point of Berghaus' new continuum was that there distance, in the sense of space-covered-in-measured-time, was theorized out of existence.

But if you discarded distance, how could you have separation?

Easily, of course. Weren't there events turned up by nuclear physicists which called for just that? Like an electron departing simultaneously in more than one direction from a given point, or coexisting with itself on two different paths. There was separation without conventional distance. Because the *one* electron involved wasn't traversing an intervening space. Berghaus' main proposition was that in his continuum instantaneity re-acquired the meaning it had lost in an Einsteinian continuum where even light takes time to cover distance.

He permitted precognition by invoking the phrase "at the same time," which in Einsteinian terms was not allowed.

But that meant—!

On the brink of fitting together his thoughts about the nature of things in this eerie alternative space postulated by Berghaus, he was slammed back to the here-and-now. Choking with rage, he opened his eyes.

Fractionally later the lights went up. He felt idiotically astonished to find he was sprawling sideways over the chair next to his own. The noise of the stardropper ceased. There was a wave of frightened exclamations.

"Leon!" someone said clearly. "Where's Leon?"

Dan pushed himself upright and looked around. He saw everyone else he recalled seeing since he arrived, but not the lean, pipe-smoking man he had sat next to. He got to his feet.

Neill and Watson were coming down from the dais. Everyone fell silent, as though looking to Watson for a lead.

"Mr. Cross, you were thrown across Leon's chair, weren't you?" Watson said puzzlingly.

"Yes!" Dan felt his palms sticky with sweat.

"And there was a slamming sound —like a gigantic handclap?"

A dozen eager voices confirmed this.

"Then," said Watson with apparently sincere regret, "I'm afraid we've seen the last of Leon Patrick."

He hesitated while a wave of terror and dismay swept the audience, and finished, "Poor devil!"

VIII.

Dan remembered clearly when he had last seen so many ghastly white faces at once—at the scene of an expressway crash in which four children were killed. There was the same expression, too. The look of people reminded in a flash that they were engaged in a dangerous pursuit—then driving at ninety miles an hour —now stardropping.

There was a long silence. People began to turn away towards the door. Dan wanted to shout after them, ask questions, demand an inquiry. But to everyone else it seemed that Patrick's vanishing was simply an event to be accepted. The slamming noise implied that something had gone wrong. That was all.

He saw the girl Angel staring at Leon's vacant chair, hugging her arms close to herself as though to control a fit of shivering. Neill, his face lugubrious, walked back to the dais to disconnect his machine.

"I guess that's all for tonight," he threw over his shoulder.

"No! Oh, *no!*"

The cry was flung like a bomb. Everyone still in the room turned to face the speaker—a drab woman of young middle age. Her washy carrot-red hair was the only touch of color about her.

"No, that's not fair!" she went on, her lips trembling. "I was getting something, I swear I was, and it's the first time I ever did, and I don't see why you should cheat me like this!"

"Ghoul," said Angel barely above a whisper.

"Who is she?" Dan asked, equally softly.

"Her name's Mrs. Towler. I think she's crazy. Can you imagine anything more ghoulish than wanting to go on after—?" She gestured at Leon's chair. "Shall we leave them to fight about it, or are you in the ghoul line, too?"

For a moment Dan remembered that he, too, had been on the edge of some revelation. But the memory was fading, like the transitory euphoria following the use of his personal code. He said, "I could do with a drink. Let's go down."

The news was already causing a sensation in the bar below, but Dan and Angel managed to elude questioning by the other customers and sat down in silence at a corner table.

After a long interval Angel said, "It's different actually being there when it happens, isn't it?"

Dan took out cigarettes and gave her one. He said, "Didn't you believe it?"

"In my mind I had to. After all, I was engaged to Robin Rainshaw. But I didn't believe it completely until now."

"*You* were Robin Rainshaw's fiancée?"

"I was. Am, I suppose. Who can say? But you sound surprised. You didn't know Robin—did you?"

He shook his head. "I only heard about him."

"Not many people even heard."

"What I want to know," Dan said after a pause, "is how it can all pass off so lightly—the disappearance of Patrick, and of your fiancé. It's too much to take for granted!"

She gave him a curious look. "You're a real novice, aren't you?" she said. "In spite of knowing Berghaus, and—"

"How do people stop being novices if they don't ask and learn by asking?"

"You don't learn this by asking. You learn by experience."

"But if you're apt to vanish in a clap of thunder, what can induce anyone to want more—*experience?*"

Before Angel could reply, the red-haired Mrs. Towler came marching through the bar to the street door, tears streaming down her face. A murmur of incredulous comment followed her.

Directly behind her Watson appeared. He stood watching till Mrs. Towler had gone out, then turned and caught sight of Dan and Angel. Unbidden, he sat down at their table.

"I calmed her with the promise of a private session with Jack's equipment," he said. "It was all I could do."

"She isn't going to make it, is she?" Angel said.

"Her? No. Or if she does, she'll go out like Leon." Watson passed his hand over his face.

"Do you think I'll ever make it?" Angel said dispiritedly.

"You can't predict it, Angel. You just keep trying."

"It seems to me," Dan cut in, choosing the nastiest way to phrase the thought, "people who want to go on, with an example like Patrick before them, are like drug-addicts going on doping."

Watson flushed. He said, "I'm not in a mood to rise to cheap attempts at baiting. Stardropping isn't a drug. It's a path to new knowledge, as Berghaus suggested."

"Do you have this knowledge? Or are you merely hopeful?"

Watson smiled sourly. "You expect an answer to that? If I say yes, you'll say, 'Explain it to me!' And that's impossible. If I say no, you'll ask why I'm so sure it exists."

"Do you claim to know what happened to Leon Patrick?"

"Yes, I do. Tell me, have you ever dropped an old-fashioned light bulb—the kind called vacuum-filled?"

"I don't see the . . oh. The sound?"

"That's right."

"Light bulbs?" Angel said mockingly. "What about them?"

"If someone did physically vanish, there would be an implosion as displaced air rushed in." Dan felt his nape prickle. He turned to her. "There was no noise when Robin disappeared, was there? Watson, what if Patrick had vanished silently?"

"He would answer to 'Hi!'," said Angel, and laughed.

"What?"

"Carroll—'The Hunting of the Snark' When the snark proved to be a boojum he softly and silently vanished away." She finished her drink and stood up. "I'm sorry. I'm a bit hysterical. I'd better go home."

"Shall I run you back?" Watson made to rise. "You live near Cosmica, don't you?"

"Thanks, I have my own car. You stay and answer our friend's questions. He needs his hand held. He's scared."

With quick uncertain steps she went to the street door. As she passed, Jerry Bartlett called after her, but she ignored him. He looked round, caught sight of Watson, and came over.

"I didn't see you hidden in this corner, Wally," he said. "I want to talk about Leon."

He sat down and began to speak with machinegun rapidity.

"I'm spinning so fast I'm dizzy. I was never there before when someone went out. I've been talking with Jack Neill, and trying to work out the conditions for instantaneous displacement. I mean, it must be instantaneous. If a man-size body were to leave at finite speed the shockwave would bring the building down!"

"If you spent more time with your stardropper and less time playing with words, Jerry, I think you'd make it," Watson said.

Jerry didn't hear him. He went on, "If Berghaus is right, the loudest signals on the 'dropper ought to be from the most highly evolved, most actively conscious races. What's human evolution? Basically a story of learning to impose a desired form on environment, which includes the series of events experienced. The more man evolves, the more he consciously plans ahead and . . . uh . . . manipulates randomness. But there's a gap here. He broke off, looking unhappy."

"Jerry," Watson said again, "you need to spend more time with your 'dropper and less time talking."

Acquiescent, Jerry wandered away, lost in thought. Dan stared at Watson. "You're not just a store-manager, are you?" he said. "To these people you're more like a . . . a guru."

"Am I?" Watson answered enigmatically. "In a commercial society, what better niche for someone who's concerned to propagate knowledge he considers important?"

"Dangerous knowledge!"

"Which seems more innocuous—to teach a man to read and write, or to make gunpowder? Yet more revolutions have been carried through

with literacy than with shot and shell."

He stood up. "Well, you've had a very eventful visit to our club," he said. "Can I give you a lift home? I have the penthouse over Cosmica—is that on your way?"

"No. No, thank you. I'm going to walk so I can calm down." Dan licked his lips. "Tell me—can't you think of a stronger term than *eventful* to describe what's happened tonight?"

Watson fixed him with his eyes. "I'm not callous, Mr. Cross. Leon was a good man, and I liked him. I simply have to face the fact that he wasn't *better*. Good night."

IX.

Eyes stinging with lack of sleep, he walked across the hotel foyer to the breakfast lounge. He had had nightmares, and preferred to eat in company rather than in his room.

There was a knot of people arguing with the reception clerk. Some of them carried cameras. He had a premonition and quickened his steps.

Pausing at the newspaper stand, he paid for a selection. As he did so, a voice rose authoritatively behind him.

"No, we don't allow anyone to intrude on our guests' privacy—press or no press!"

I thought so.

It was clear what had happened. Grateful for the reception clerk's obstinacy, he went into the lounge and took an unoccupied table, shaking out the papers one by one. Garish headlines in blue and red leaped at him. WHERE DID PATRICK GO? STARDROPPER FAN VANISHES! REMARKABLE EVENT AT "STARDROPPER" CLUB.

There was a waiter bending over him. He said, "Coffee. Black. A lot of it, and quickly."

"The manager sent me, sir," the waiter said under his breath. "There are several reporters wanting to interview you. We don't want to let them guess who you are, but they're very insistent."

"Thank the manager for me," Dan said. "They can go jump in the Serpentine before I'll talk to them."

"Very good, sir," the waiter said. and added, raising his voice, "And the main dish? Smoked haddock, ham and eggs—"

"Coffee. A lot of it. I'll decide about the rest later."

"*Very* good, sir."

That was service, Dan reflected. He bent to the papers again. This looked like what Redvers had feared—the disappearance of someone newsworthy. For Patrick had been director of a large real estate agency, and his son was a champion cushion-craft jockey.

He had a sickening sense of sliding helpless to disaster.

The press had been thorough. Among others, they had found Watson, Jeremy Bartlett and Angel Allen. The treatment varied from skeptical to sensational, but no one was making fun of it.

Worse yet, someone digging in the morgue had uncovered the human

interest angle of Angel's engagement. Clearly Redvers, or someone else, had planted a story to cover Robin's disappearance, but here under a red subhead were the words:

Was it coincidence that brilliant Robin Rainshaw, son of the inventor of the stardropper, was doing such research when he vanished? That question must be asked—NOW!

"Mr. Cross?" a mild voice inquired. He looked up. Taking a place at his table was a nondescript man with a wisp of sandy beard. A reporter who had eluded the watchful staff?

Memory clocked. No, this man had been among the forty or so in the audience at the Cosmica Club. No good denying his identity, then. He said, "Who are you?"

"Norman Ferrers, Mr. Cross. You were sitting next to Patrick at the club last night. I want to talk to you about that."

"I have nothing to say to you," Dan answered curtly.

Not at all put out, Ferrers picked up one of Dan's papers. He opened it to the editorial page and offered it to Dan, marking the leading article with one finger.

"Perhaps you haven't read this yet. I think you should."

After a second's hesitation, Dan looked at the paper.

Not since the advent of atomic energy has there been a new power so pregnant with possibilities and so fraught with danger as the miraculous talent which—we must now believe—is hidden in the signals of stardroppers. Perilous, yet full of promise, it must be handled with care. .

It went on like that—empty pontificating. Dan put the paper aside. "A lot of hot air," he snapped at Ferrers.

"Think again, Mr. Cross. I know that over the past decade our government has caused a divergence between your country and mine, but there's a real identity of interest, and some of us work to preserve and maintain it against treachery. I put it to you: Suppose that the eastern bloc manages to control this—"

"Who are you?" Dan said, sudden chill in his voice.

"I'm a member of the Blue Front, Mr. Cross. Our organization is conducting an emergency inquiry into the Patrick case. I put it to you as an American that it's your duty to help us. Wouldn't you rather that this power was first gained by people whose traditional links with your own country's—?"

It took Dan that long to marshal his words. He drew a deep breath. If there was one thing he had learned working for the Special Agency it was that a nationalist in the nuclear age was as anachronistic as a crusader yelling, "Death to the infidel!" And the Blue Front was one of the most reactionary groups in Europe; the Agency had often tangled with them.

He said, "Listen to me. This is the nuclear age. This is the world of rockets and satellites, and our planet has shrunk so small we have no room to think with our muscles any more.

My community of interest is with the human race at large. I'm a human being first and an American second. *Go away.*"

The waiter arrived with his coffee. Dan pointed a rolled newspaper at Ferrers and said, "Get this *person* out of here."

The waiter set the coffeepot down and turned to Ferrers. "You're not a client of the hotel, sir," he said. "This gentleman is, and wishes to be undisturbed. Please leave."

Ferrers stood up, his face suddenly ugly. "I don't know if you're a conscious traitor or a fool," he said. "But we shall be watching you. The country is crawling with Reds, and they are bound to try and pump you."

"They'll get the same answer, if that'll ease your small mind," Dan answered grimly. "Are you going?"

Ferrers bared his teeth and spun on his heel.

"Nasty piece of work, sir," the waiter said. "We apologize for not keeping him away from you, but it's very difficult."

"You've done well so far," Dan said.

"Thank you. There's a call for you from a Mr. Redvers, by the way. Shall I bring the phone?"

Dan sighed. "O.K., I'd better talk to him."

"Morning, Cross. What do you make of it?"

"You're slow. I already had a member of the Blue Front here—investigating the Patrick case was the excuse he gave."

"I hope you spat in his eye. Listen, Cross: you were sitting next to Patrick, weren't you? You didn't get an inkling that something was going to happen, or notice anything special?"

"No, not before it happened. I was preoccupied. Afterwards I was too shocked to think straight. I didn't sleep worth mentioning last night, and when I did I had nightmares."

"So did I. You realize this is probably the one we've been waiting for, which will really scare people?"

"You don't think there's any way of counteracting that?"

Redvers gave a mirthless laugh. "Not that I know of. It's up to you, isn't it?"

He broke the connection. Dan signaled the waiter to take the phone away.

It was odd, the way Redvers seemed to be looking to him. Not to the Agency, which would be logical enough, but to Dan personally.

He ate his neglected food absently. His mind was running on the same track it had followed during his wakeful night. Time and again he fetched up against the same conclusion—he had facts but no sense, evidence but no information.

He recalled what he had said to Watson: that he was not just the store-manager he pretended to be. Logically, then, he must go back to Watson.

X.

Redvers' gloomy prophecy was being fulfilled to the letter. Cosmica

Limited was full of people, and two policemen were trying to control the jostling crowd on the sidewalk outside. As Dan approached he saw a middle-aged man emerge from the store with a new stardropper. At once a dozen eager would-be customers converged on him, offering to buy it from him.

You couldn't yet say it was at the stage of hysteria. But already there was a fearful greed in the eyes of successful purchasers which made Dan's nape prickle.

He had learned to exploit his height as part of his Agency training. He bore himself commandingly into the crowd, and without knowing why they did so people made way for him, so that he entered the store ahead of twenty earlier arrivals.

Inside the store, he had another advantage; he wasn't interested in the stardroppers which were on display. He worked himself to within two or three places of the counter.

The staff were getting harassed and irritable. Dan caught the eye of the pretty girl who had served him before, and she grimaced, pushing her hair back from her face.

Directly in front of Dan were two men in business suits, one carrying what Dan took at first glance for a stardropper, but which proved to be a camera. As became clear immediately the girl came to serve them, the pair were hopeful journalists. He didn't catch what the man without a camera said, but he got the girl's answer because it was shrill with impatience.

"No, Mr. Watson *isn't* available and I don't know where he is!"

The reporter persisted. The cameraman nudged him.

"Jack, why don't you just put it down that he vanished up his stardropper, too?" he suggested cynically.

Jack scowled at him. The girl made to attend to another clamoring customer, but he caught her arm.

"Uh . . . miss, I think I'll take the chance while I'm here and buy one of your 'droppers."

The girl slammed a catalogue in front of him and said in a hard voice, "Five through nine and twenty-nine and forty-two are out of stock. I'll be back when you make up your mind."

"Jack, you're not falling for this, too?" the cameraman said.

"I don't know," Jack said slowly. "I just don't know."

It was nearly ten minutes before Dan could get out of the store again. The crush was worse than ever. Seeing he had bought nothing, a sly-faced man sidled up to him.

"Say, I have good bargains in stardroppers if you want one. Good scarcely-used secondhand instruments of highest quality. Prices ridiculously low, you understand." He winked. "Handmade American stardroppers for fifty pounds cash. Regular British instruments for twenty-five and up—"

Dan ignored him. He was probably offering stolen goods. And that gave him an idea.

The sly man saw his sales talk was not taking effect, and turned his attention elsewhere. Dan walked briskly along the street, studying the buildings. Watson had mentioned that he had the penthouse on top of the building where Cosmica was located. This whole area had recently been rebuilt, and to eliminate traffic congestion caused by trucks unloading most of these blocks had access tunnels running under them parallel with the street.

Correct. He had gone barely a quarter-mile before he came to a sloping service ramp. Without hesitation he marched down it.

There was no difficulty in finding Cosmica's delivery entrance, either. A huge truck lettered with the name GALE AND WELCHMAN, BIRMINGHAM, was being unloaded. Several eager stardroppers were clustered round trying to bribe the truckers to let them have instruments straight from the packing-cases.

A harassed apprentice was trying to carry a big box through the back door of the store. Dan held the door for him, and he did not question Dan's right to follow him through. Once in the building, Dan found himself in a corridor running behind the salesroom. An elevator car stood vacant with the door open. He strode into it, and punched the penthouse setting.

It had been almost too easy. Surely a persistent reporter could have located Watson's address from a directory and come this way to see if he were at home?

Well, perhaps some reporters had done so, and been disappointed. Dan didn't care whether he was at home or not.

He stepped out in a short corridor at the top. At either end a frosted glass window let in daylight. A sign beside each window stated that there was an outside fire escape. There was a narrow stairway for use if the elevator failed, but the treads were dusty.

Opposite the elevator was a door on which a printed card was fixed. The card read WALTER K. WATSON.

As a precaution he thumbed the buzzer. There was no reply. He inspected the doorframe. Tiny metal tabs indicated a Laxton and Carpenter alarm system. He could get past that with only a little trouble.

When he had located the leads and shorted them out, he attacked the lock. It yielded to a minute's use of his pocketknife. It was a perfectly good knife, but it was also a Special Agency operative's standard toolkit. If you didn't know how to open it, an oxyacetylene torch or an X-ray photograph at high intensity was needed to reveal its secrets.

He left the door open long enough to walk round the small but luxurious apartment. All clear. He closed the door, opened one of the bedroom windows—from which it was possible to reach the outside fire escape—in case he was interrupted, and settled to work.

Unhurriedly he went through the lounge first, then the bedroom. He

found nothing peculiar before he came to the tall built-in closets in the bedroom. There were correspondence files, books and notebooks, and many personal papers, but none referred to stardropping except incidentally, as one would expect from Watson's job. Yet he could *not* be a mere store-manager—

What the heck was he doing with a diving suit hung up in his wardrobe?

Dan stared. Yes, a diving suit. One of Siebe and Gorman's ultra-lightweight outfits, made of scarlet imperviflex for easy seeing under water. It looked almost new. With it were the goldfish-bowl helmet, lighter than a metal one, and a sealed camera, and a set of oxygen tanks. The meters showed "full."

Who in the world made a hobby out of suit-diving?

He looked again, and realized suddenly—no boots. For suit-diving you had to have weighted boots, and there were none here.

He hunted further, and did not find them. He found a file of typed notes in a drawer of shirts; they were headed C.P.F. and bore a date two months previous. They consisted mainly of lists of numbers with such comments as "Unconfirmed" and "Definite!"

They told him nothing. He went on. The next thing he found was a box of color slides which might have been taken with the sealed camera in the closet with the diving suit.

The slides showed thick dark greenery and red-yellow desert with eroded rock formations. He guessed at Australia or South America, but he could not say for sure. He looked at twenty and put them back; there were hundreds altogether.

In the last closet he opened there was a sack of rocks. He was no geologist, and they, too, told him nothing.

Replacing everything as it had been, he went back to the file of notes. This time he turned up a handwritten sheet he had overlooked, and found what the letters C.P.F. stood for. The writer—presumably Watson—had put:

"It's the cocktail party factor. No simple solution."

That was clear, at least. It was the standard nickname for sorting a sequence of information out of a jumble of background noise. But he already knew that Watson did serious research into stardropper signals. He put the notes back in their place.

There was no sign of a stardropper in the apartment, but if the firm downstairs carried sixty different models Watson could presumably pick and choose from those. Not significant.

He left the bedroom and moved to to the kitchen. Again, nothing in the least peculiar—

A bright red man-shape moved across the open kitchen doorway.

Dan froze, and had not had time to decide on a course of action when a pleasant, rather tired voice said, "Wally? Is that you?" And the intruder looked into the kitchen.

He was young—perhaps twenty-

five—and he was wearing a diving suit like the one in Watson's closet. He had taken off his helmet and clasped it under his arm.

"I thought you were Wally," he said. "Where is he?"

"Ah—" Dan's mind spun like a super-efficient machine. "Someone went out at the club last night. There's been a big scandal. He's keeping out of the way of the press."

The stranger nodded and laid his helmet down. "Give me a hand with these bottles, will you?" he said, unfastening the harness which held his oxygen cylinders. Warily, Dan came out of the kitchen and helped him to wriggle free.

"That's better," the stranger said. "A bit wearing, not being able to crack the suit for twenty-four hours on end. How bad is this scandal, as you call it?"

"It's going to be an international incident, I imagine. Everyone and his uncle is out buying stardroppers."

The stranger peeled off his suit. "I suppose we couldn't avoid it much longer. By the way, I don't think we've met."

Dan gave his name, tensing, but the stranger nodded. "A member of the club?" he suggested.

"Since just lately."

"Ah-hah. I've been away at Sixty-One so much it's not surprising I don't know you. I'm Robin Rainshaw."

XI.

Dan's self-control held good. He did not betray his shock by movement of a single muscle. He only paused for a few seconds before he could trust his voice to remain steady.

Robin Rainshaw did not notice. He was clearly at home here. He dropped his suit on a chair, walked to the bathroom and began to fill the tub. While the water was running he got himself a plate of salad from the refrigerator.

It was clear why he had accepted Dan's presence so calmly. He must know about the alarm on the door, and since it took a specialist with Agency training or a skilled burglar to get past it, he would assume that Watson had let Dan in or given him a key.

Or that Dan had come by the route he himself had taken.

Either way, Dan must be party to the stunning secret that the powers gained from the stardropper *had* been understood and put to use.

Dan studied him, thinking he was rather ordinary-looking: fair-haired, fresh-faced, quick to smile. He did not look like a man who could walk into a locked apartment without using the door.

Rainshaw came back with his food and sat down to attack it. Weighing his words, Dan said, "I met your father the other day."

Rainshaw nodded. "How is he?"

"He looks very worried. He's losing weight."

"The strain must be awful," Rainshaw frowned. "I almost wish I'd been hard-hearted enough not to tell him that I'd gone out—but it would be

worse if he thought I were dead."

So Dr. Rainshaw was keeping up a pose. He must be doing it well, or Redvers' attitude to him would have been different.

"Where did you say you'd been?" he ventured.

"Sixty-One again. Sixty-One Cygni."

This time the shock was still worse. Sixty-one Cygni—that was a *star,* and one that had become famous because there astronomers had located an extrasolar planetary system. Oh, it hung together! The diving suit, against an alien atmosphere or alien bacteria; color slides which Dan didn't recognize as showing any place on Earth—and this man could come home as calmly as from a walk around that block. *That* was shocking.

But here, illegally in a stranger's home, was no place to figure it all out. He would have to probe for information, and it would be doubly difficult because he didn't know how someone in his position ought to react.

"How was the trip?" Innocent enough, that—surely.

"As usual. Not very rewarding. The Earth-type planet of the system matches our gravity very closely, so it's a convenient trip. But our friends who originated the 'dropper signals must be closer to the center of the galaxy. Probably no one except ourselves in this area has got so far."

Half-remembered information prompted Dan's next question. "We're sort of—prematurely arrived on the scene?" he suggested.

"I'm sure of it. It would probably have taken another million years of evolution if we hadn't chanced across the stardropper. Still, that's our particular gift—gadgetry."

"There's definitely no one at home at . . . uh . . . Sixty-One?"

"Oh, no. The level of evolution suggests Earth as it was half a million years ago." Rainshaw put his plate aside. "Nothing to eat, either—we're allergic to a basic protein-complex of the local life forms. Got a cigarette?"

Dan gave him one. "You're American?" Rainshaw went on. "How are things your side?"

Dan thought wildly of the news that was blazoned across the papers, but he said, "Quiet compared with here. I got into this through meeting Berghaus"—that name might improve his precarious standing with Rainshaw—"but I'm a real novice to the whole thing. I told you Wally is dodging the press after what happened at the club. I'm doing the same, because I was next to the guy who went out."

"A good one or a bad one? Who was it?"

"Ah . . . a bad one, I'm afraid. A man called Leon Patrick."

Rainshaw got up to turn off his tub, but came back to sit and finish his cigarette. "Don't know him," he said. "And you were next to him? Not comfortable, I imagine."

"Very uncomfortable. And Jack Neill was running a very interesting demonstration—"

He broke off. Rainshaw's face hardened with intense suspicion, and so did his voice.

"Who are you?" Rainshaw said. "What are you doing here?"

Stunned, Dan tried to decide what had given him away. He was still tongue-tied when Rainshaw disappeared.

Dan swung round. There he was at the door, inspecting the lock and the alarm. At least he would find no sign of tampering. But here he was, back in a flash, not reassured, confronting Dan from just beyond arm's reach.

"Well?" he said harshly.

"Well . . . what?" Dan said. He was terrified, and not ashamed of the fact. How could anyone help it, suddenly faced with a man who could go instantly from place to place.

He saw puzzlement breach Rainshaw's suspicion. A stranger and outsider ought to have been taken aback by a display of teleportation, but Dan's acting was proof against that.

Seizing his chance, Dan said, "What's *wrong?* I was going to say that a Mrs. Towler got hysterical at the demonstration being called off."

"Why?"

"She thought"—*watch it!*—"she was going to go out, too."

The suspicion was fading still more. Dan put on an injured expression. "Who did you think I was?" he demanded. "You just saw for yourself that the door is fast. Calm down!"

"I'm sorry," Rainshaw said. "It was what you said about Neill's demonstration that worried me for a moment."

"Calling it interesting, you mean?"

"Yes." Rainshaw sat down slowly, his hostility fading but latent. "There can't have been more to it than there ever is to a club demonstration. Least of all at Club Cosmica. Only the signals matter."

Dan took another gamble. He said, "Well, the Mrs. Towlers of the world aren't to know that, are they?"

His head was threatening to spin with the illusion that he was playing some childish game of forfeits, instead of fencing in a deadly duel of words. However, his improvisations had saved him this time. He began to relax.

Too soon. But there was nothing on earth he could do.

For there was Watson standing behind Rainshaw's chair, more suddenly than a conjuring trick.

He was trapped. You couldn't run away from a man who could put himself instantly between you and your way of escape.

But he desperately wanted to try.

"How did you get in here, Cross?" Watson said, his narrowed eyes menacing. Rainshaw stood up.

"He's not a friend of yours? Not one of us?"

"No," Watson said shortly. "He turned up two or three days ago, posing as a novice stardropper fan. But there must be more to him than that. Well—Cross?"

Rainshaw looked crestfallen. He said, "I talked too freely, Wally. When I found him here I naturally assumed—"

"Can't be helped." Watson brushed

the apology aside. The phone began to ring; he shot a glance at it and Dan saw the attention switch move twice, making and breaking the connection.

He can move things at a distance, too . . .

"Cross!" Watson snapped. "I want to know who you are—whether you're dangerous or just nosey. And quickly. I could pick you up without touching you and hang you over the street, and since you're heavy I'd get tired and pretty soon I'd have to let you drop. Want me to prove it?"

Rainshaw made to object; Watson glared at him.

"All right," he said to Dan. "I'll prove it to you."

There was a snatching sensation—

not like someone taking hold of him, but as though all his body were being moved, like the express-elevator feeling turned sideways. By reflex Dan resisted, and for a moment he was seeing blackness.

Blackness? Not just the lack of sight caused by blinking, though it lasted no longer, but *dazzling* blackness. His eyes stung. His skin felt as though it had been pounded with wet leather straps. There was straining tension in his ears, and he had to exhale as though he had been punched in the belly. His sinuses hurt like blazes.

But against the blackness, sharply thrown into relief like an overexposed photograph, he had seen the shape of a man.

And all this happened so quickly he had no time to be puzzled before he found he was not facing Watson and Rainshaw. He was behind them on the other side of the room, and they were just turning with expressions of blank amazement.

"But he can!" Rainshaw said, and then, seeing Dan, swung towards him and changed the words. "But you can!"

XII.

The phone bell stabbed the air again. Watson stopped it automatically. He said, "I think—"

And broke off, putting his hands to his forehead.

Rainshaw said, "I'll swear that was a first time, and no one has ever gone out for the first time not actually listening to a 'dropper!"

"I think this man is an exception to everything," Watson said. "Cross—*who are you?*"

Dan wiped tears from his tortured eyes. He did not know how he had gone to the other side of the room, or the meaning of the vision of darkness which seemed to punctuate the journey. All that mattered now was that Rainshaw and Watson might explain.

He said wearily, "I'm an operative of the UN Special Agency."

Rainshaw gave a humorless chuckle. "I guess we're lucky at that," he said. Watson took no notice.

"Are you really a stardropper fan?" he demanded.

"I was given a stardropper by my chief last Friday. I never more than dabbled before then."

"Then you've set an incredible record for speed of assimilation." Watson was recovering his poise. "A predisposition, maybe, Robin?"

Rainshaw bit his lip. Now the first panic reaction was over, Dan felt he was being regarded as a scientific curiosity. He burst out, "Will you tell me what this is all about?"

Watson hesitated. "What happened when you went from here to there?" he said.

Dan told him.

"No one could have dreamed that up without seeing it," Watson nodded. "Fantastic chance that you saw one of the failures—"

"Failures?"

"Yes. Perhaps even Leon Patrick, poor devil—but no, the point must have shifted. More likely someone we don't know about. They're coming thick and fast now. The news of Patrick's going out tipped a lot of people past the point of incredulity and let them cut loose." He gestured at Rainshaw.

"Set him straight, will you?"

Rainshaw sat down by feel in a nearby chair. Conscious of near-exhaustion, Dan copied him.

"Just now you went out," Rainshaw said. "You found yourself at a point between here and the sun where the gravitational potential matches that here in this room. By luck, or quick thinking, you came back before much harm was done. But I see your eyes are watering, and you came back gasping like a stranded fish. You'd

better get a dose of a good antiradiation drug. But you're better off than you'd have been in a spaceship, because the primary cosmics went through you as though you weren't there and in a ship you stop a lot of slow secondaries— I'm rambling!"

Dan sat numbly, waiting for sense to emerge.

"The bad cases, as we call them, don't come back. A person 'goes out' to that point of equivalence because it's easier to aim for than a place on Earth's surface and it's also a spectacular trip. Accurate aiming takes practice; out there, it follows from the least-resistance principle.

"A bad case panics and dies and there's no helping him. A good case —like you—comes back and by reflex balances the energy account involved. Think, and you'll see that someone who goes out quietly changes places with an equal volume of air. You did that, over-elaborating because you took a long way round. But there was scarcely a whisper of sound. You're good—or you're going to be!"

"But I don't know how I did it!" Dan protested.

"I think I have it," Watson said. "If there's one thing everyone knows about the Special Agency, from TV and movies, it's that the operatives each have a personal-association code."

"True," Dan confirmed.

"And it's hypnotically locked away from consciousness?"

"Except when it's triggered—*but I don't see . . .*"

"A code like that would get round the big obstacle most people meet, trying to understand 'dropper signals. Human knowledge is transmitted in words—arbitrary labels not chosen by the user. But a personal-association code corresponds closely to real experience. So do stardropper signals."

"Then why—" Dan thought of Lilith: *lucky kid to go out quietly!* "Why can a kid succeed and an adult fail?"

"Fewer preconceptions, which helps," Watson replied. "But also, the experience they correspond to is, in everyday terms, impossible. And one man plus one stardropper is like a fisherman trying to catch one fish out of thousands, all hungry."

"The cocktail party factor," Dan said.

"Exactly. If you lose the right thread of information, out of lack of concentration, you wind up insane —or dead."

"And otherwise?"

"You may be tantalized forever by a hint of meaning you can never properly grasp. Or you may keep hold of one strong, clear sequence of signals long enough to acquire the vicarious experience which shows you how to carry out corresponding action."

Dan remembered Angel's phrase about riding a bicycle. If she had got that close, she was probably going to make it. He wondered if she knew what had become of Robin.

"The clearest signals come from

the most highly evolved minds," Watson was saying. "Remember Jerry Bartlett saying that evolution consists in improving control over the environment. The commonest first talent learned from a 'dropper is teleportation, and telekinesis associated with it. For control of environment is also control of probability. I can't put it more exactly into words for you; it doesn't belong in words.

"There's a vanishingly small statistical possibility that a particle might be elsewhere than it's observed to be. Up till now this could only be shown on a microcosmic scale. You must accept that control of one's location by act of will is part of the sequence which began with the very first plans for the future—planting seeds in spring for harvest in autumn. Not being able to verbalize it doesn't matter. We used fire for untold generations before we formulated a theory of combustion, and the early theories were wrong, anyway."

"But it takes energy to go from place to place!" Dan said. "And to go to a star—!"

Rainshaw cleared his throat. "I let that slip," he said.

Watson nodded. "I'll show you where you're wrong," he told Dan. "Imagine an airless planet as smooth as a billiard ball. Imagine an object in orbit a millimeter above its surface. Is there any reason why it should not continue forever without expending energy? I mean, in ideal space."

"At one millimeter! But . . . yes, all right," Dan frowned.

"At point A on the orbit it has the same potential energy as at point B. But it's in a different place. And has spent no energy. The return of a body to a former state of potential energy balances the energy accounts just as well as its remaining in that state. You yourself went to the equipotential point between here and the sun, and returned, and expended the following energy: that consumed in making an act of will, and that consumed owing to the difference of mass between your body and the air with which you changed places. So long as there's inertia you can't avoid that. But by the look of you you move a hundred and seventy pounds at every step, so you didn't give that a second thought.

"There are points on planets throughout the universe to which we can go, after practice and experiment, as easily as stepping across a room. An animal doesn't know how it metabolizes its food, but it can run regardless. We'll figure out the mechanics later; meantime, we're well occupied doing it."

"Most of it can be predicted from the Berghausian continuum," Rainshaw said. "Actual instantaneity—previous action—separation without distance—"

"I was getting that!" Dan said, thunderstruck. "At Neill's demonstration! I almost had it when Patrick went out!"

"I thought so," Watson said. "Probably the whole of your subconscious memory which is full of your association code has been finishing the

job for you. Creative thinkers of all kinds often rely on that. It's simply what they call sleeping on an idea. Could you go out now, do you think?"

"I . . . I'm not sure." There was a grinding, earthquakelike sensation in Dan's mind. You could walk to the stars. There really were alien intelligences. There really were supernatural—no, natural talents. A few minutes ago he had feared and hated these men. Now his fear seemed petty.

Odd—the phone hadn't rung again.

Why should that cross his mind when he had fifty other questions burning his tongue? He said, "And you? I know you have the talent. Why are you a store-manager and not—?"

"I told you," Watson cut in. "You didn't believe it. Through Club Cosmica and its sixteen branches, and the store itself which has an international reputation, I'm in touch with everyone doing serious research into stardropping."

"I see. And your demonstrations and so on are just a way of exposing people to specially informative signals, I suppose."

"Not exactly. They're a way of studying, not the signals, but the audiences."

The buzzer on the door sounded. Rainshaw vanished, and Dan felt his stomach turn over. It would take a long time to adjust to such casualness. Watson got to his feet.

"That's probably a policeman I know," he said. "Since you are with the Special Agency, maybe you know him, too."

"Redvers?" Dan said.

"That's right." Watson was walking to the door. "I would have mentioned—except that I haven't had time—that I went out this morning for a purpose. We've had to be crude, and I wish we hadn't. But I think we've made out." He was talking to himself rather than Dan. He opened the door.

Standing back, he said, "Hello, Hugo. Come on in."

XIII.

Two unrelated thoughts occurred to Dan as Redvers came in. First: *He called him Hugo; he must know him well.* Second: *One thinks of the crucial decisions being made in palaces and council chambers. Not here.*

Redvers strode in, hurled the portfolio he carried into a chair, and looked at Watson with burning eyes.

"I suppose you're pleased with yourself," he said in a dead voice. "How did you get him on your side?" He indicated Dan.

"I didn't," Watson said. "He went out. He did it himself."

Redvers sat down. "Why am I asking?" he said. "When we have so little time left. Seventy-two hours, maybe."

And then his false apathy broke apart.

"Do you know what you've done?" He almost screamed. "Cross, do you

know what he's been doing all this morning? Amusing himself at the expense of our lives! Vanishing and reappearing under people's eyes! Fleet Street! Piccadilly! Lime Grove television studios! The Bull Ring in Birmingham!"

"And Fifth Avenue, and Red Square, and the Boulevard Maotse Tung in Peking, and other places," Watson said calmly. "Not by myself, of course. If I tried to go direct from here to the street, I'd be as smashed up as if I'd jumped. There were over fifty of us working together."

His face crumbling with dismay, Redvers said, "You're out of your mind, that's all. I suppose now you've got your godlike powers you think you can stir us mortals up like a man kicking an antheap. Cross!" He shifted his gaze. "What do you think the results are going to be?"

Dan stood up, almost too appalled to speak. He said, "But it *is* lunacy! It'll drive people crazy with fear! It makes a mockery of frontiers, of secrecy, security—even privacy! I wouldn't say seventy-two hours—more like twelve!"

He looked accusingly at Watson. "You're stampeding the world into war!"

Watson took a cigarette from a box on a table. He didn't light it. He said, "That's the general idea, of course."

Dan's mouth went dry. "At this moment," he said, "there's nuclear potential equivalent to—"

"A hundred sixty tons of TNT for everyone on earth," Watson said, bored. "It was eighty tons a decade ago when we quit contributing to it in this country. I worked for us to quit. There are enough bacterial toxins to kill us all, too, and chemical weapons to do the job again. I read the papers."

"Cross!" Redvers said. "Is there any way to stop what this maniac has started?"

Feeling sick and empty, Dan shook his head.

Watson toyed with his unlit cigarette. He said, "You didn't get what you thought you did out of the 'dropper, did you, Hugo?"

Redvers crushed his hands against his temples, as though to hurt himself into believing this was actually happening.

"What's that?" Dan said.

"I've been a fool," Redvers said, choking. "You were all I ever got out of a stardropper, Cross. I wasn't so clever I could be waiting for a Special Agency man the moment he came off the plane. I knew beforehand, out of the stardropper I had. I learned that a big cross man was going to come from the west with the answer to the problem. When we saw your name on the passenger list we checked up on who you were."

He beat his fist into his palm. "I thought the Special Agency might save us. Only this crazy idiot has done what he set out to do and the world is going to be smashed to bits!"

Dan thought of hardened missile sites, of submarines on patrol, of spy

satellites and orbital hardware. A hundred sixty tons TNT-equivalent for everyone alive . . .

He looked at Watson. An itch of doubt remained in his mind. A maniac might be calm, but could he be so sardonically amused? Yet if Redvers had told the truth—

Watson, turning his cigarette in his fingers, said, "If you hadn't lost heart and given up stardropping, Hugo, you might not be so miserable now. I, too, figured out that this man Cross might have the answer. Admitted, I didn't see what the answer was till he went out, spectacularly, a few minutes ago. Have you worked it out yet, Cross? Or are you still stuck with poor Hugo in a morass of despair?"

A spark of wordless hope flickered up in Dan's mind.

"Look!" Watson commanded, and help up the cigarette.

It disappeared.

"There are a practical infinity of points in the universe," Watson said didactically, "where the gravitational potential is equal to that here. There is positively nothing easier than to scatter an object's constituent particles randomly among those points."

"Even a massive object?" Dan said.

"Exactly." Watson smiled. No, this wasn't a maniac. This was a man with so much common sense you automatically didn't believe it. Dan smiled back. He couldn't help it.

"What are you grinning for?" Redvers said hysterically.

"You saw that cigarette vanish," Dan said. "Spell it out."

"One moment," Watson said. "I've been assuming that if anybody knows where it all is, the Special Agency does. Right?"

"I can tell you myself where every hardened missile site, every major stockpile of bacterial and chemical weapons, and most troop concentrations are located. The Special Agency has more such information than any national organization. It has to."

"The submarines are the problem," Watson suggested.

"Yes . . . they'll have to be located individually." Dan's mind was racing. "It can be done, but it'll be difficult."

"What do you expect?" Watson said with sudden vehemence. "We've been at this business for a generation or so —plenty of time to make it *impossible* to save the world!"

"How many are there . . . of us?" Dan said.

"Three hundred at least. More coming in all the time." Watson chuckled. "Our best recruits are from the government-sponsored stardropper projects of both east and west. It's the first thing you get out of a 'dropper, even before concrete information—the realization that in a universe full of who knows how many intelligent races this is one small pebble, too small to contain narrow local loyalties."

Dan gave a sudden burst of laughter. He said, "I wonder how they're going to react."

Already he was thinking in terms of *they* and *we*. And yet—not already, but always. That was why men set up

organizations like the Special Agency —to combat the mysterious "they," always someone else somewhere else, who did cruel, stupid things.

Watson turned to Redvers. "Are you with us yet?" he said.

Face buried in his hands, Redvers shook his head.

"Oh, for—!" said Watson. "Hugo, this was the first useful purpose we thought of to apply our new talents to! I'm already certain there isn't going to be a nuclear war, because ever since Patrick's disappearance made it certain there would be a crisis, we've been working that trick I showed you with my cigarette. Only we've been working it on plutonium cores in H-bombs, and botulinus toxin, and military bacteria, and small objects like the remote-controlled switches which actuate the firing-circuits in missiles. Three hundred people with skill—this skill!—can do a great deal in a short time."

He turned to Dan and beckoned.

"Come on," he said. "We shall have to hurry."

The second time, Dan found, it was incredibly easy.

And eventually, of course, there would be the stars. ■

IN TIMES TO COME

Next month's issue features as the lead story "The Toughest Opponent," by Christopher Anvil. It is another of the series about the unfortunate difficulties that the great Centran unifiers get into. This time their Terrestrial allies have just about as tough a job of it as the Centrans do . . . despite the aid of a quite diversified collection of Terrans.

The cover, however, is not one of Jack Schoenherr's beautiful scientific paintings—it's a cover picture supplied by Palomar Mountain Observatory, courtesy of California Institute of Technology, that shows that space is not *black. There is a short discussion on the highly indefinite meaning of the term "color" as applied to galactic nebulae—but the picture Cal Tech loaned us for the cover establishes beyond question that whatever color space is it is not black.*

The Editor

SCIENCE FICTION HEAT-RAY?

■ General Electric Company engineers at Schenectady, New York, have used a beam of light to strike holes in diamonds.

The holes were cut in 200-millionths of a second—the light beams smashing against the diamonds with explosive force and generating temperatures in the order of 10,000 degrees F.

The experiments—using industrial diamonds—point the way, G.E. said, to high speed, inexpensive techniques for machining all sorts of extremely hard materials.

"If we can use a light beam to cut diamonds, we can use it to cut anything," declared Dr. J. Herbert Hollomon, head of the Company's General Engineering Laboratory where the work was performed.

The coherent, narrow-beam light was produced by a Laser—also known as an Optical Maser—a startling new development which is opening many horizons for scientists and engineers. Tremendous light and energy are compacted in the light beam which remains pencil-thin even when projected over long distances.

J. P. Chernoch, project engineer, said the diamond surface exposed to the high-energy light is vaporized in the instant the light beam strikes it. The impact creates an explosive sound and produces a blue-white jet similar to the flame of an intensely hot gas.

The holes are approximately 20/1000ths of an inch in diameter. and the diamonds themselves, about ¼-inch in diameter. Analysis of the diamonds has revealed no structural damage resulting from the experiments.

Diamonds can also be cut by an electron beam technique, but the Laser method promises a number of advantages, including lower cost and higher operating speed, Chernoch explained. The electron beam must be operated in a vacuum, which is not required for the Laser.

Chernoch said the engineering laboratory has also used the Laser light to pierce holes in stainless steel, tungsten and other hard metals difficult to machine by ordinary methods.

In the metals work, as well as in the diamond experiments, he said, the Laser beam is further concentrated by placing a focusing lens between the Laser "gun" and the workpiece.

Heart of the device which generates the Laser light is a ruby in the form of an eight-inch-long rod, slightly more than ½ inch in diameter.

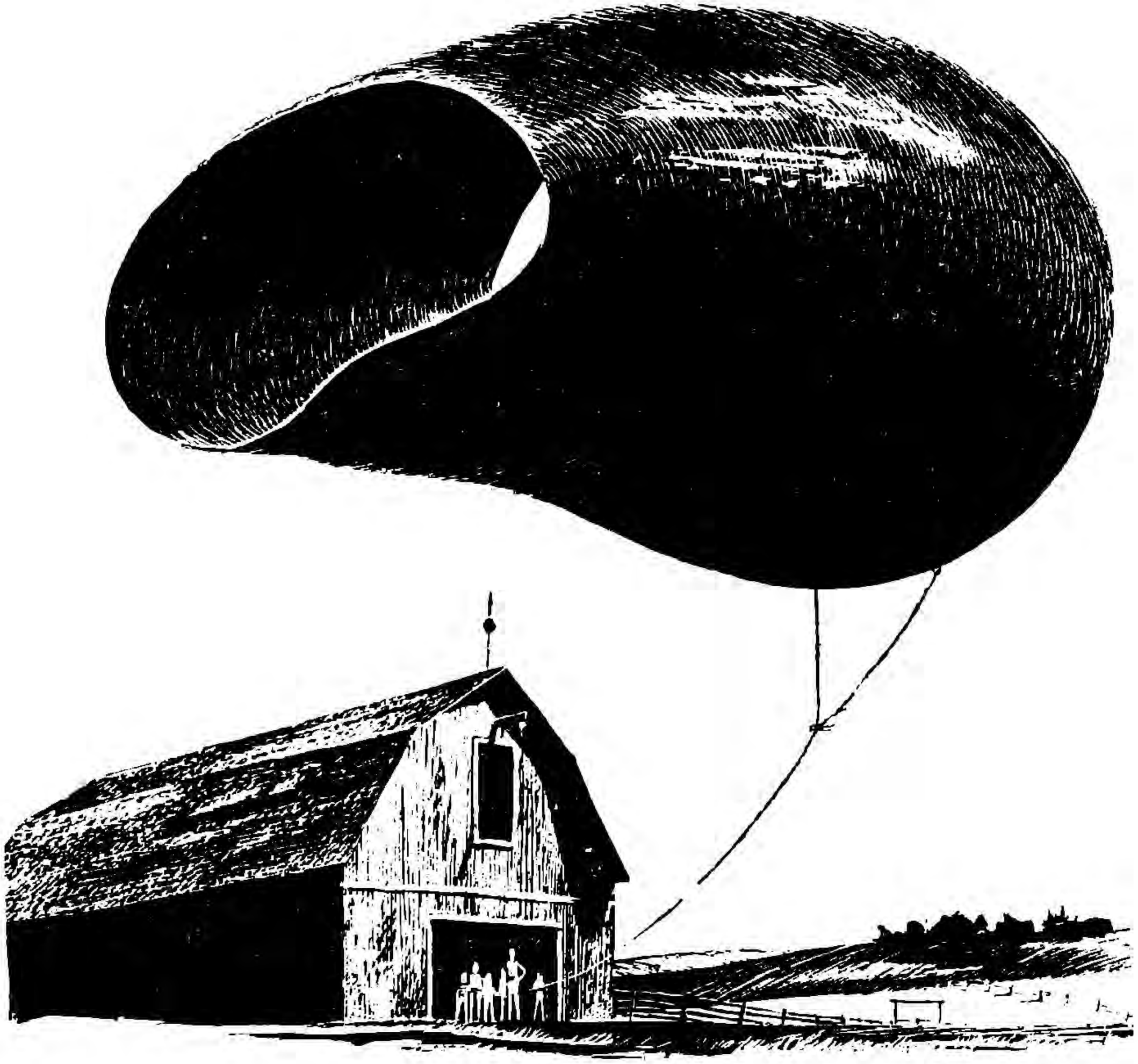
The system was operated at room temperature, but it is known that even higher energies may be achieved by cooling the ruby crystal with liquid nitrogen. ■

Fallout is, of course, always disastrous—
one way or another

JUNIOR ACHIEVEMENT

BY WILLIAM LEE

ILLUSTRATED BY SCHOENHERR



■ "What would you think," I asked Marjorie over supper, "if I should undertake to lead a junior achievement group this summer?"

She pondered it while she went to the kitchen to bring in the dessert. It was dried apricot pie, and very tasty, I might add.

"Why Donald," she said, "it could be quite interesting, if I understand what a junior achievement group is. What gave you the idea?"

"It wasn't my idea, really," I admitted. "Mr. McCormack called me to the office today, and told me that some of the children in the lower grades wanted to start one. They need adult guidance of course, and one of the group suggested my name."

I should explain, perhaps, that I teach a course in general science in our Ridgeville Junior High School, and another in general physics in the Senior High School. It's a privilege which I'm sure many educators must envy, teaching in Ridgeville, for our new school is a fine one, and our academic standards are high. On the other hand, the fathers of most of my students work for the Commission and a constant awareness of the Commission and its work pervades the town. It is an uneasy privilege then, at least sometimes, to teach my old fashioned brand of science to these children of a new age.

"That's very nice," said Marjorie. "What does a junior achievement group do?"

"It has the purpose," I told her, "of teaching the members something about commerce and industry. They manufacture simple compositions like polishing waxes and sell them from door-to-door. Some groups have built up tidy little bank accounts which are available for later educational expenses."

"Gracious, you wouldn't have to sell from door to door, would you?"

"Of course not. I'd just tell the kids how to do it."

Marjorie put back her head and laughed, and I was forced to join her, for we both recognize that my understanding and "feel" for commercial matters—if I may use that expression—is almost nonexistent.

"Oh, all right," I said, "laugh at my commercial aspirations. But don't worry about it, really. Mr. McCormack said we could get Mr. Wells from Commercial Department to help out if he was needed. There is one problem, though. Mr. McCormack is going to put up fifty dollars to buy any raw materials wanted and he rather suggested that I might advance another fifty. The question is, could we do it?"

Marjorie did mental arithmetic. "Yes," she said, "yes, if it's something you'd like to do."

We've had to watch such things rather closely for the last ten—no, eleven years. Back in the old Ridgeville, fifty odd miles to the south, we had our home almost paid for, when the accident occurred. It was in the path of the heaviest fall out, and we couldn't have kept on living there even if the town had stayed. When Ridgeville moved to its present site, so, of course, did we, which meant

starting mortgage payments all over again.

Thus it was that on a Wednesday morning about three weeks later, I was sitting at one end of a plank picnic table with five boys and girls lined up along the sides. This was to be our headquarters and factory for the summer—a roomy unused barn belonging to the parents of one of the group members, Tommy Miller.

"O.K.," I said, "let's relax. You don't need to treat me as a teacher, you know. I stopped being a school teacher when the final grades went in last Friday. I'm on vacation now. My job here is only to advise, and I'm going to do that as little as possible. You're going to decide what to do, and if it's safe and legal and possible to do with the starting capital we have, I'll go along with it and help in any way I can. This is your meeting."

Mr. McCormack had told me, and in some detail, about the youngsters I'd be dealing with. The three who were sitting to my left were the ones who had proposed the group in the first place.

Doris Enright was a grave young lady of ten years, who might, I thought, be quite a beauty in a few more years, but was at the moment rather angular—all shoulders and elbows. Peter Cope, Jr. and Hilary Matlack were skinny kids, too. The three were of an age and were all tall for ten-year-olds.

I had the impression during that first meeting that they looked rather alike, but this wasn't so. Their features were quite different. Perhaps from association, for they were close friends, they had just come to have a certain similarity of restrained gesture and of modulated voice. And they were all tanned by sun and wind to a degree that made their eyes seem light and their teeth startlingly white.

The two on my right were cast in a different mold. Mary McCready was a big husky redhead of twelve, with a face full of freckles and an infectious laugh, and Tommy Miller, a few months younger, was just an average extroverted well adjusted youngster, noisy and restless, tee shirted and butch barbered.

The group exchanged looks to see who would lead off, and Peter Cope seemed to be elected.

"Well, Mr. Henderson, a junior achievement group is a bunch of kids who get together to manufacture and sell things, and maybe make some money."

"Is that what you want to do," I asked, "make money?"

"Why not?" Tommy asked. "There's something wrong with making money?"

"Well sure, I suppose we want to," said Hilary. "We'll need some money to do the things we want to do later."

"And what sort of things would you like to make and sell?" I asked.

The usual products, of course, with these junior achievement efforts, are chemical specialties that can be made safely and that people will buy and use without misgivings—solvent to

free up rusty bolts, cleaner to remove road tar, mechanics hand soap—that sort of thing. Mr. McCormack had told me, though, that I might find these youngsters a bit more ambitious. "The Miller boy and Mary McCready," he had said, "have exceptionally high IQ's—around one forty or one fifty. The other three are hard to classify. They have some of the attributes of exceptional pupils, but much of the time they seem to have little interest in their studies. The junior achievement idea has sparked their imaginations. Maybe it'll be just what they need."

Mary said, "Why don't we make a freckle remover? I'd be our first customer."

"The thing to do," Tommy offered, "is to figure out what people in Ridgeville want to buy, then sell it to them."

"I'd like to make something by powder metallurgy techniques," said Pete. He fixed me with a challenging eye. "You should be able to make ball bearings by molding, then densify them by electroplating."

"And all we'd need is a hydraulic press," I told him, "which, on a guess, might cost ten thousand dollars. Let's think of something easier."

Pete mulled it over and nodded reluctantly. "Then maybe something in the electronics field. A hi-fi sub assembly of some kind."

"How about a new detergent," Hilary put in.

"Like the liquid dishwashing detergents?" I asked.

He was scornful. "No, they're formulations—you know, mixtures. That's cookbook chemistry. I mean a brand new synthetic detergent. I've got an idea for one that ought to be good even in the hard water we've got around here."

"Well now," I said, "organic synthesis sounds like another operation calling for capital investment. If we should keep the achievement group going for several summers, it might be possible later on to carry out a safe synthesis of some sort. You're Dr. Matlack's son, aren't you? Been dipping into your father's library?"

"Some," said Hilary, "and I've got a home laboratory."

"How about you, Doris," I prompted. "Do you have a special field of interest?"

"No." She shook her head in mock despondency. "I'm not very technical. Just sort of miscellaneous. But if the group wanted to raise some mice, I'd be willing to turn over a project I've had going at home."

"You could sell mice?" Tommy demanded incredulously.

"Mice," I echoed, then sat back and thought about it. "Are they a pure strain? One of the recognized laboratory strains? Healthy mice of the right strain," I explained to Tommy, "might be sold to laboratories. I have an idea the Commission buys a supply every month."

"No," said Doris, "these aren't laboratory mice. They're fancy ones. I got the first four pairs from a pet shop in Denver, but they're red—sort of chipmunk color, you know. I've

carried them through seventeen generations of careful selection."

"Well now," I admitted, "the market for red mice might be rather limited. Why don't you consider making an after-shave lotion? Denatured alcohol, glycerine, water, a little color and perfume. You could buy some bottles and have some labels printed. You'd be in business before you knew it."

There was a pause, then Tommy inquired, "How do you sell it?"

"Door to door."

He made a face. "Never build up any volume. Unless it did something extra. You say we'd put color in it. How about enough color to leave your face looking tanned. Men won't use cosmetics and junk, but if they didn't have to admit it, they might like the shave lotion."

Hilary had been deep in thought. He said suddenly, "Gosh, I think I know how to make a—what do you want to call it—a before-shave lotion."

"What would that be?" I asked.

"You'd use it before you shaved."

"I suppose there might be people who'd prefer to use it beforehand," I conceded.

"There will be people," he said darkly, and subsided.

Mrs. Miller came out to the barn after a while, bringing a bucket of soft drinks and ice, a couple of loaves of bread and ingredients for a variety of sandwiches. The parents had agreed to underwrite lunches at the barn and Betty Miller philosophically assumed the role of commissary officer. She paused only to say hello and to ask how we were progressing with our organization meeting.

I'd forgotten all about organization, and that, according to all the articles I had perused, is most important to such groups. It's standard practice for every member of the group to be a company officer. Of course a young boy who doesn't know any better, may wind up a sales manager.

Over the sandwiches, then, I suggested nominating company officers, but they seemed not to be interested. Peter Cope waved it off by remarking that they'd each do what came naturally. On the other hand, they pondered at some length about a name for the organization, without reaching any conclusions, so we returned to the problem of what to make.

It was Mary, finally, who advanced the thought of kites. At first there was little enthusiasm, then Peter said, "You know, we could work up something new. Has anybody ever seen a kite made like a wind sock?"

Nobody had. Pete drew figures in the air with his hands. "How about the hole at the small end?"

"I'll make one tonight," said Doris, "and think about the small end. It'll work out all right."

I wished that the youngsters weren't starting out by inventing a new article to manufacture, and risking an almost certain disappointment, but to hold my guidance to the minimum, I said nothing, knowing that later I could help them redesign it along standard lines.

At supper I reviewed the day's happenings with Marjorie and tried to recall all of the ideas which had been propounded. Most of them were impractical, of course, for a group of children to attempt, but several of them appeared quite attractive.

Tommy, for example, wanted to put tooth powder into tablets that one would chew before brushing the teeth. He thought there should be two colors in the same bottle—orange for morning and blue for night, the blue ones designed to leave the mouth alkaline at bed time.

Pete wanted to make a combination nail and wood screw. You'd drive it in with a hammer up to the threaded part, then send it home with a few turns of a screwdriver.

Hilary, reluctantly forsaking his ideas on detergents, suggested we make black plastic discs, like poker chips but thinner and as cheap as possible, to scatter on a snowy sidewalk where they would pick up extra heat from the sun and melt the snow more rapidly. Afterward one would sweep up and collect the discs.

Doris added to this that if you could make the discs light enough to float, they might be colored white and spread on the surface of a reservoir to reduce evaporation.

These latter ideas had made unknowing use of some basic physics, and I'm afraid I relapsed for a few minutes into the role of teacher and told them a little bit about the laws of radiation and absorption of heat.

"My," said Marjorie, "they're really smart boys and girls. Tommy Miller does sound like a born salesman. Somehow I don't think you're going to have to call in Mr. Wells."

I do feel just a little embarrassed about the kite, even now. The fact that it flew surprised me. That it flew so confoundedly well was humiliating. Four of them were at the barn when I arrived next morning; or rather on the rise of ground just beyond it, and the kite hung motionless and almost out of sight in the pale sky. I stood and watched for a moment, then they saw me.

"Hello, Mr. Henderson," Mary said, and proffered the cord which was wound on a fishing reel. I played the kite up and down for a few minutes, then reeled it in. It was, almost exactly, a wind sock, but the hole at the small end was shaped—by wire—into the general form of a kidney bean. It was beautifully made, and had a sort of professional look about it.

"It flies too well," Mary told Doris. "A kite ought to get caught in a tree sometimes."

"You're right," Doris agreed. "Let's see it." She gave the wire at the small end the slightest of twists. "There, it ought to swoop."

Sure enough, in the moderate breeze of that morning, the kite swooped and yawed to Mary's entire satisfaction. As we trailed back to the barn I asked Doris, "How did you know that flattening the lower edge of the hole would create instability?" She looked doubtful.

"Why it would have to, wouldn't

it? It changed the pattern of air pressures." She glanced at me quickly. "Of course, I tried a lot of different shapes while I was making it."

"Naturally," I said, and let it go at that. "Where's Tommy?"

"He stopped off at the bank," Pete Cope told me, "to borrow some money. We'll want to buy materials to make some of these kites."

"But I said yesterday that Mr. McCormack and I were going to advance some cash to get started."

"Oh sure, but don't you think it would be better to borrow from a bank? More businesslike?"

"Doubtless," I said, "but banks generally want some security." I would have gone on and explained matters further, except that Tommy walked in and handed me a pocket check book.

"I got two hundred and fifty," he volunteered—not without a hint of complacency in his voice. "It didn't take long, but they sure made it out a big deal. Half the guys in the bank had to be called in to listen to the proposition. The account's in your name, Mr. Henderson and you'll have to make out the checks. And they want you to stop in at the bank and give them a specimen signature. Oh yes, and cosign the note."

My heart sank. I'd never had any dealings with banks except in the matter of mortgages, and bank people make me most uneasy. To say nothing of finding myself responsible for a two hundred and fifty dollar note—over two weeks salary. I made a mental vow to sign very few checks.

"So then I stopped by at Apex Stationers," Tommy went on, "and ordered some paper and envelopes. We hadn't picked a name yesterday, but I figured what's to lose, and picked one. Ridge Industries, how's that?" Everybody nodded.

"Just three lines on the letterhead," he explained. "Ridge Industries—Ridgeville—Montana."

I got my voice back and said, "Engraved, I trust."

"Well sure," he replied. "You can't afford to look chintzy."

My appetite was not at its best that evening, and Marjorie recognized that something was concerning me, but she asked no questions, and I only told her about the success of the kite, and the youngsters embarking on a shopping trip for paper, glue and wood splints. There was no use in both of us worrying.

On Friday we all got down to work, and presently had a regular production line under way; stapling the wood splints, then wetting them with a resin solution and shaping them over a mandrel to stiffen, cutting the plastic film around a pattern, assembling and hanging the finished kites from an overhead beam until the cement had set. Pete Cope had located a big roll of red plastic film from somewhere, and it made a wonderful looking kite. Happily, I didn't know what the film cost until the first kites were sold.

By Wednesday of the following week we had almost three hundred kites finished and packed into flat

cardboard boxes, and frankly I didn't care if I never saw another. Tommy, who by mutual consent, was our authority on sales, didn't want to sell any until we had, as he put it, enough to meet the demand, but this quantity seemed to satisfy him. He said he would sell them the next week and Mary McCready, with a fine burst of confidence, asked him in all seriousness to be sure to hold out a dozen.

Three other things occurred that day, two of which I knew about immediately. Mary brought a portable typewriter from home and spent part of the afternoon banging away at what seemed to me, since I use two fingers only, a very creditable speed.

And Hilary brought in a bottle of his new detergent. It was a syrupy yellow liquid with a nice collar of suds. He'd been busy in his home laboratory after all, it seemed.

"What is it?" I asked. "You never told us."

Hilary grinned. "Lauryl benzyl phosphonic acid, dipotassium salt, in 20% solution."

"Goodness," I protested, "it's been twenty-five years since my last course in chemistry. Perhaps if I saw the formula—."

He gave me a singularly adult smile and jotted down a scrawl of symbols and lines. It meant little to me.

"Is it good?"

For answer he seized the ice bucket, now empty of its soda bottles, trickled in a few drops from the bottle and swished the contents. Foam mounted to the rim and spilled over. "And that's our best grade of Ridgeville water," he pointed out. "Hardest in the country."

The third event of Wednesday came to my ears on Thursday morning.

I was a little late arriving at the barn, and was taken a bit aback to find the roadway leading to it rather full of parked automobiles, and the barn itself rather full of people, including two policemen. Our Ridgeville police are quite young men, but in uniform they still look ominous and I was relieved to see that they were laughing and evidently enjoying themselves.

"Well now," I demanded, in my best classroom voice. "What is all this?"

"Are you Henderson?" the larger policeman asked.

"I am indeed," I said, and a flash bulb went off. A young lady grasped my arm.

"Oh please, Mr. Henderson, come outside where it's quieter and tell me all about it."

"Perhaps," I countered, "somebody should tell me."

"You mean you don't know, honestly? Oh it's fabulous. Best story I've had for ages. It'll make the city papers." She led me around the corner of the barn to a spot of comparative quiet.

"You didn't know that one of your junior whatsisnames poured detergent in the Memorial Fountain basin last night?"

I shook my head numbly.

"It was priceless. Just before rush

hour. Suds built up in the basin and overflowed, and down the library steps and covered the whole street. And the funniest part was they kept right on coming. You couldn't imagine so much suds coming from that little pool of water. There was a three-block traffic jam and Harry got us some marvelous pictures—men rolling up their trousers to wade across the street. And this morning," she chortled, "somebody phoned in an anonymous tip to the police—of course it was the same boy that did it—Tommy—Miller?—and so here we are. And we just saw a demonstration of that fabulous kite and saw all those simply captivating mice."

"Mice?"

"Yes, of course. Who would ever have thought you could breed mice with those cute furry tails?"

Well after a while things quieted down. They had to. The police left after sobering up long enough to give me a serious warning against letting such a thing happen again. Mr. Miller, who had come home to see what all the excitement was, went back to work and Mrs. Miller went back to the house and the reporter and photographer drifted off to file their story or whatever it is they do. Tommy was jubilant.

"Did you hear what she said? It'll make the city papers. I wish we had a thousand kites. Ten thousand. Oh boy, selling is fun. Hilary, when can you make some more of that stuff? And Doris, how many mice do you have?"

Those mice! I have always kept my enthusiasm for rodents within bounds, but I must admit they were charming little beasts, with tails as bushy as miniature squirrels.

"How many generations?" I asked Doris.

"Seventeen. No, eighteen, now. Want to see the genetic charts?"

I won't try to explain it as she did to me, but it was quite evident that the new mice were breeding true. Presently we asked Betty Miller to come back down to the barn for a conference. She listened and asked questions. At last she said, "Well all right, if you promise me they can't get out of their cages. But heaven knows what you'll do when fall comes. They won't live in an unheated barn and you can't bring them into the house."

"We'll be out of the mouse business by then," Doris predicted. "Every pet shop in the country will have them and they'll be down to nothing apiece."

Doris was right, of course, in spite of our efforts to protect the market. Anyhow that ushered in our cage building phase, and for the next week—with a few interruptions—we built cages, hundreds of them, a good many for breeding, but mostly for shipping.

It was rather regrettable that, after the *Courier* gave us most of the third page, including photographs, we rarely had a day without a few visitors. Many of them wanted to buy mice or kites, but Tommy refused to sell any mice at retail and we soon had to dis-

appoint those who wanted kites. The Supermarket took all we had—except a dozen—and at a dollar fifty each. Tommy's ideas of pricing rather frightened me, but he set the value of the mice at ten dollars a pair and got it without any arguments.

Our beautiful stationery arrived, and we had some invoice forms printed up in a hurry—not engraved, for a wonder.

It was on Tuesday—following the Thursday—that a lanky young man disentangled himself from his car and strolled into the barn. I looked up from the floor where I was tacking squares of screening onto wooden frames.

"Hi," he said. "You're Donald Henderson, right? My name is McCord—Jeff McCord—and I work in the Patent Section at the Commission's downtown office. My boss sent me over here, but if he hadn't, I think I'd have come anyway. What are you doing to get patent protection on Ridge Industries' new developments?"

I got my back unkinked and dusted off my knees. "Well now," I said, "I've been wondering whether something shouldn't be done, but I know very little about such matters—."

"Exactly," he broke in, "we guessed that might be the case, and there are three patent men in our office who'd like to chip in and contribute some time. Partly for the kicks and partly because we think you may have some things worth protecting. How about it? You worry about the filing and final fees. That's sixty bucks per brainstorm. We'll worry about everything else."

"What's to lose," Tommy interjected.

And so we acquired a patent attorney, several of them, in fact.

The day that our application on the kite design went to Washington, Mary wrote a dozen toy manufacturers scattered from New York to Los Angeles, sent a kite to each one and offered to license the design. Result, one licensee with a thousand dollar advance against next season's royalties.

It was a rainy morning about three weeks later that I arrived at the barn. Jeff McCord was there, and the whole team except Tommy. Jeff lowered his feet from the picnic table and said "Hi."

"Hi yourself," I told him. "You look pleased."

"I am," he replied, "in a cautious legal sense, of course. Hilary and I were just going over the situation on his phosphonate detergent. I've spent the last three nights studying the patent literature and a few standard texts touching on phosphonates. There are a zillion patents on synthetic detergents and a good round fifty on phosphonates, but it looks"—he held up a long admonitory hand—"it just looks as though we had a clear spot. If we do get protection, you've got a real salable property."

"That's fine, Mr. McCord," Hilary said, "but it's not very important."

"No?" Jeff tilted an inquiring eye-

brow at me, and I handed him a small bottle. He opened and sniffed at it gingerly. "What gives?"

"Before-shave lotion," Hilary told him. "You've shaved this morning, but try some anyway."

Jeff looked momentarily dubious, then puddled some in his palm and moistened his jaw line. "Smells good," he noted, "and feels nice and cool. Now what?"

"Wipe your face." Jeff located a handkerchief and wiped, looked at the cloth, wiped again, and stared.

"What is it?"

"A whisker stiffener. It makes each hair brittle enough to break off right at the surface of your skin."

"So I perceive. What is it?"

"Oh just a mixture of stuff. Cookbook chemistry. Cysteine thiolactone and a fat soluble magnesium compound."

"I see. Just a mixture of stuff. And do your whiskers grow back the next day?"

"Right on schedule," I said.

McCord unfolded his length and stood staring out into the rain. Presently he said, "Henderson, Hilary and I are heading for my office. We can work there better than here, and if we're going to break the hearts of the razor industry, there's no better time to start than now."

When they had driven off I turned and said, "Let's talk a while. We can always clean mouse cages later. Where's Tommy?"

"Oh, he stopped at the bank to get a loan."

"What on earth for? We have over six thousand in the account."

"Well," Peter said, looking a little embarrassed, "we were planning to buy a hydraulic press. You see, Doris put some embroidery on that scheme of mine for making ball bearings." He grabbed a sheet of paper. "Look, we make a roller bearing, this shape only it's a permanent magnet. Then you see—." And he was off.

"What did they do today, dear?" Marge asked as she refilled my coffee cup.

"Thanks," I said. "Let's see, it was a big day. We picked out a hydraulic press, Doris read us the first chapter of the book she's starting, and we found a place over a garage on Fourth Street that we can rent for winter quarters. Oh yes, and Jeff is starting action to get the company incorporated."

"Winter quarters," Marge repeated. "You mean you're going to try to keep the group going after school starts?"

"Why not? The kids can sail through their courses without thinking about them, and actually they won't put in more than a few hours a week during the school year."

"Even so, it's child labor, isn't it?"

"Child labor nothing. They're the employers. Jeff McCord and I will be the only employees—just at first, anyway."

Marge choked on something. "Did you say you'd be an employee?"

"Sure," I told her. "They've offered me a small share of the company, and I'd be crazy to turn it down. After all, what's to lose?" ■

THE OTHER LIKENESS

There is a limit to how perfect
a counterfeit can be —
a limit that cannot be passed without
an odd phenomenon setting in . . .

BY JAMES H. SCHMITZ

ILLUSTRATED BY SCHELLING

■ When he felt the sudden sharp tingling on his skin which came from the alarm device under his wrist watch, Dr. Halder Leorm turned unhurriedly from the culture tray he was studying, walked past the laboratory technician to the radiation room, entered it and closed the door behind him. He slipped the instrument from his wrist, removed its back plate, and held it up to his eye.

He was looking into the living room of his home, fifty miles away in another section of Orado's great city of Draise. A few steps from the entry, a man lay on his back on the carpeting, eyes shut, face deeply flushed, apparently unconscious. Halder Leorm's mouth tightened. The man on the carpet was Dr. Atteo, his new assistant, assigned to the laboratory earlier in the week. Beyond Atteo, the entry from the residence's delivery area and car port stood open.

Fingering the rim of the tiny scanner with practiced quickness, Halder Leorm shifted the view to other sections of the house, finally to the car port. An empty aircar stood in the port; there was no one in sight.

Halder sighed, replaced the instrument on his wrist, and glanced over at a wall mirror. His face was pale but looked sufficiently composed. Leaving the radiation room, he picked up his hat, said to the technician, "Forgot to mention it, Reef, but I'll have to head over to central laboratories again."

Reef, a large, red-headed young man, glanced around in mild surprise. "They've got a nerve, calling you across town every two days!" he

observed. "Whose problem are you supposed to solve now?"

"I wasn't informed. Apparently, something urgent has come up and they want my opinion on it."

"Yeah, I bet!" Reef scratched his head, glanced along the rows of culture trays. "Well . . . nothing here at the moment I can't handle, even if Atteo doesn't show up. Will you be back before evening?"

"I wouldn't count on it," Halder said. "You know how those conferences tend to go."

"Uh-huh. Well, Dr. Leorm, if I don't see you before tomorrow, give my love to your beautiful wife."

Halder smiled back at him from the door. "Will do, Reef!" He let the door slide shut behind him, started towards the exit level of the huge pharmaceutical plant. Reef had acted in a completely normal manner. If, as seemed very probable, "Dr. Atteo" was a Federation agent engaged in investigating Dr. Halder Leorm, Halder's co-workers evidently had not been apprised of the fact. Still, Halder thought, he must warn Kilby instantly. It was quite possible that an attempt to arrest him would be made before he left the building.

He stepped into the first ComWeb booth on his route, and dialed Kilby's business number. His wife had a desk job in one of the major fashion stores in the residential section of Draise, and—which was fortunate just now—a private office. Her face appeared almost immediately on the screen before him, a young face, soft-looking, with large, gray eyes. She smiled in pleased surprise. "'Lo, Halder!"

"'Lo, Kilby . . . Did you forget?"

Kilby's smile became inquiring. "Forget what?"

"That we're lunching together at Hasmin's today."

Halder paused, watching the color drain quickly from Kilby's cheeks.

"Of course!" she whispered. "I did forget. Got tied up in . . . and . . . I'll leave right now! All right?"

Halder smiled. She was past the first moment of shock and would be able to handle herself. After all, they had made very precise preparations against the day when they might discover that the Federation's suspicions had turned, however tentatively, in their direction.

"That'll be fine," he said. "I'm calling from the lab and will leave at once"—he paused almost imperceptibly—"if I'm not held up. Meet you at Hasmin's, in any case, in around twenty minutes."

Kilby's eyes flickered for an instant. If Halder didn't make it away, she was to carry out her own escape, as planned. That was the understanding. She gave him a tremulous smile. "And I'm forgiven?"

"Of course." Halder smiled back.

The guards at the check-out point were not men he knew, but Halder walked through the ID-scanning band without incident, apparently without arousing interest. Beyond, to the left, was a wide one-way portal to a tube station. His aircar was in the

executive parking area on the building's roof, but the escape plan called for both of them to abandon their private cars, which were more than likely to be traps, and use the public transportation systems in starting out.

Halder entered the tube station, went to a rented locker, opened it and took out two packages, one containing a complete change of clothing and a mirror, the other half a dozen canned cultures of as many varieties of microlife — highly specialized strains of life, of which the pharmaceutical concern that employed Dr. Halder Leorm knew no more than it did of the methods by which they had been developed.

Halder carried the packages into a ComWeb booth which he locked and shielded for privacy. Then he opened both packages and quickly removed his clothing. Opening the first of the cultures, he dipped one of the needles into it and, watching himself in the mirror, made a carefully measured injection in each side of his face. He laid the needle down and opened the next container, aware of the enzyme reaction that had begun to race through him.

Three minutes later, the mirror showed him a dark-skinned stranger with high cheek bones, heavy jaw, thick nose, slightly slanted eyes, gray-ing hair. Halder disposed of the mirror, the clothes he had been wearing and the remaining contents of the second package. Unchecked, the alien organisms swarming in his blood stream now would have gone on to destroy him in a variety of unpleasant ways. But with their work of disguise completed, they were being checked.

He emerged presently from a tube exit in uptown Draise, on the terrace of a hotel forty stories above the street level. He didn't look about for Kilby, or rather the woman Kilby would turn into on her way here. The plan called for him to arrive first, to make sure he hadn't been traced, and then to see whether she was being followed.

She appeared five minutes later, a slightly stocky lady now, perhaps ten years under Halder's present apparent age, dark-skinned as he was, showing similar racial characteristics. She flashed her teeth at him as she came up, sloe eyes flirting.

"Didn't keep you waiting, did I?" she asked.

Halder growled amiably, "What do you think? Let's grab a cab and get going." Nobody had come out of the tube exit behind her.

Kilby nodded understandingly; she had remembered not to look back. She was talking volubly about some imaginary adventure as they started down the terrace stairs towards a line of aircabs, playing her part, high-piled golden hairdo bobbing about. A greater contrast to the slender, quiet, gray-eyed girl, brown hair falling softly to her shoulders, with whom Halder had talked not more than twenty minutes ago would have been difficult to devise. The disguises might have been good enough, he thought, to permit them to remain undetected in Draise itself.

But the plan didn't call for that.

There were too many things at stake.

Kilby slipped into the cab ahead of him without a break in her chatter.

Her voice stopped abruptly as Halder closed the cab door behind him, activating the vehicle's one-way vision shield. Kilby was leaning across the front seat beside the driver, turning off the comm box. She straightened, dropped down into the back seat beside Halder, biting her lip. The driver's head sagged sideways as if he had fallen asleep; then he slid slowly down on the seat and vanished from Halder's sight.

"Got him instantly, eh?" Halder asked, switching on the passenger controls.

"Hm-m-m!" Kilby opened her purse, slipped the little gun which had been in the palm of her left hand into it, reached out and gripped Halder's hand for an instant. "You drive, Halder," she said. "I'm so nervous I could scream! I'm scared cold! What happened?"

Halder lifted the cab out from the terrace, swung it skywards. "We were right in wondering about Dr. Atteo," he said. "Half an hour ago, he attempted to go through our home in our absence. We'll have to assume he's a Federation agent. The entry trap knocked him out, but the fat's probably in the fire now. The Federation may not have been ready to make an arrest yet, but after this there'll be no hesitation. We'll have to move fast if we intend to keep ahead of Atteo's colleagues."

Kilby drew in an unsteady breath. "You warned Rane and Santin?"

Halder nodded. "I sent the alert signal to their apartment ComWeb in the capital. Under the circumstances, I didn't think a person-to-person call would be advisable. They'll have time to pack and get out to the ranch before we arrive. We'll give them the details then."

"Did you reset the trap switch at the house entry?"

Halder slowed the cab, turning it into one of the cross-city traffic lines above Draise. "No," he said. "Knocking out a few more Federation agents wouldn't give us any advantage. It'll be eight or nine hours before Atteo will be able to talk; and, with any luck at all, we'll be clear of the planet by that time."

The dark woman who was Kilby and a controlled devil's swarm of microlife looked over at him and asked in Kilby's voice, "Halder, do you think we should still go on trying to find the others now?"

"Of course. Why stop?"

Kilby hesitated, said, "It took you three months to find me. Four months later, we located Rane Rellis . . . and Santin, at almost the same time. Since then we've drawn one blank after another. A year and a half gone, and a year and a half left."

She paused, and Halder said nothing, knowing she was fighting to keep her voice steady. After a few seconds, Kilby went on. "Almost twelve hundred still to find, scattered over a thousand worlds. Most of them probably in hiding, as we were.

And with the Federation on our trail . . . even if we get away this time, what chance is there now of contacting the whole group before time runs out?"

Halder said patiently, "It's not an impossibility. We've been forced to spend most of the past year and a half gathering information, studying the intricate functioning of this gigantic civilization—so many things that our mentors on Kalechi either weren't aware of or chose not to tell us. And we haven't done too badly, Kilby. We're prepared now to conduct the search for the group in a methodical manner. Nineteen hours in space, and we'll be on another world, under cover again, with new identities. Why shouldn't we continue with the plan until . . ."

Kilby interrupted without change of expression. "Until we hear some day that billions of human beings are dying on the Federation's worlds?"

Halder kept his eyes fixed on the traffic pattern ahead. "It won't come to that," he said.

"Won't it? How can you be sure?" Kilby asked tonelessly.

"Well," Halder asked, "what else can we do? You aren't suggesting that we give ourselves up—"

"I've thought of it."

"And be picked apart mentally and physically in the Federation's laboratories?" Halder shook his head. "In their eyes we'd be Kalechi's creatures . . . monsters. Even if we turn ourselves in, they'll think it's some trick, that we'd realized we'd get caught anyway. We couldn't expect much mercy. No, if everything fails, we'll see to it that the Federation gets adequate warning. But not, if we can avoid it, at the expense of our own lives." He glanced over at her, his eyes troubled. "We've been over this before, Kilby."

"I know." Kilby bit her lip. "You're right, I suppose."

Halder let the cab glide out of the traffic lane, swung it around towards the top of a tall building three miles to their left. "We'll be at the club in a couple of minutes," he said. "If you're too disturbed, it would be better if you stayed in the car. I'll pick up our flight-hiking outfits and we can take the cab on to the city limits before we dismiss it."

Kilby shook her head. "We agreed we shouldn't change any details of the escape plan unless it was absolutely necessary. I'll straighten out. I've just let this situation shake me too much."

They set the aircab to traffic-safe random cruise control before getting out of it at their club. It lifted quietly into the air again as soon as the door had closed, was out of sight beyond the building before they reached the club entrance. The driver's records had indicated that his shift would end in three hours. Until that time he would not be missed. More hours would pass after the cab was located before the man returned to consciousness. What he had to say then would make no difference.

In one of the club rooms, rented to

a Mr. and Mrs. Anley, they changed to shorts and flighthiking equipment, then took a tube to the outskirts of Draise where vehicleless flight became possible. Forest parks interspersed with small residential centers stretched away to the east. They set their flight harnesses to Draise's power broadcast system, moved up fifty feet and floated off into the woods, energizing drive and direction units with the measured stroking motion which made flighthiking one of the most relaxing and enjoyable of sports. And one—so Halder had theorized—which would be considered an improbable occupation for a couple attempting to escape from the Federation's man-hunting systems.

For an hour and a half, they held a steady course eastwards, following the contours of the rolling forested ground, rarely emerging into the open. Other groups of vehicleless fliers passed occasionally; as members of a sporting fraternity, they exchanged waves and shouted greetings. At last, a long, wild valley opened ahead, showing no trace of human habitation; at its far end began open land, dotted with small tobacco farms where automatic cultivators moved unhurriedly about. Kilby, glancing back over her shoulder at Halder for a moment, swung around towards one of the farms, gliding down close to the ground, Halder twenty feet behind her. They settled down beside a hedge at the foot of a slope covered with tobacco plants. A small gate in the hedge immediately swung open.

"All clear here, folks!" a voice curiously similar to Halder's addressed them from the gate speaker.

Rane Rellis, a lanky, red-headed man with a wide-boned face, was striding down the slope towards them as they moved through the gate. "We got your alert," he said, "but as it happens, we'd already realized that

something had gone wrong."

Kilby gave him a startled glance. "Somebody has been checking on you, too?"

"Not that . . . at least as far as we know. Come on up to the shed. Santin's already inside the mountain." As they started along the narrow path between the rows of plants, Rellis went on, "The first responses

to our inquiries came in today. One of them looked very promising. Santin flew her car to Draise immediately to inform you about it. She scanned your home as usual before calling, discovered three strange men waiting inside."

"When was this?" Halder interrupted.

"A few minutes after one o'clock. Santin checked at once at your place of work and Kilby's, learned you both were absent, deduced you were still at large and probably on your way here. She called to tell me about it. Your alert signal sounded almost before she'd finished talking."

Halder glanced at Kilby. "We seem to have escaped arrest by something like five minutes," he remarked dryly. "Were you able to bring the records with you, Rane?"

"Yes, everything. If we get clear of Orado, we can pick up almost where we left off." Rane Rellis swung the door of the cultivator shed open and followed them in, closing and locking the door behind him. They crossed quickly through the small building to an open wall portal at the far end. Beyond the portal a large, brightly lit room was visible, comfortably furnished, windowless. Between that room and the shed the portal spanned a distance of seven miles, a vital point in the organization of their escape route. If they were traced this far, the trail would end—temporarily, at least—at the ranch.

They stepped over into the room, and Rane Rellis pulled down a switch. Behind them the portal entry vanished. Back in the deserted ranch building, its mechanisms were bursting into flames, would burn fiercely for a few seconds and fuse to dead slag.

Rane said tightly, "I feel a little better now . . . just a little! The Fed agents are good, but I haven't yet heard of detection devices that could drive through five hundred yards of solid rock to spot us inside a mountain." He paused as a tall girl with black hair, dark-brown eyes, came in from an adjoining room. Santin Rellis was the only one of the four who was not employing a biological disguise at the moment. In spite of the differ-

ences in their appearance, she might have been taken for Kilby's sister.

Halder told them what had occurred in Draise, concluded, "I'd believed that suspicion was more likely to center first on one of you. Particularly, of course, on Santin, working openly in Orado's Identification Center."

Santin grinned. "And, less openly, copying out identity-patterns!" she added. Her face sobered quickly again. "There's no indication of what did attract attention to you?"

Halder shook his head. "I can only think it's the microbiological work I've been doing. That, of course, would suggest that they already have an inkling of Kalechi's three-year plan to destroy the Federation."

Rane added, "And that at least one of the group already has been captured!"

"Probably."

There was silence for a moment. Santin said evenly, "That isn't a pleasant thought. Halder, everything we've learned recently at the Identification Center indicates that Rane's theory is correct . . . every one of the twelve hundred members of the Kalechi group probably can be analyzed down to the same three basic identity-patterns, reshuffled in endless variation. The Federation wouldn't have to capture many of us before discovering the fact. It will then start doing exactly what we're trying to do—use it to identify the rest of the group."

Halder nodded. "I've thought of that."

"You still intend to use the Senla Starlight Cruisers to get out into space?" Rane asked.

"Kilby and I will," Halder said. "But now, of course, you two had better select one of the alternate escape routes."

"Why that?" Santin asked sharply.

Halder looked at her. "That's obvious, isn't it? There's a good chance you're still completely in the clear."

"That's possible. But it isn't a good enough reason for splitting up. We're a working team, and we should stay together, regardless of circumstances What do you say, Rane?"

Her husband said, "I agree with you." He smiled briefly at Halder. "We'll be waiting for you on the north shore of Lake Senla ten minutes before the Starlight Cruise lifts. Now, is there anything else to discuss?"

"Not at the moment." Halder paused, dissatisfied, then went on. "All right. We still don't know just what the Federation is capable of . . . one move might as easily be wrong as the other. We'll pick you up, as arranged. Kilby and I are flighthiking on to Senla, so we might as well start immediately."

They went into the second room of the underground hideout. Rane turned to the exit portal's controls. asked, "Where shall I let you out?"

"We'll take the river exit," Halder said. "Six miles from here, nine from the ranch . . . that should be far enough. We'll be lost in an army of vacationers from Draise and the capital thirty seconds after we emerge."

It was dusk when Halder and Kilby turned into the crowded shore walk of the lake resort of Senla, moving unhurriedly towards a bungalow Halder had bought under another name some months before. Halder's thoughts went again over the details of the final stage of their escape from Orado. Essentially, the plan was simple. An hour from now they would slide their small star cruiser out of the bungalow's yacht stall, pick up Rane and Santin on the far shore of the lake, then join the group of thirty or so private yachts which left the resort area nightly for a two-hour flight to a casino ship stationed off the planet. A group cruise was unlikely to draw official scrutiny even tonight; and after reaching the casino, they should be able to slip on unobserved into space.

There was, however, no way of knowing with certainty that the plan . . . or any other plan . . . would work. It was only during the past few months that the four of them had begun to understand in detail the extent to which the vast, apparently loose complex of the Federation's worlds was actually organized. How long they had been under observation, how much the Federation suspected or knew about them—those questions were, at the moment, unanswerable. So Halder walked on in alert silence, giving his attention to anything which might be a first indication of danger in the crowds surging quietly past them along Senla's shore promenade in the summer evening. It was near the peak of the resort's season; a sense of ease and relaxation came from the people he passed, their voices seeming to blend into a single, low-pitched, friendly murmur. Well, and in time, Halder told himself, if everything went well, he and Kilby might be able to mingle undisguised, unafraid, with just such a crowd. But tonight they were hunted.

He laid his hand lightly on Kilby's arm, said, "Let's rest on that bench over there for a moment."

She smiled up at him, said, "All right," turned and led the way towards an unoccupied bench set back among the trees above the walk. They sat down, and Halder quickly slipped the watch off his wrist and removed the scanner's cover plate. The bungalow was a few hundred yards away now, on a side path which led down to the lake. It was showing no lights, but as the scanner reached into it, invisible radiation flooded the dark rooms and hallway, disclosing them to the instrument's inspection. For two or three minutes, Halder studied the bungalow's interior carefully; then he shifted the view to the grounds outside, finally to the yacht stall and the little star cruiser. Twice Kilby touched him warningly as somebody appeared about to approach the bench, and Halder put down his hand. But the strangers went by without pausing.

At last, he replaced the instrument on his wrist. He had discovered no signs of intrusion in the bungalow;

and, at any rate, it was clear that no one was waiting there now, either in the little house itself or in the immediate vicinity. He stood up, and put out his hand to assist Kilby to her feet.

"We'll go on," he said.

A few minutes later, they came along a narrow garden path to the bungalow's dark side entrance. There was to be no indication tonight that the bungalow had occupants. Halder unlocked the door quietly, and after Kilby had slipped inside, he stepped in behind her and secured the door.

For an instant, as they moved along the short, lightless passage to the front rooms, a curious sensation touched Halder—a terrifying conviction that some undefinable thing had just gone wrong. And with that, his whole body was suddenly rigid, every muscle locking in mid-motion. He felt momentum topple him slowly forwards; then he was no longer falling but stopped, tilted off-balance at a grotesque angle, suspended in a web of forces he could not feel. Not the slightest sound had come from Kilby, invisible in the blackness ahead of him.

Halder threw all his will and strength into the effort to force motion back into his body. Instead, a wave of cold numbness washed slowly up through him. It welled into his brain, and for a time all thought and sensation ended.

His first new awareness was a feeling of being asleep and not knowing how to wake up. There was no disturbance associated with it. All about was darkness, complete and quiet.

With curious deliberation, Halder's senses now began bringing other things to his attention. He was seated, half reclining, in a deep and comfortable chair, his back against it. He seemed unable to move. His arms were secured in some manner to the chair's armrests; but, beyond that, he also found it impossible to lift his body forwards or, he discovered next, to turn his head in any direction. He was breathing normally, and he could open and shut his eyes and glance about in unchanging darkness. But that was all.

Still with a dreamlike lack of concern, Halder began to ask himself what had happened; and in that instant, with a rush of hot terror, his memory opened out. They had been trapped . . . some undetectable trick of Federation science had waited for them in the bungalow at Lake Senla. He had been taken somewhere else.

What had they done with Kilby?

Immediately, almost as if in answer to his question, the darkness seemed to lighten. But the process was gradual; seconds passed before Halder gained the impression of a very large room of indefinite proportions. Twenty feet away was the rim of a black, circular depression in the flooring. At first, his chair seemed the only piece of furnishing here; then, as the area continued to brighten, Halder became aware of several objects at some distance on his right.

For an instant, he strained violent-

ly to turn his head towards them. That was still impossible, but the objects were there, near the edge of his vision. Again the great room grew lighter, and for seconds Halder could distinguish three armchairs like his own, spaced perhaps twenty feet apart along the rim of the central pit. Each chair had an occupant; in the nearest was Kilby, restored to her natural appearance, motionless, pale face turned forwards, eyes open. Suddenly the light vanished.

Halder sat shocked, realizing he had tried to speak to Kilby and that no sound had come from his throat. Neither speech nor motion was allowed them here. But he didn't doubt that Kilby was awake, or that Santin and Rane Rellis were in the farther chairs, though he hadn't seen either of them clearly. Their captors had given them a brief glimpse of one another, perhaps to let them know all had been caught. Then, as the light disappeared, Halder's glance had shifted for an instant to his right hand lying on the armrest—long enough to see that the dark tinge was gone from his skin, as it was from Kilby's, that he, too, had been deprived of the organisms which disguised him.

And that, his studies in Draise had showed clearly, was something the Federation's science would be a century away from knowing how to do unless it learned about Kalechi's deadly skills.

Once more, it was almost as if the thought were being given an answer. In the darkness of the room a bright image appeared, three-dimensional, not quite a sphere in form, tiger-striped in orange and black, balanced on a broad, bifurcated swimming tail. Stalked eyes protruded from the top of the sphere; their slit pupils seemed to be staring directly at Halder. Down both sides ran a row of ropy arms.

Simultaneously with the appearance of this projection, a man's voice began to speak, not loudly but distinctly. Dreamlike again, the voice seemed to have no specific source, as if it were coming from every direction at once; and a numbing conviction arose in Halder that their minds were being destroyed in this room, that a methodical dissecting process had begun which would continue move by move and hour by hour until the Federation's scientists were satisfied that no further scraps of information could be drained from the prisoners. The investigation might be completely impersonal; but the fact that they were being ignored here as sentient beings, were not permitted to argue their case or offer an explanation, seemed more chilling than deliberate brutality. And yet, Halder told himself, he couldn't really blame anyone for the situation they were in. The Kalechi group represented an urgent and terrible threat. The Federation could not afford to make any mistakes in dealing with it.

"This image," the voice was saying, "represents a Great Satog, the oxygen-breathing, water-dwelling native of the world of Kalechi. There are numerous type-variations of the spe-

cies. Shown here is the dominant form. It is highly intelligent; approximately a third of a Satog's body space is occupied by its brain.

"Kalechi's civilization is based on an understanding of biological processes and the means of their manipulation which is well in advance of our own. This specialized interest appears to have developed from the Satogs' genetic instability, a factor which they have learned to control and to use to their advantage. At present, they have established themselves on at least a dozen other worlds, existing on each in a modified form which is completely adapted to the new environment.

"Our occasional contacts with Kalechi and its colonies during the past two centuries have been superficially friendly, but it appears now that the Great Satogs have regarded our technological and numerical superiority with alarm and have cast about for a method to destroy the Federation without risk to themselves. A weapon was on hand—their great skill and experience in altering genetic patterns in established life forms to produce desired changes. They devised the plan of distributing Kalechi agents secretly throughout the Federation. These were to develop and store specific strains of primitive organisms which, at an indicated later date, would sweep our major worlds simultaneously with an unparalleled storm of plagues.

"The most audacious part of the Kalechi scheme follows. Ninety-two years ago, a Federation survey ship disappeared in that sector of the galaxy. Aboard it was a man named Ohl Cantrall, an outstanding scientist of the period. We know now that this ship was captured by the Great Satogs, and that Cantrall, his staff, and his crew, were subjected to extensive experimentation by them, and eventually were killed.

"The experimentation had been designed to provide Kalechi's master-biologists with models towards which to work. They proposed to utilize the high mutability of their species to develop a Satog type that would be the exact physical counterpart of a human being and could live undetected on our worlds for the several years required to prepare for the attack. They were amazingly successful. Each group of cells in the long series which began moving towards an approximation of the human pattern was developed only far enough to initiate the greatest favorable shift possible at that point in its genetic structure. Cell generations may have followed each other within hours in this manner, for over six decades.

"The goal of the experiment, the last generation issued in Kalechi's laboratories, were Satog copies of embryonic human beings. This stage was comprised of approximately twelve hundred individuals who were now permitted to mature and were schooled individually in complete isolation by Satog teachers. They were indoctrinated with their purpose in life . . . the destruction of our populations . . . and trained fully in the manner of accomplishing it.

"Eventually, each was shipped to a Federation world. Cover identities as obscure Federation citizens with backgrounds and records had been prepared. The final instructions given these agents were simple. They were to do nothing to draw attention to themselves, make no attempt to contact one another. They were to create their stocks of lethal organisms, provide methods of distribution and, on a selected day, three Federation years away, release the floods of death."

The voice paused briefly, went on. "It is a sobering reflection that this plan—an attack by a comparatively minor race with one specialized skill on the greatest human civilization in history—might very well have been appallingly successful. But the Great Satogs failed, in part because of the very perfection of their work.

"From the human beings on board Ohl Cantrall's captured survey ship the Satog scientists selected Cantrall himself and two female technicians on his staff as the models to be followed in developing Kalechi's pseudohumanity. In the twelve hundred members of the group sent to the Federation ninety years later, these three identity patterns are recognizable. They appear in varying degrees of combination, but an occasional individual will show only one or the other of the three patterns involved.

"Ohl Cantrall was regarded as a great man in his time, and his identification pattern is on record. That was the detail which first revealed the plot. When three duplicates of that particular pattern—and a considerable number of approximate duplicates—turned up simultaneously in identification banks at widely separated points in the Federation, it aroused more than scientific curiosity. Our security system has learned to look with suspicion on apparent miracles. The unsuspecting 'Cantralls' were located and apprehended at once; the threat to the Federation was disclosed; and an intensive though unpublicized search for the scattered group of Kalechi agents began immediately . . ."

The voice paused again.

The Satog image above the pit vanished. A clear light sprang up in the big room. Simultaneously, Halder felt the nightmare immobility draining from him and the sensation of dreamlike unreality fade from his mind. He turned to the right, found Kilby's eyes already on him, saw the Rellis couple sitting beyond her . . . Rane, no longer disguised, looking like a mirror image of Halder.

They were still fastened to their chairs. Halder's gaze shifted back quickly to the center of the room. Where the pit had been, the flooring was now level, carrying a massive, polished table. Behind the table sat a heavily built, white-haired man with a strong face, harsh mouth, in the formal black and gold robes of a Councilman of the Federation.

"I am Councilman Mavig." The voice was the one that had spoken in the dark; it came now from the man at the table. "I am in charge of the

operation against the Kalechi agents, and it is my duty to inform them, after their arrest and examination, of the disposition that must be made of them."

He hesitated, twisting his mouth thoughtfully, almost as if unwilling to continue. "You four have been thoroughly examined," he stated at last. "Most of the work has been done while you were still unconscious. A final check of your emotional reactions was being made throughout the stress situation just ended, in which you listened to a replay of a report on the Kalechi matter. That part is now concluded."

Mavig paused, scowled, cleared his throat. "I find," he went on, "that some aspects of this affair still strain my credulity! More than half of your group have been captured by now; the remainder are at large but under observation. The danger is past. The activities of the Great Satogs of Kalechi will receive our very close scrutiny for generations to come. They shall be given no opportunity to repeat such a trick; nor—after they have been made aware of the measures we are preparing against them—will they feel the slightest inclination to try it.

"Now, as to yourselves. After we had tracked down the first dozen or so of you, a startling pattern began to emerge. You were not following Kalechi's careful instructions. In one way and another—in often very ingenious ways—you were attempting primarily to establish contact with one another. When captured and examined while unconscious by the various interrogation instruments of our psychologists you told us your reasons for doing this."

Councilman Mavig shook his head. "The interrogation machines are supposed to be infallible," he remarked. "Possibly they are. But I am not a psychologist, and for a long time I refused to accept the reports they returned. But still . . ."

He sighed. "Well, as to what is to happen with you. You will be sent to join the previously arrested members of your group, and will remain with them until the last of you is in our hands, has been examined, and . . ."

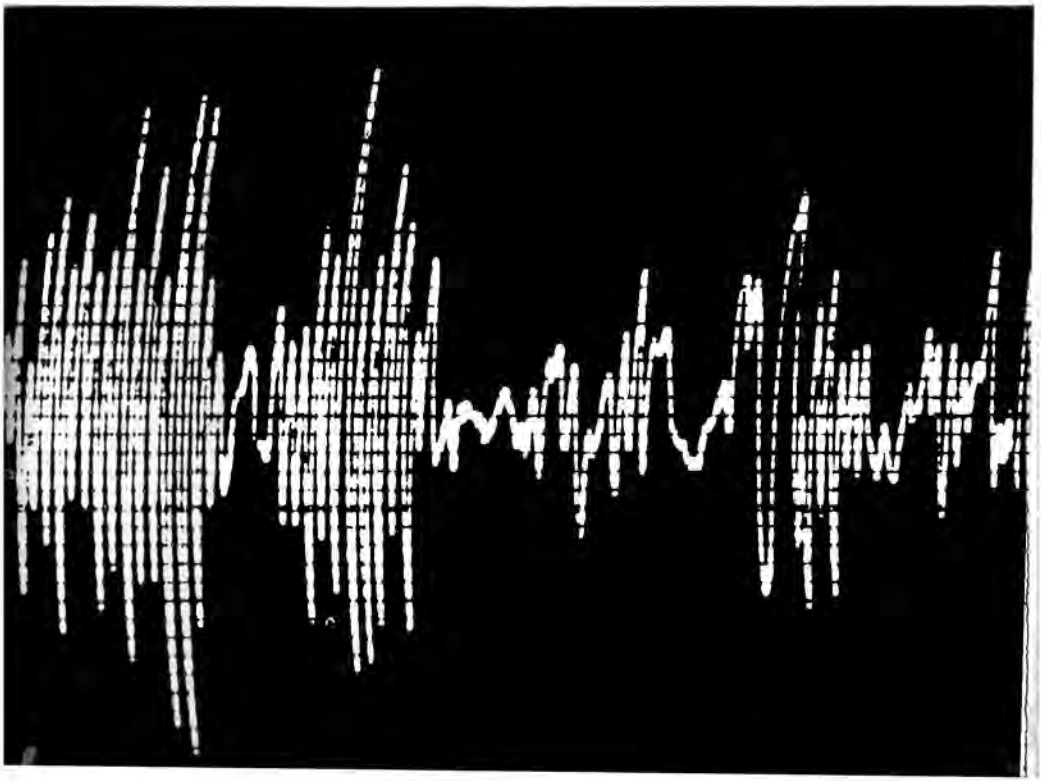
Mavig paused again.

"You see, we can accuse you of no crime!" he said irritably. "As individuals and as a group, your intention from the beginning has been to prevent the crime against the Federation from being committed. The Great Satogs simply did too good a job. You have been given the most searching physical examinations possible. They show uniformly that your genetic pattern is stable, and that in no detail can it be distinguished from a wholly human one of high order.

"You appreciate. I imagine, where that leaves the Federation! When imitation is carried to the point of identity . . ." Federation Councilman Mavig shook his head once more, concluded, "It is utterly absurd, in direct contradiction to everything we have understood to date! You've regarded yourselves as human beings, and believed that your place was among us. And we can only agree." ■

Brain Waves and Thought Patterns

by Eric Holmes, M.D.



Trying to find out what goes on in a brain from the outside is like trying to understand English by listening to a crowd all carrying on private conversations at once. You've got to get in and pick out one conversation at a time—

■ The subtle functions of the brain, those complex processes we call perception, memory, emotion and motivation, have eluded understanding for centuries. Observation of patients with localized brain injury has been the major source of knowledge, and this is essentially a study of what the nervous system can do without, rather than with, the area in question. Most psychologists choose to consider the brain as a "black box," which is to say, you can specify what goes into it—the stimulus—and what comes out of it—the response—while what goes on inside remains a mystery.

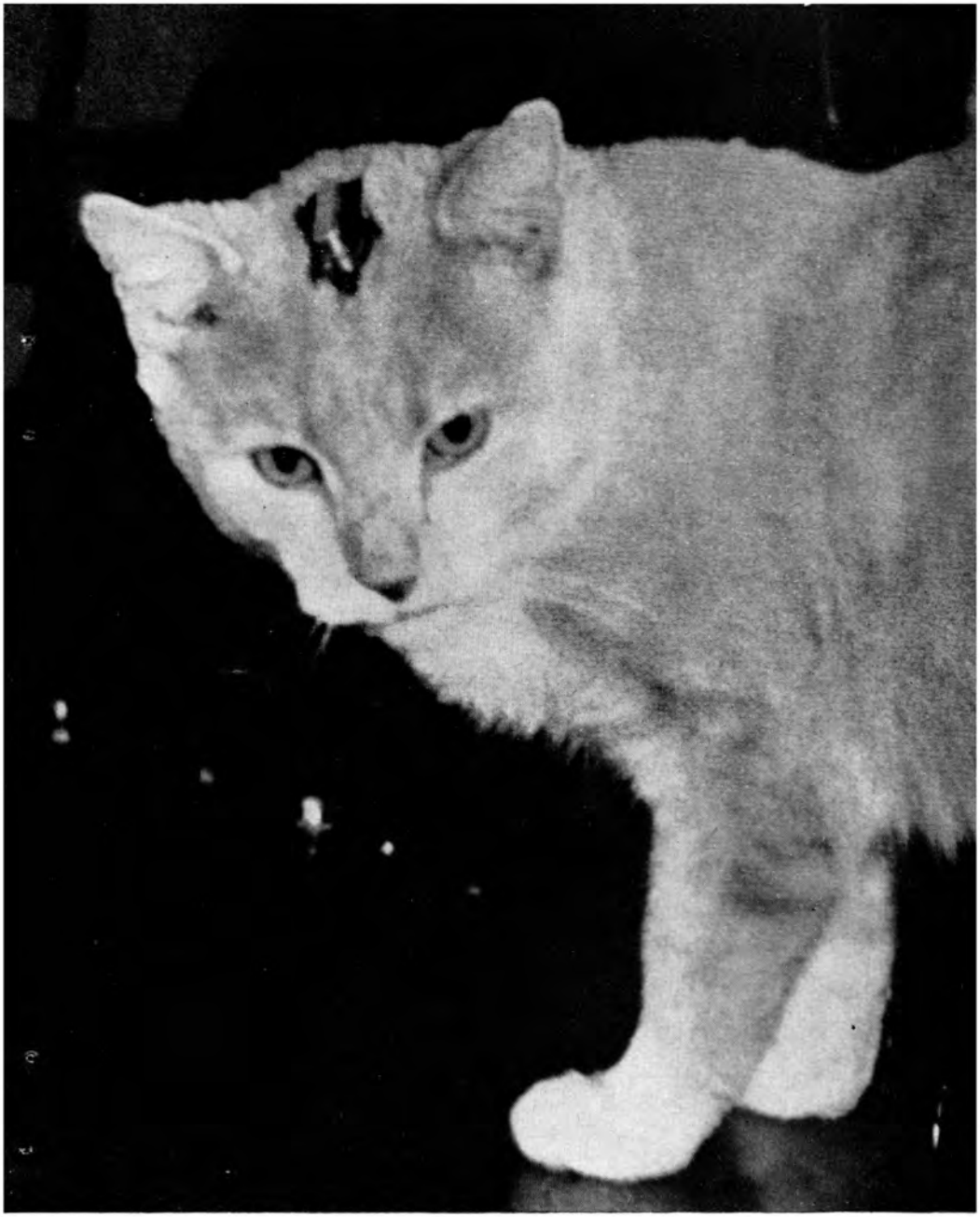
At a recent symposium on new techniques in this field, Dr. David Rioch said: "We have had this black box with us a long time, the stimulus going in one side and the response coming out the other side. Now, however, it is quite clear that the lid has been taken off this box."[1]

[1] Rioch, D. McK., in "Electrical Studies on the Unanesthetized Brain" (New York: Paul B. Hoeber, Inc., 1960), p. 408.

The analogy is not entirely exact, for the recent flood of information from neurophysiological laboratories all over the world comes not from opening up the brain, but from inserting electronic probes within it. It is now possible to place fine wires or tubing through tiny drill holes in the skull, locate them in any given brain structure, and attach them to a plug which is permanently cemented to the top of the head. Electrodes for recording or electrical stimulation, needles for the injection of drugs, these can be left in place indefinitely and the experimental animal plugged into appropriate apparatus through a flexible cable as desired. Implanted electrodes have been successfully used in rats, cats, dogs, dolphins, monkeys and even man.

Recorded on the paper sheets of the electroencephalograph, or the photographs of oscilloscopes, are the microvolt changes in electrical potential from small areas of brain. With special techniques, recordings can be made from individual cells. These brain-wave records can now be compared with the behavior of the alert, free-moving animal in the laboratory. Although some relationships between the anatomical location, frequency, amplitude, et cetera of the brain waves and the behavioral data of activity, past learning, nature of stimuli and intensity of drives can be seen, the records from the living

Fig. 1. "Pinkie," cat with seven cortical electrodes. Metal covered electrical socket protrudes from his scalp.



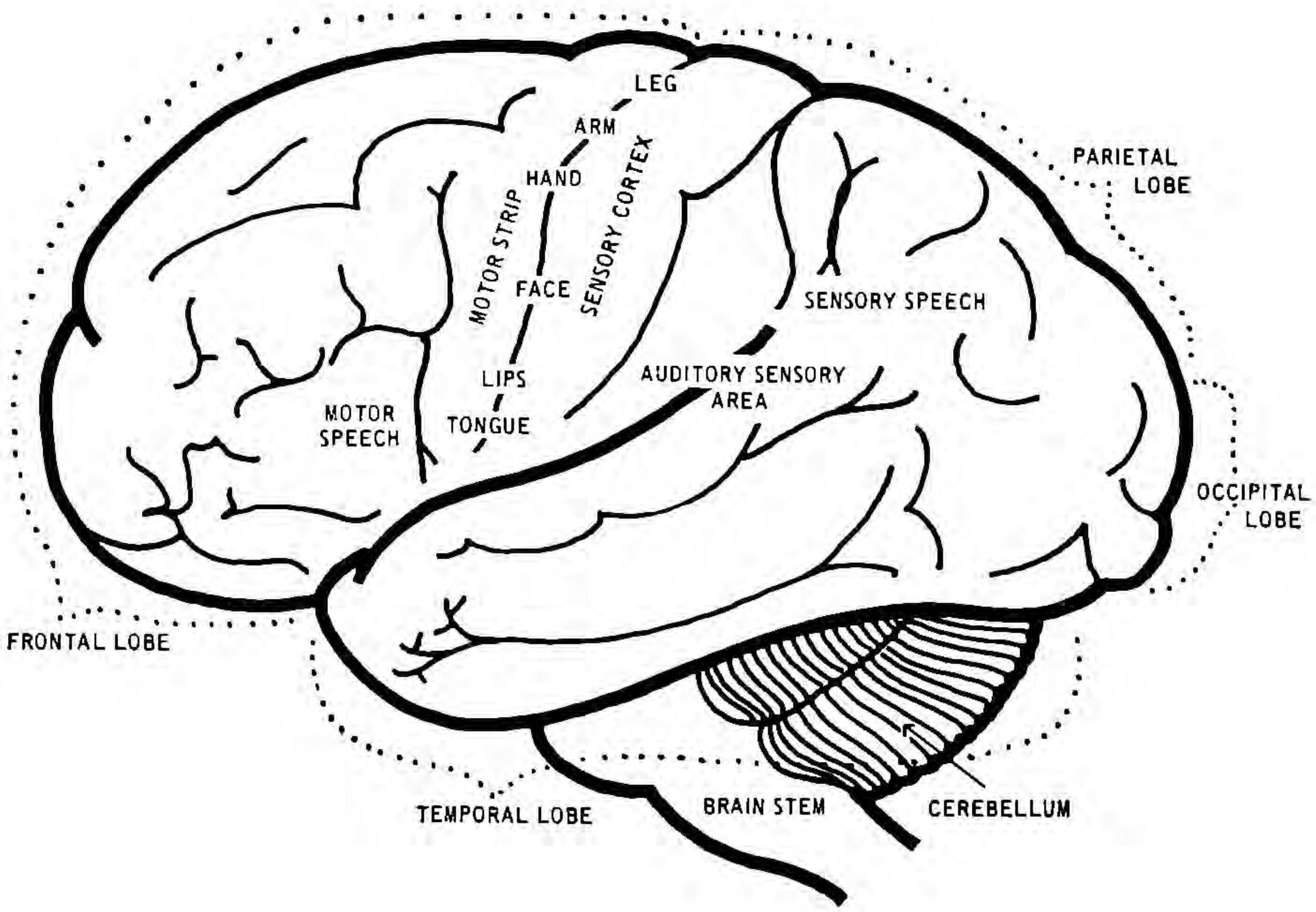
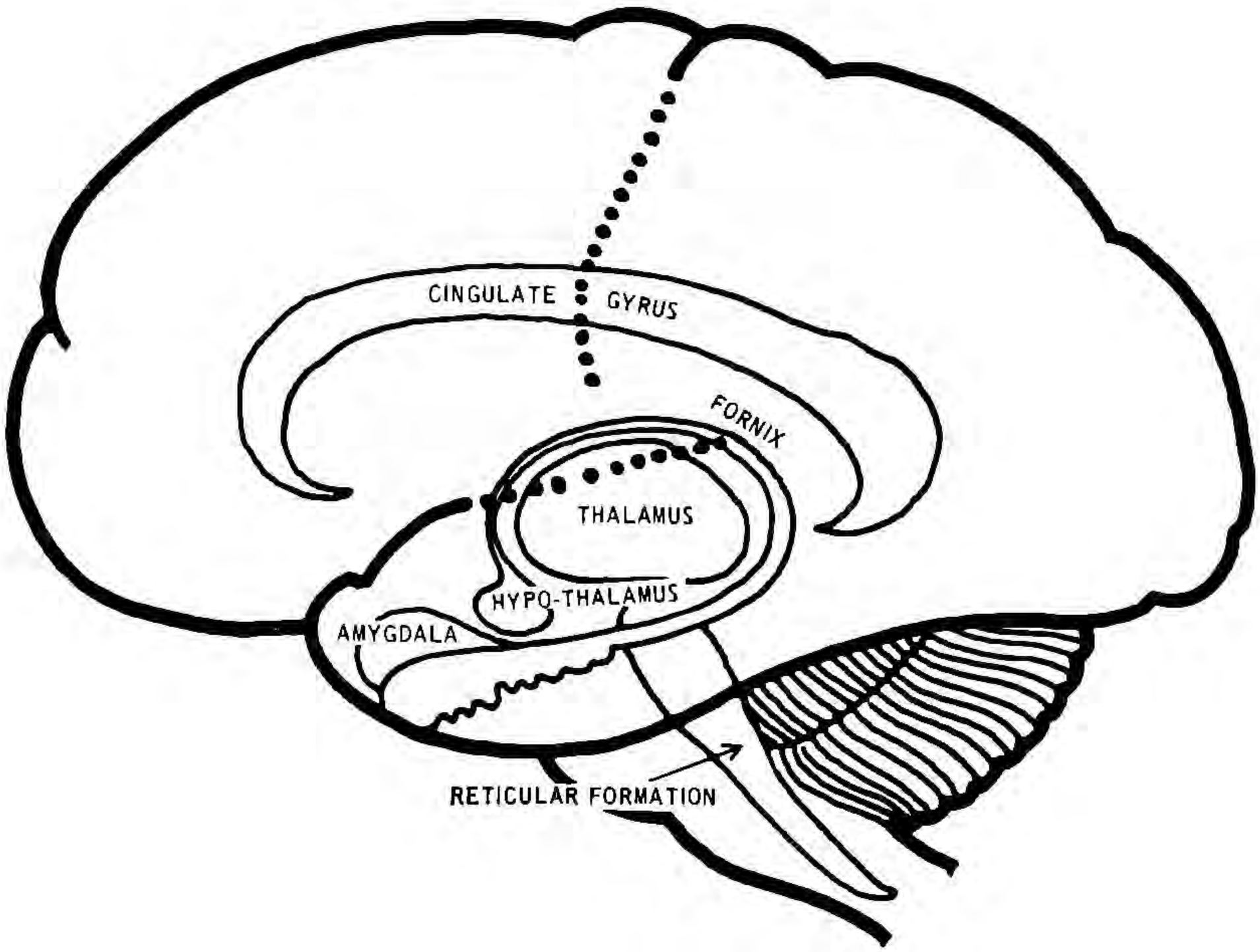


Fig. 2. Sensory and motor areas of the human cortex (brain surface). Stimulation of motor areas produces movements of the opposite side of the body. Stimulation of sensory areas in alert human patients at surgery produces tingling of the skin, buzzing noises or flashes of light. The speech areas are identified as those in which injury in humans produces losses in language ability. The cortical surface is divided into four lobes on the basis of surface markings. The cerebellum is a large structure with a specialized cortex concerned with coordination of movements.

Fig. 3. Some of the structures on the inner surface
and depths of the human brain,
represented as if the cortex were transparent.
Most of the large motor relay areas have been left out.
The hippocampus and amygdala lie in the tip
of the temporal lobe, the thalamus and hypothalamus at the center
of the brain, the cingulate gyrus above them.
The major known function of the thalamus
is to relay sensory messages to the cortex.
The hypothalamus controls reactions of heart, gut,
blood vessels, glands of internal secretion, et cetera.
Some functions for the reticular formation
of the brain stem, the hippocampus and the amygdala
are suggested in the text.
The cingulate gyrus probably provides higher order
integration of internal organs and emotions.
No attempt has been made to portray
the extensive interconnections of all these structures.



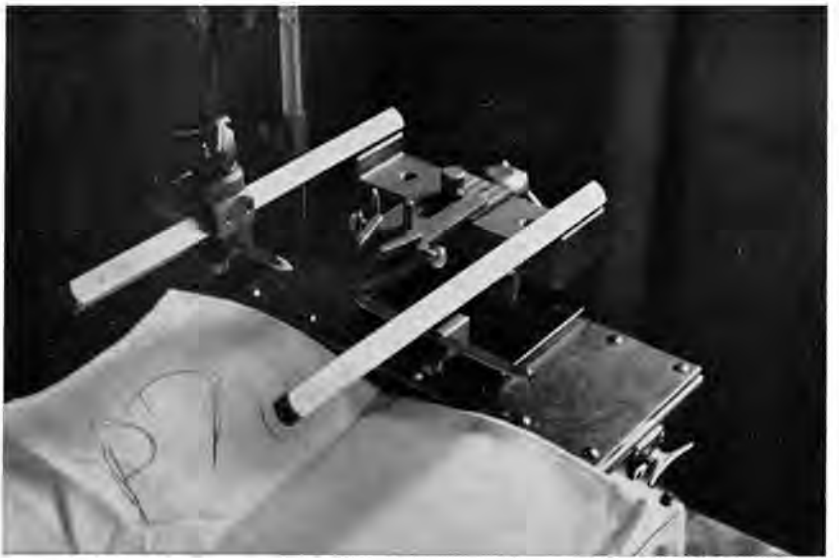


Fig. 4. Sterotaxic surgical instrument for implanting electrodes in the animal brain. The animal is anesthetized and his head securely mounted between the two large guide bars. Using calibrated electrode carriers, one of which is shown attached to the left guide bar, needle electrodes can be lowered into the brain through small drill holes made in the skull. Two electrodes are shown on the towel under the instrument, another is mounted in the carrier.

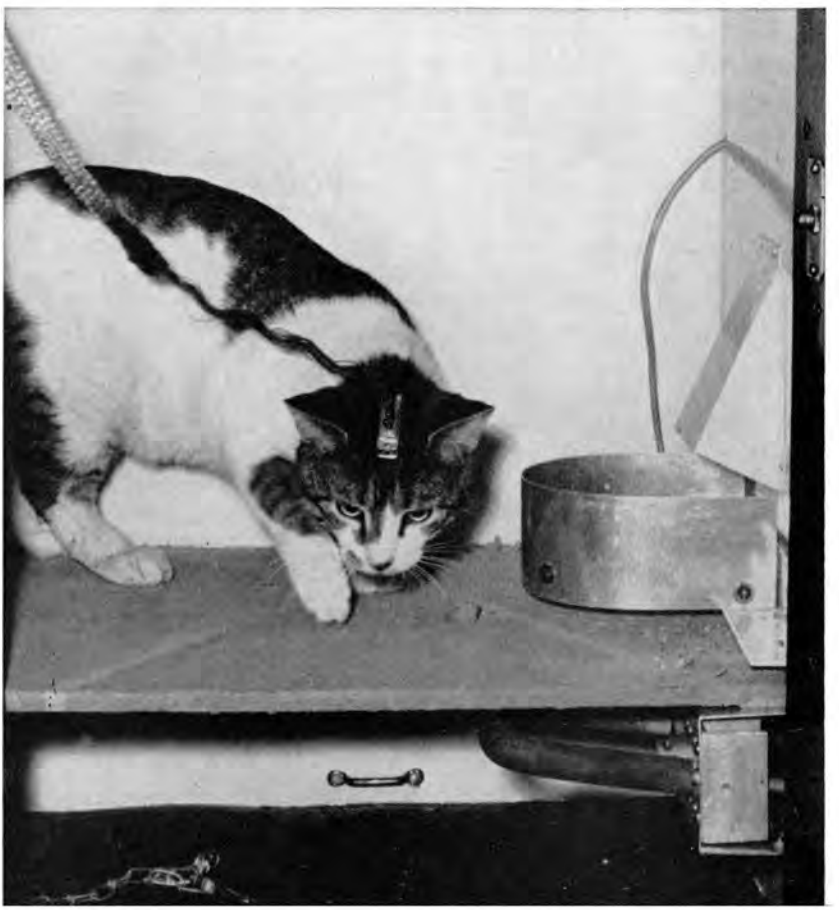
brain are essentially an unciphered code. It is a code we feel certain conveys all the meaningful information necessary for normal function and survival, but the method of decoding and handling this information remains unknown.

Let us start at the cortical layers of cells on the surface of the brain and work down into the even more mysterious depths. Fair maps of most of the cortex have been made. Motor functions and the sensations of touch, vision and hearing are located in separate areas (Figure 1). In the sensory cortex an appropriate stimulus to the eye, ear or skin produces a sharp spikelike change in electrical activity. This change is probably due to the spread of the arriving impulses in the branching receiving fibers—dendrites—of the cortical cells. Recording from implanted electrodes resting on the auditory receiving area of the cat, a single click from a loud-speaker produces a brief spike in the brain wave. (Most of the neurophysiology of the brain is based on the cat. An adult cat's brain is of fairly standard size and this makes the location of electrodes through the skull more accurate. The dog brain varies too much from one individual to another, the laboratory rat

is too small and monkeys are expensive and difficult to keep in good health. As a result, more is known about the function of the nervous system of the cat than of any other animal, including man.) If the click is repeated over and over in the cat's ear, he will cease to pay attention to it and the electrical response of the brain may decrease in size. Now let the click signal an annoying air puff to the face, something no fastidious feline will tolerate. The height of the spike jumps up thirty per cent and stays until the animal is taught that the air puff is not to follow the click. Brain wave response to a stimulus depends in part on its "meaning."[2]

If recordings are made from the visual receiving area of the cortex, a

Fig. 5. Cat in recording and test chamber (converted ice box) showing the shielded cable attached to the plug in his head. Food pan to animal's left. Signal lights and loud-speakers mounted in the roof of the box and cannot be seen.



noise like a click or a tone will produce no change in the electroencephalogram. These are auditory stimuli and responses to them will occur only in the auditory areas of the cortex. A flickering light, however, produces a rhythmical wave in the visual areas of approximately the same frequency as the flicker. If a tone is now made a signal of the start of the flicker, a time will come when the visual area will react to the auditory stimulus of the tone alone—it will flicker. More than that, the cat's visual cortex will flicker at the right frequency when the animal is merely put into the testing chamber.[3] Here we see not just a change in a response but a new learned response that looks very much like a memory trace. If the training of tone followed by flickering light is continued the tone will lose its newly acquired ability to make the visual cortex flicker, but this may be because the two signals have no real significance to the animal.

Below the cortex lie a series of complexly interrelated brain areas common to all vertebrate animals—even those like fish and reptiles with little or no cortex at all. These clusters of nerve cells (Figure 2) may play a vital role in learning and perception. Certain electroencephalographic patterns in the hippocampus and amygdala are related to the drives of the animal—his degree of hunger or thirst—or to the meaning of the sights, sounds, and smells around him. The reticular formation, a diffuse network of cells at the base of the brain, regulates attention and alertness of the nervous system. Activity here determines whether the animal is awake or asleep, the state of his spinal reflexes, the activity of the brain cortex, and, probably, what messages are transmitted along all sensory channels.

If recordings are taken from the first group of sensory cells relaying auditory impulses to the cortex, again a brain wave spike to a loud click will be seen. This recording is from implanted electrodes in the brain stem of the cat. Show the cat a mouse, however, and the click response vanishes from the auditory system while attention is focused on this more interesting object.[4] The screening out of nonessential information occurs not at the cortex, but far downstream, perhaps, in some cases, at the sense organ itself. It is obvious that we ignore most of the sensory messages that bombard us daily, but only recently has this elaborate censorship system been revealed in any detail. Again the electrical trace of a stimulus changes according to what it means to the animal.

The perception of any set of stimuli probably involves patterns of electrical activity in a great many

---

[2] Marsh, J. T., McCarthy, D. A., Sheatz, G. and Galambos, R. "Amplitude Changes in Evoked Auditory Potentials During Habituation and Conditioning." *Electroenceph. Clin. Neurophysiol.* (1961) 13:224-234.

[3] Morrell, F., "Electrophysiological Contributions to Neural Basis of Learning." *Physiological Reviews* (1961), 41:3.

[4] Hernandez-Peon, R. Scherrer, H., and Jouvet, M., "Modification of Electric Activity in Cochlear Nucleus during attention in unanesthetized Cats." *Science* (1956), 123:331.

SYSTEMS
SYSTEMS
SYSTEMS
SYSTEMS
SYSTEMS
SYSTEMS
SYSTEMS ANALYSIS
ANALYSIS
ANALYSIS
ANALYSIS
ANALYSIS
ANALYSIS
ANALYSIS

Have you defined your requirements for professional growth?

The development of total systems for vital government projects offers opportunities to apply analytical skills and systems knowledge in complex and challenging tasks. This development also offers professional association with senior analysts, mathematicians, systems engineers, and with senior professionals in such fields as astronomy, human factors, the space sciences and related areas.

The Systems Development Department has current contracted projects, studies and related programs for **Systems** involved in . . .

Administration · Command · Space · Communications · Intelligence

If your background and experience apply to these general topics, IBM Systems Development has a professional assignment for you to consider:

Administrative Systems Techniques
Command Systems Specifications
Communications Analysis
Data Flow Analysis
Operations Research
Programming Specifications
Real-Time Operational Analysis
Sampled Data Systems

Candidates with backgrounds and degrees in engineering, mathematics or systems-related fields are preferred. IBM offers extensive educational programs, liberal company-paid benefits, relocation allowances, salaries commensurate with ability. Advancement is based on merit. IBM is an Equal Opportunity Employer.

Qualified applicants are invited to explore the career opportunities with Systems Development by writing to: **John V. Croker, Dept. 742T, IBM Systems Development Dept., 7220 Wisconsin Avenue, Bethesda 12, Maryland.**

IBM

CLICK STIMULUS

FOOD

ONE SEC.

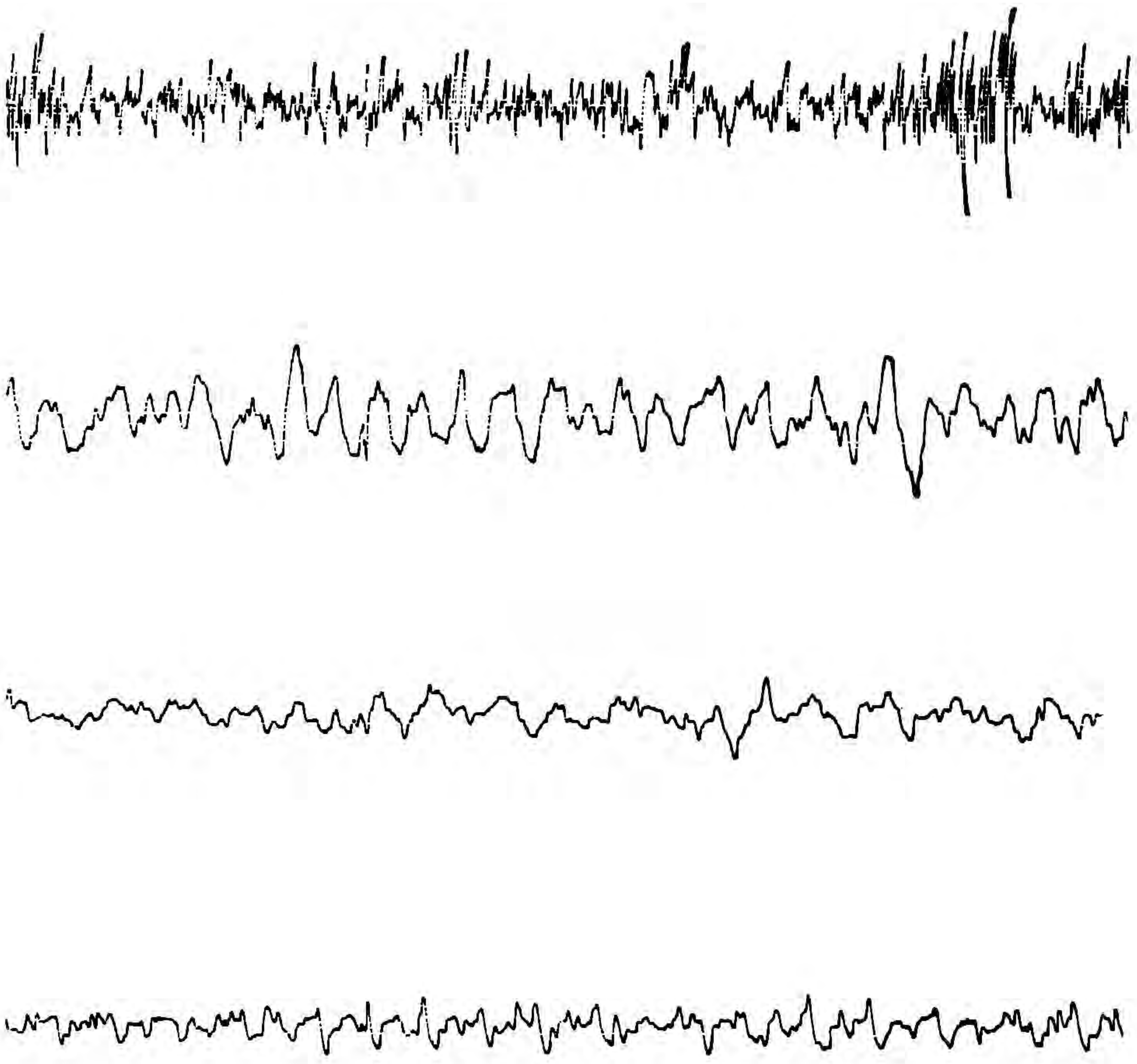
AMYGDALA

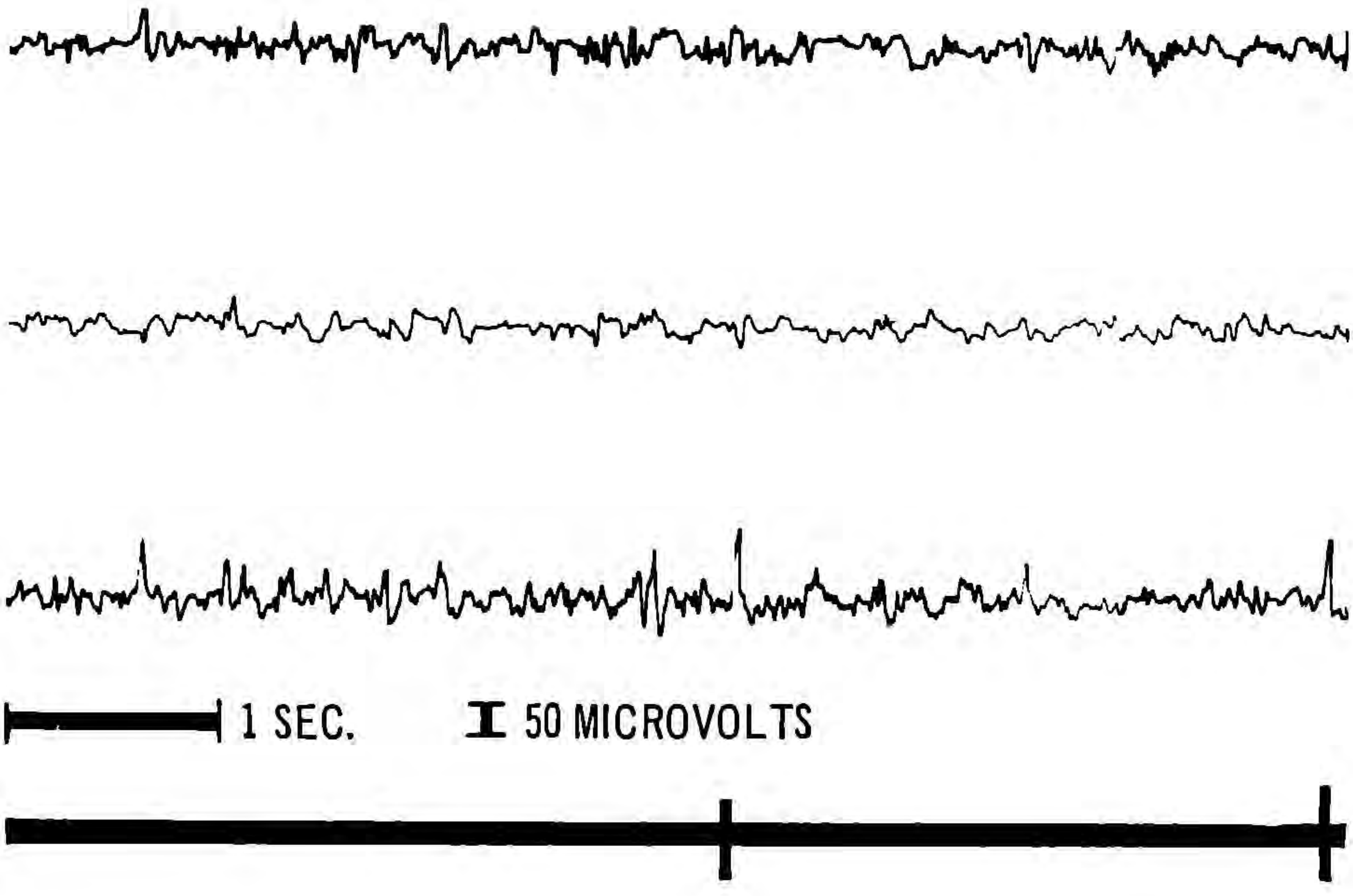
HIPPOCAMPUS 1

HIPPOCAMPUS 2

AUDITORY CORTEX

Fig. 6. Sample electroencephalographic record from subcortical structures and auditory cortex of a cat. (Reproduced courtesy of Frederick Gault and Gaylord Ellison of Yale University.) The cat has been trained with a series of clicks, after which he gets a small amount of milk. The auditory cortex gives a large response to the first click, then a smaller one to the subsequent clicks. The hippocampus shows large click responses. In the upper hippocampal record notice the build up of slow (4 to 6 per second) waves during the test. The amygdala produces marked bursts of 40-cycle waves, usually seen in conditions of hunger or thirst, and these drop out after the food is delivered.

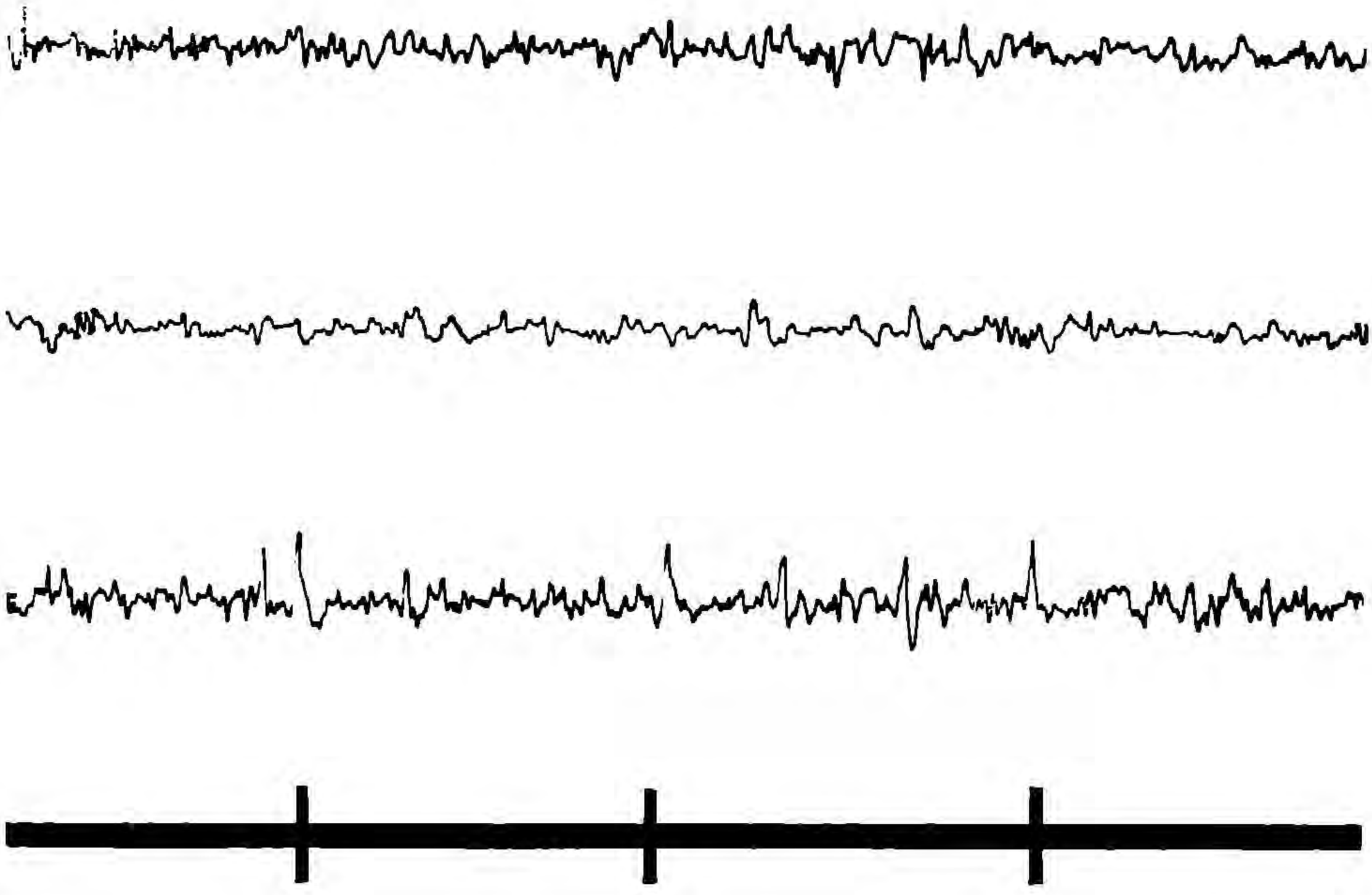




different brain structures. In a unique series of experiments, Drs. Killam and John tried to get at this by using the flickering light effect. They recorded from a number of cortical and subcortical areas with implanted electrodes in cats. The first time the flickering light came on there were flicker-frequency responses all through the brain. After many repetitions these "labeled responses" dropped out and only the visual receiving areas showed flicker. Now the light was made a signal to jump over a barrier to the other side of the cage, avoiding a shock to the feet. Immediately the flicker frequency came back in the thalamus, hippocampus and reticular formation and remained until the correct response was learned. Then it again disappeared. During early training the animals sometimes jumped beween trials while the light was off—at these times the appropriate rhythm would first appear in their brains![5]

Finally, one cat was taught to jump to avoid shock if the flicker were six cycles per second, to press a lever for milk if it were ten. After he had learned this distinction a dramatic series of events could be seen in his brain as the flickering light came on. The visual system would follow the light frequency but the thalamus and reticular formation would pulse at six cycles, then alternate between

[5] John, E. R., and Killam, K. F., "Electrophysiological Correlates of Avoidance Conditioning in the Cat." *Journal of Pharmacology and Experimental Therapeutics* (1959), 125:3.



six and ten. Only when all structures were going at approximately the same frequency would the correct response be given.[6] Here it is easy to imagine the cat comparing the incoming signal with the old memory trace: "Six? Ten? Shock or food?"

If the pattern of brain wave does indeed represent the perception and meaning of a stimulus, then with correct electrode placement it should be possible to "read the animal's mind," tell what sensory system was stimulated, the exact nature of the stimulus, what the emotional reaction to the message was, what the subsequent behavior would be. Not only should we be able to "read out" information but we should, by stimulating the brain through the same electrodes, be able to put information directly into the brain. Nieder and Neff trained cats to lift a paw to a sound, then found they would lift the same paw to electrical stimulation of auditory areas of the brain.[7]

Fig. 7 Electroencephalogram from cat Pinkie shown in photo—three areas of left cortex. Bottom trace shows sharp spike in auditory cortex with repetition of click—indicated by marker on next to bottom line.

[6] John, E. R., and Killam, K. F., "Electrophysiological Correlates of Differential Approach-Avoidance Conditioning in Cats." *Journal of Nervous and Mental Disease* (1960), 131:3.

[7] Nieder, P. C., and Neff, W. D., "Auditory Information from Subcortical Electrical Stimulation in Cats." *Science* (1961), 133:3457.

In addition, if a meaningful pattern of impulses can be recorded from the depths of one brain it should cause meaningful information when used to stimulate another brain. This experiment has not yet been done, but undoubtedly will be tried in the near future. What this amounts to, of course, is nothing less than telepathy!

It may be that the brain wave patterns of one individual will be too specific to be informative to anyone else. Experience with an unusual group of human patients, however, indicates that this need not be the

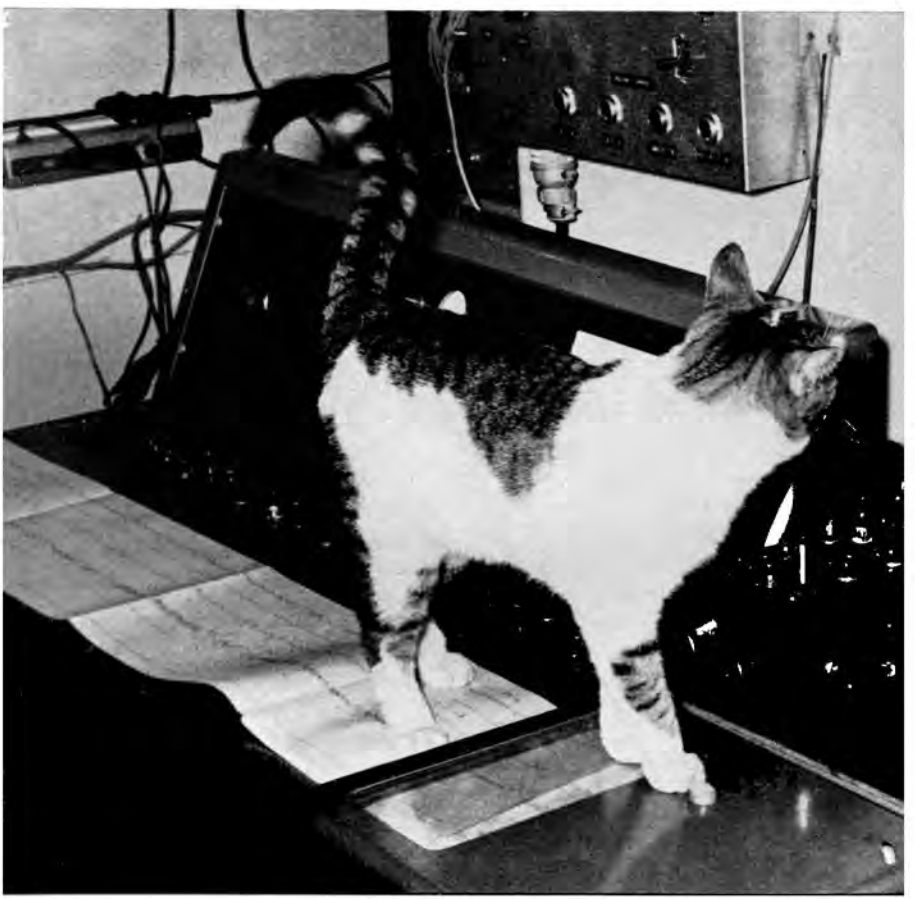
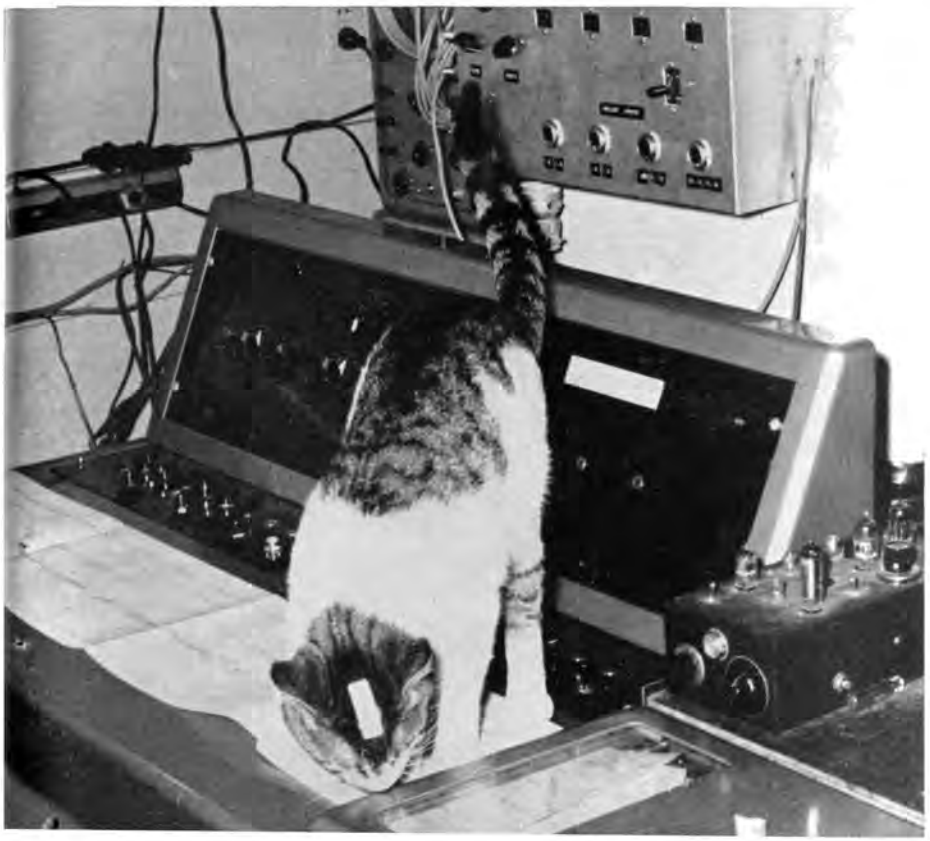


Fig. 8 Electroencephalographic recording machine with a cat standing on a sample of his own brain waves. The small metal plug can be seen on the top of the animal's head. Records are made with electrically controlled pens on a continuous sheet of paper moving through the machine at a constant speed.

case. Stimulation of one point with a standard frequency can produce very elaborate and bizarre effects. The brain has no perception of pain or injury to itself. It is therefore possible to operate on the brain under local anesthesia with the patient completely awake and co-operative. Electrical stimulation of the human brain in such cases may give the neurosurgeon invaluable information—if he is searching for a small area of injury producing epileptic convulsions.

In a rare type of convulsive disorder called "temporal lobe epilepsy," because of the location of the disease causing it, the patient's fit may begin with an hallucination or peculiar emotional state. When the cortex of such a person is stimulated electrically at operation he may have organized sensory perceptions.

Here is a seventeen-year-old boy who has had seizures for two years. At operation the left temporal lobe was explored with an electrical stimulator (four volts, sixty cycle current). At one point the boy said he "felt six years old again." Stimulation was repeated with the same ef-



fect. The electrode was moved. The patient said, "I have a sensation like I was building a jet-racer." Three years before the operation he had actually built a racer. During the electrically evoked memory the patient knew he was in the operating room and remained fully oriented. After removal of the diseased temporal lobe his memory for the racer incident was unimpaired.[8]

Here is another example: During exploration of the right temporal lobe this woman's brain was stimulated—one volt, sixty cycle current. She said, "I just heard one of my children—Frank—speaking." She added that she also heard "neighborhood noises."

"When questioned about it ten days later she recalled that she had heard 'Frankie and the neighborhood noises.' She was asked whether it seemed to her to be a memory and she replied, 'Oh no, it seemed more real than that.' She thought she was looking into the yard and saw as well as heard the boy. She knew she was still in the operating room."[9]

This strange story can be matched by any neurosurgeon treating patients with temporal lobe seizures. Usually the patient can recall later when the electrically elicited vision actually occurred. It is a real memory but often one he has not thought of for years. When the electrode is applied to the right point on the cortex, however, it unfolds the hallucinatory vividness. Note, also that the stimulation used here is a few volts of sixty cycle current—the same frequency to be found in any wall socket! (Enough voltage of alternating current will produce a convulsion—in any person—the basis of electroshock therapy. The voltage here is carefully controlled by the surgeon.) If this unphysiological stimulus can be so effective under these special conditions, what might be produced by more elaborate patterned stimulation of many points within the brain?

Implanted electrodes have been used in human patients, but only in cases of disease where some benefit might be expected. They are used for recording from a suspected epileptic focus before attempting to destroy it, and recordings are often made incidentally when the purpose of surgery is localized destruction in the newer operations for Parkinsonian tremor. Stimulation below the cortex has been attempted in psychotic patients to alter their emotional outlook with some success, but with results of brief duration. What is required is an intensive study of brain waves and behavior in experimental animals to enable us to crack the information coding system of the brain. This will probably involve considerable revision in the way we categorize mental phenomena. In the cat hippocampus, for example, a six-cycle per second rhythm means "get ready to move out" whether the situation demands

---

[8] Baldwin, M., "Electrical Stimulation of the Mesial Temporal Region," in *Electrical Studies on the Unanesthetized Brain* (New York: Paul B. Hoeber, Inc., 1960), p. 167.

[9] Penfield, W., and Jasper, H., *Epilepsy and the Functional Anatomy of the Human Brain* (Boston: Little, Brown and Company, 1954), p. 137.

escape from a painful shock or approach to a food pan.[10, 11] Contemporary psychology would consider these fundamentally different "avoidance" and "approach" responses. Pavlovian theory would emphasize that one is a "defensive" and the other an "alimentary" reflex. In neuropsychology there may be little difference between the two.

The effect of a telepathic minority in modern society has been the subject of science-fiction speculation for years. Some of the problems of telepaths of a "naturally occurring" variety are portrayed in A. E. Van Vogt's "Slan," Henry Kuttner's "Baldy Series," and Alfred Bester's "Demolished Man."

Implanted electrodes, however, will involve elaborate equipment and technically tricky neurosurgery, not unattended by risk. One obvious application would be in psychotherapy. What a boon to the therapist to experience his patient's emotional reactions, or to impress other patterns into his brain! This use alone has vast potential for good and evil.

In human and international relations a "reading" of motivational and emotional state, a foolproof lie detector in which the questioner could sense the most personal reactions of the speaker, might avoid some of the disorders which hang over us.

It is in the field of co-operative enterprise, however, that the biggest potential seems to lie. In an age of increasing specialization and "team research," how much simpler to have the experience and ability of one's colleagues flash through the mind with the vividness the temporal lobe patient experiences on the operating table! With an archive of human brain waves on tape, with automated stimulation control, direct contact with the minds of others becomes a simple matter of being "plugged in" to the proper stimulus outlet.

Such a prospect, every man linked to his brother man around the globe through an electrical fixture on the top of his head, sounds like the "group mind" proposed for a giant ant hill. Ants, however, do not communicate except by elaborate sensory cues. What a true group mind of human brains in electrical parallel might accomplish can scarcely be dreamed. Attempts to understand the brain-wave patterns of animals and human patients continue, however, and the techniques may be at hand sooner than we imagine. The opening of the "black box," with subsequent understanding of the brain which Dr. Rioch suggests, promises to open a Pandora's box of unexpected marvels and possible horrors. Mind reading and mind controls are no longer wishful fantasies, they are immediate possibilities. In a world in which the race appears to be engaged in an all-out struggle to survive, our greatest asset is the human brain. It is high time that an intensive scientific study was made of its function. ■

---

[10] Adey, W. R., Dunlop, C. W., and Hendrix, M. S., "Hippocampal Slow Waves." (1960) *A.M.A. Archives of Neurology*, 3:74.

[11] Holmes, J. E., and Adey, W. R., "Electrical Activity of the Entorhinal Cortex During Conditioned Behavior." (1960) *American Journal of Physiology*, 199:5.

Border, Breed nor Birth

Part I of Two. Kipling said those things
didn't count when two strong men stood face to face.
But...do they count when
two strong ideologies stand face to face...?

by Mack Reynolds

Illustrated by Schoenherr

I

■ El Hassan, would-be tyrant of all North Africa, was on the run.

His followers at this point numbered six, one of whom was a wisp of a twenty-four year old girl. Arrayed against him and his dream, he knew, was the combined power of the world in the form of the Reunited Nations, and, in addition, such individual powers as the United States of the Americas, the Soviet Complex, Common Europe, the French Community, the British Commonwealth and the Arab Union, working both together and unilaterally.

Immediate survival depended upon getting into the Great Erg of the Sahara where even the greatest powers the world had ever developed would have their work cut out locating El Hassan and his people.

Bey-ag-Akhamouk who was riding next to Elmer Allen in the lead air cushion hover-lorry, held a hand high. Both of the solar powered desert vehicles ground to a halt.

Homer Crawford vaulted out of the seat of the second lorry before it had settled to the sand. "What's up, Bey?" he called.

Bey pointed to the south and west. They were in the vicinity of Tessalit, in what was once known as French Sudan, and immediately to the south of Algeria. They were deliberately avoiding what little existed in this area in the way of trails, the Tanezrouft route which crossed the Sahara from Colomb-Béchar to Gao, on the Niger, was some fifty miles to the west.

Homer Crawford stared up into the sky in the direction Bey pointed and his face went wan.

The others were piling out of the vehicles.

"What is it?" Isobel Cunningham said, squinting and trying to catch what the others had already spotted.

"Aircraft," Bey growled. "A rocket-plane."

"Which means the military in this part of the world," Homer said.

The rest of them looked to him for instructions, but Bey suddenly took over. He said to Homer, "You better get on over beneath that outcropping of rock. The rest of us will handle this."

Homer looked at him.

Bey said, flatly, "If one of the rest of us gets it, or even if all of us do, the El Hassan movement goes on. But if something happens to you, the movement dies. We've already taken our stand and too much is at stake to risk your life."

Homer Crawford opened his mouth to protest, then closed it. He reached inside the solar-powered lorry and fetched forth a Tommy-Noiseless and started for the rock outcropping at a trot. Having made his decision, he wasn't going to cramp Bey-ag-Akhamouk's style with needless palaver.

Isobel Cunningham, Cliff Jackson, Elmer Allen and Kenny Ballalou gathered around the tall, American educated Tuareg.

"What's the plan?" Elmer said. Either he or Kenny Ballalou could have taken over as competently, but they were as capable of taking orders as giving them, a desirable trait in fighting men.

Bey was still staring at the oncoming speck. He growled, "We can't even hope he hasn't seen the pillars of sand and dust these vehicles throw up. He's spotted us all right. And we've got to figure he's looking for us, even though we can hope he's not."

The side of his mouth began to tic, characteristically. "He'll make three passes. The first one high, as an initial check. The second time he'll come in low just to make sure. The third pass and he'll clobber us."

The aircraft was coming on, high but nearer now.

"So," Elmer said reasonably, "we either get him the second pass he makes, or we've had it." The young Jamaican's lips were thinned back over his excellent teeth, as always when he went into combat.

"That's it," Bey agreed. "Kenny, you and Cliff get the flac rifle, and have it handy in the back of the second truck. Be sure he doesn't see it on this first pass. Elmer, get on the radio and check anything he sends."

Kenny Ballalou and the hulking Cliff Jackson ran to carry out orders.

Isobel said, "Got an extra gun for me?"

Bey scowled at her. "You better get over there with Homer where it's safer."

She said evenly, "I've always considered myself a pacifist, but when somebody starts shooting at me, I forget about it and am inclined to shoot back."

"I haven't got time to argue with you," Bey said. "There aren't any extra guns except handguns and they'd be useless." As he spoke, he pulled his own Tommy-Noiseless from its scabbard on the front door of the air cushion lorry, and checked its clip of two hundred .10 caliber ultra-high velocity rounds. He flicked the selector to the explosive side of the clip.

The plane was roaring in on what would be its first pass, if Bey had guessed correctly. If he had guessed incorrectly, this might be the end. A charge of neopalm would fry everything for a quarter of a mile around, or the craft might even be equipped with a mini-fission bomb. In this area a minor nuclear explosion would probably go undetected.

Bey yelled, "Don't anybody even try to fire at him at this range. He'll be back. It takes half the sky to turn around in with that crate, but he'll be back, lower next time."

Cliff Jackson said cheerlessly, "Maybe he's just looking for us. He won't necessarily take a crack at us."

Bey grunted. "Elmer?"

"Nothing on the radio," Elmer said. "If he was just scouting us out, he'd report to his base. But if his orders are to clobber us, then he wouldn't put it on the air."

The plane was turning in the sky, coming back.

Cliff argued, "Well, we can't fire unless we know if he's just hunting us out, or trying to do us in."

Elmer said patiently, "For just finding us, that first pass would be all he needed. He could radio back that he'd found us. But if he comes in again, he's looking for trouble."

"Here he comes!" Bey yelled. "Kenny-Cliff . . . the rifle!"

Isobel suddenly dashed out into the sands a dozen yards or so from the vehicles and began running around and around in a circle as though demented.

Bey stared at her. "Get back here," he roared. "Under one of the trucks!"

She ignored him.

The rocketplane was coming in, low and obviously as slow as the pilot could retard its speed.

The flac rifle began jumping and tracers reached out from it—inaccurately. The Tommy-Noiseless automatics in the hands of Bey and Elmer Allen gave their silenced *flic flic flic* sounds, equally ineffective.

On the ultra-stubby wings of the fast moving aircraft, a row of brilliant cherries flickered and a row of explosive shells plowed across the desert, digging twin ditches, miraculously going between the air cushion lorries but missing both. It was upon them, over and gone, before the men on the ground could turn to fire after.

Elmer Allen muttered an obscenity under his breath.

Cliff Jackson looked around in desperation. "What can we do now? He won't come close enough for us to even fire at him, next time."

Bey said nothing. Isobel had collapsed into the sand. Elmer Allen looked over at her. "Nice try, Isobel," he said. "I think he came in lower and slower than he would have otherwise—trying to see what the devil it was you were doing."

She shrugged, hopelessly.

"Hey!" Kenny Ballalou pointed.

The rocketcraft was wobbling, shuddering, in the sky. Suddenly it burst into a black cloud of fire and smoke and explosion.

At the same moment, Homer Crawford got up from the sand dune behind which he'd stationed himself and plowed awkwardly through the sand toward them.

Bey glared at him.

Homer shrugged and said, "I checked the way he came in the first time and figured he'd repeat the run. Then I got behind that dune there and faced in the other direction and started firing where I *thought* he'd be, a few seconds before he came over. He evidently ran right into it."

Bey said indignantly, "Look, wise guy, you're no longer the leader of a five-man Reunited Nations African Development Project team. Then, you were expendable. Now, you're El Hassan. You give the orders. Other people are expendable."

Homer Crawford grinned at him, somewhat ruefully and held up his hands as though in supplication. "Listen to the man, is that any way to talk to El Hassan?"

Elmer Allen said worriedly, "He's right, though, Homer. You shouldn't take chances."

Homer Crawford went serious. "Actually, none of us should, if we can avoid it. In a way, El Hassan isn't one person. It's this team here, and Jake Armstrong, who by this time I hope is on his way to the States."

Bey was shaking his head in stubborn determination. "No," he said. "I'm not sure that you comprehend this yourself, Homer, but you're Number One. You're the symbol, the hero these people are going to follow if we put this thing over. They couldn't understand a sextet leadership. They want a leader, someone to dominate and tell them what to do. A team you need, admittedly, but not so much as the team needs you. Remember Alexander? He had a team starting off with Aristotle for a brain-trust, and Parmenion, one of the greatest generals of all time for his right-hand man. Then he had a group of field men such as Ptolemy, Antipater, Antigonus and Seleucus—not to be rivaled until Napoleon built his team, two thousand years later. And what happened to this super-team when Alexander died?"

Homer looked at him thoughtfully.

Bey wound it up doggedly. "You're our Alexander. Our Caesar. Our Napoleon. So don't go getting yourself killed, damn it. Excuse me, Isobel."

Isobel grinned her pixielike grin. "I agree," she said. "Dammit."

Homer said, "I'm not sure I go all along with you or not. We'll think about it." His voice took a sharper note. "Let's go over and see if there's enough left in that wreckage to give us an idea of who the pilot represented. I can't believe it was a Reunited Nations man, and I'd like to know who, of our potential enemies, dislikes the idea of El Hassan so much that they figure we should all be bumped off before we even get under way."

It had begun—if there is ever a beginning—in Dakar. In the offices of Sven Zetterberg the Swedish head of the Sahara Division of the African Development Project of the Reunited Nations.

Homer Crawford, head of a five-man trouble-shooting team, had reported for orders. In one hand he held them, when he was ushered into the other's presence.

Zetterberg shook hands abruptly, said, "Sit down, Dr. Crawford."

Homer Crawford looked at the secretary who had ushered him in.

Zetterberg said, scowling, "What's the matter?"

"I think I have something to be discussed privately."

The secretary shrugged and turned and left.

Zetterberg, still scowling, resumed his own place behind the desk and said, "Claud Hansen is a trusted Reunited Nations man. What could possibly be so secret . . . ?"

Homer indicated the orders he held. "This assignment. It takes some consideration."

Sven Zetterberg was not a patient man. He said, in irritation, "It should be perfectly clear. This El Hassan we've been hearing so much about.

This mystery man come out of the desert attempting to unify all North America. We want to talk to him."

"Why?" Crawford said.

"Confound it," Zetterberg snapped. "I thought we'd gone into this yesterday. In spite of the complaints that come into this office in regard to your cavalier tactics in carrying out your assignments, you and your team are our most competent operatives. So we've given you the assignment of finding El Hassan."

"I mean, why do you want to talk to him?"

The Swede glared at him for a moment, as though the American was being deliberately dense. "Dr. Crawford," he said, "when the African Development Project was first begun we had high hopes. Seemingly all Reunited Nations members were being motivated by high humanitarian reasons. Our task was to bring all Africa to a level of progress comparable to the advanced nations. It was more than a duty, it was a crying need, a demand. Africa is and has been throughout history a *have-not* continent. While Europe, the Americas, Australia and now even Asia, industrialized and largely conquered man's old socio-economic problems, Africa lagged behind. The reasons were manifold, colonialism, lingering tribal society . . . various others. Now that very lagging has become a potential explosive situation. With the coming of antibiotics and other break-throughs in medicine, the African population is growing with an all but geometric progression. So fast *is* it growing, that what advances were being made did less than keep up the level of per capita gross product. It was bad enough to have a per capita gross product averaging less than a hundred dollars a year, but it actually sank below that point."

Homer Crawford was nodding.

Zetterberg continued the basic lecture with which he knew the other was already completely familiar. "So the Reunited Nations took on the task of advancing as rapidly as possible the African economy and all the things that must be done before an economy *can* be advanced. It was self-preservation, I suppose. *Have-not* nations, not to speak of *have-not* races and *have-not* continents, have a tendency eventually to explode upon their wealthier neighbors."

The Swede pressed his lips together before continuing. "Unfortunately, the Reunited Nations as the United Nations and the League of Nations before it, is composed of members each with its own irons in the fire. Each with its own plans and schemes." His voice was bitter now. "The Arab Union with its desire to unite all Islam into one. The Soviet Complex with its ultimate dream of a soviet world. The capitalistic economies of the British Commonwealth, Common Europe, and your United States of the Americas, with their hunger for, positive need for, sources of raw materials and markets for their manufactured products. All, though playing lip service to the African Development Project, have still their own ambitions."

Sven Zetterberg waggled a finger at Homer Crawford. "I do not charge that your United States is attempting to take over Africa, or even any section of it, in the old colonialistic sense. Even England and France have discovered that it is much simpler to dominate economically than to go through all the expense and effort of governing another people. That is the basic reason they gave up their empires. No, your United States would love to so dominate Africa that her products, her entrepreneurs, would flood the continent to the virtual exclusion of such economic competitors as Common Europe. The Commonwealth feels the same, so does the French Community. The Soviets and Arabs have different motivations, but they, too, wish to take over. The result . . ." The Swede tossed up his hands in a gesture more Gallic than Scandinavian.

"What has all this got to do with El Hassan?" Homer Crawford asked softly.

The Swede leaned forward. "If we more devoted adherents of the Reunited Nations are ever to see our hopes come true, Africa must be united and made strong. And this must be done through the efforts of *Africans* not Russians, British, French, Arabs . . . nor even Scandinavians. Socio-economic changes should not, possibly cannot, be inflicted upon a people from without. Look at the mess the Russians made in such countries as Hungary, or the Americans in such as South Korea."

"The people themselves must have the dream," Crawford said softly.

"I beg your pardon?"

"Nothing. Go on."

Zetterberg said, "On the surface, great progress seems to be continuing. Afforestation of the Sahara, the solar pumps creating new oases, the water purification plants on the Atlantic and Mediterranean, pushing back the desert, the oil fields, the mines, the roads, the damming of the Niger. But already cracks can be seen. A week or so ago, a team of Cubans, supposedly, at least, in the Sudan to improve sugar refining methods, were machine-gunned to death. By whom? By the Sudanese? Unlikely. No, this Cuban massacre was one of many recent signs of conflict between the great powers in their efforts to dominate. Our problem, of course, deals only with North Africa, but I have heard rumors in Geneva that much the same situation is developing in the south as well.

"At any rate, Dr. Crawford, when the rumors of El Hassan began to come into this office they brought with them a breath of hope. From all we have heard, he teaches our basic program—a breaking down of old tribal society, education, economic progress, Pan-African unity. Dr. Crawford, no one with whom this office is connected seems ever to have seen this El Hassan but we are most anxious to talk to him. Perhaps this is the man behind whom we can throw our support. Your task is to find him."

Homer Crawford raked the fingers

of his right hand back over his short wiry hair, and grimaced. He said, "It won't be necessary."

"I beg your pardon, Doctor?"

Crawford said, "It won't be necessary to go looking for El Hassan."

The Swede scowled his irritation at the other. "See here . . ."

Crawford said, "I'm El Hassan."

Sven Zetterberg stared at him, uncomprehending.

Homer Crawford said, "I suppose

it's your turn to listen and for me to do the talking." He shifted in his chair; uncomfortably. "Dr. Zetterberg, even before the Reunited Nations evolved the idea of the African Development Project, it became obvious that the field work was going to have to be in the hands of Negroes. The reason is doublefold. First, the African doesn't trust the white man, for good reason. Second, the white man is a citizen of his own country, first of all, and finds it difficult not to have motives connected with his own race and nation. But the African Negro, too, has his tribal and sometimes national affiliations and cannot be trusted not to be prejudiced in their favor. The answer? The educated American Negro, such as myself.

"I haven't the slightest idea from whence came my ancestors, from what part of Africa, what tribe, what nation. But I am a Negro and . . . well, have the dream of bettering my race. I have no irons in the fire, beyond altruistic ones. Of course, when I say American Negroes I don't exclude Canadian ones, or those of Latin America or the Caribbean. It is simply that there are greater numbers of educated American Negroes than you find elsewhere."

Zetterberg said impatiently, "Please, Dr. Crawford. Come to the point. That ridiculous statement you made about El Hassan."

"Of course, I am merely giving background. Most of we field workers, not only the African Development teams, but such organizations as the Africa for Africans Association and the representatives of the African Department of the British Commonwealth, and of the French Community's African Affairs sector, are composed of Negroes."

Zetterberg was nodding. "All right, I know."

Homer Crawford said, "The teams of all these organizations do their best to spur African progress, in our case, in North Africa, especially the area between the Niger and the Mediterranean. Often we disguise ourselves as natives since in that manner we are more quickly trusted. We wear the clothes, speak the local language or lingua franca."

The American hesitated a moment, then plunged in. "Dr. Zetterberg, the African is still a primitive but newly beginning to move out of a tradition-ritual-taboo tribal society. He seeks a hero to follow, a man of towering prestige who knows the answers to all questions. We may not *like* this fact, we with our traditions of democracy, but it is so. The African is simply not yet at that stage of society where political democracy is applicable."

"My team does most of its work posing as Enaden—low caste itinerant smiths of the Sahara. As such we can go any place and are everywhere accepted, a necessary sector of the Saharan economy. As such, we continually spread the . . . ah, propaganda of the Reunited Nations—the need for education, the need for taking jobs on the new projects, the need for casting aside old institutions

and embracing the new. Early in the game we found our words had little weight coming from simple Enaden smiths so we . . . well, *invented* this mysterious El Hassan, and everything we said we attributed to him.

"News spreads fast in the desert, astonishingly fast. El Hassan started with us but soon other teams, hearing about him and realizing that his message was the same as that they were trying to propagate, did the same thing. That is, attributed the messages they had to spread to El Hassan. It was amusing when a group of us got together last week in Timbuktu, to find that we'd all taken to kowtowing to this mythical desert hero who planned to unite all North Africa."

The Swede was staring at him unbelievingly. "But, a bit earlier you said you were El Hassan."

Homer Crawford looked into his chief's face and nodded seriously. "I've been conferring with various other field workers, both Reunited Nations and otherwise. The situation calls for a real El Hassan. If we don't provide him, someone else will. I propose to take over the position."

Sven Zetterberg's face was suddenly cold. "And why, Dr. Crawford, do you think you are more qualified than others?"

The American Negro could hardly fail to note the other's disapproval. He said evenly, but definitely, "Through experience. Through education. Through . . . through having the dream, Dr. Zetterberg."

"The Reunited Nations cannot support such a project, Dr. Crawford. I absolutely forbid you to consider it."

"Forbid me?"

It was as though a strange something entered the atmosphere of the room, almost as though a new *presence* was there. And almost, it seemed to Sven Zetterberg, that the already tall, solidly built man across from him grew physically as his voice seemed to swell, to reach out, to dominate. There was a new, and all but unbelievable Homer Crawford here.

The Swedish official regathered his forces. This was ridiculous. He said again, "I forbid you to . . ." the sentence dribbled away under the cold disdain in the air now.

Homer Crawford said flatly, "You don't seem to understand, Zetterberg. The Reunited Nations has no control over El Hassan. Homer Crawford, as of this meeting, has resigned his post with the African Development Project. And El Hassan has begun his task of uniting all North Africa."

Sven Zetterberg, shaken by this new and unsuspected force the other seemed to be able to bring to his command, fought back. "It will be simple to discredit you, to let it be known that you are no more than an ambitious American out to seize power illegally."

Crawford's scorn held an element of amusement. "Try it. I suspect your attempts to discredit El Hassan will prove unsuccessful. He has already

been rumored to be everything from an Ethiopian to the Second Coming of the Messiah. Your attempt to brand him an American adventurer will be swallowed up in the flood of other rumor."

The Swede was still shaken by the strange manner in which his once subordinate had suddenly dominated him. Sven Zetterberg was not a man to be dominated, to be made unsure.

Time folded back on itself and for a moment he was again a lad and on vacation with his father in Bavaria. They were having lunch in the famed Hofbraühaus, largest of the Munich beercellars, and even a ten-year-old could sense an anticipation in the air, particularly among the large number of brownshirted men who had gathered to one side of the ground level of the beer hall. His father was telling Sven of the history of the medieval building when a silence fell. Into the beerhall had come a pasty faced, trenchcoat garbed little man, his face set in stern lines but insufficiently to offset the ludicrous mustache. He was accompanied by an elderly soldier in the uniform of a Field Marshal, by a large tub of a man whose face beamed—but evilly—and by a pinch faced cripple. All were men of command, all except the pasty faced one, to whom they seemingly and surprisingly, deferred. And then he stood on a heavy chair and spoke. And then his *power* reached out and grasped all within reach of his shrill voice. Grasped them and compelled them and they became a shouting, red faced, arm brandishing mob, demanding to be led to glory. And Sven's father had bustled the shocked boy from the building.

It came back to him now, clearly and forcefully, and he realized that whatever it was with which the Beast of Berchtesgaden had enchanted his people, that power was on call in Homer Crawford. Whether he used it for good or evil, that enchanting power was on call. And again Sven Zetterberg was shaken.

Homer Crawford was on his feet, preparatory to leaving.

The Swede simply *had* to reassert himself. "Dr. Crawford, the Reunited Nations is not without resources. You'll be arrested before you leave Dakar."

An element of the tenseness left the air when Crawford smiled and said, "Doctor, for several years now I have been playing hide and seek in the Sahara, doing your work. You mentioned earlier that my team is the most experienced and capable. Just whom are you going to send to pick me up? Members of some of the other teams? Old friends and comrades in arms. Many of whom owe their lives to my team when all bets were down. Please do send them, Doctor, I am going to need recruits."

He swung and left the office and even as he went could hear the angry Reunited Nations chief blasting into an interoffice communicator. He decided he'd better see if there wasn't a back door or window through which to leave the building. He'd have to phone Bey, Isobel and the others and get together for a meeting to plan

developments. El Hassan was getting off to a fast start, already he was on the lam.

Homer Crawford played it safe. From the nearest public phone he called Isobel Cunningham at the Hotel Juan-le-Pin. No matter how fast Sven Zetterberg swung into action, it would take his operatives some time to connect Isobel with Homer and his team. As an employee of the Africa for Africans Association, she would ordinarily come in little contact with the Reunited Nations teams.

He said, "Isobel? Homer here. Can you talk?"

She said, "Cliff and Jake are here."

He said, "Have you sounded them out? How do they feel about the El Hassan project?"

"They're in. At least, Jake is. We're still arguing with Cliff."

"O.K. Now listen, carefully. Zetterberg turned thumbs down on the whole deal, for various reasons we can discuss later. In fact, he's incensed and threatened to take steps to keep us from leaving Dakar."

Isobel was alerted but she snorted deprecation. "What do you want?"

"They're probably already looking for me, and in a matter of minutes will probably try to pick up Bey-ag-Akhamouk, Elmer Allen and Kenny Ballalou, the other members of my team. Get in touch with them immediately and tell them to get into native costume and into hiding. You and Jake—and Cliff—do the same."

"Right. Where do we meet and when?"

"In the *souk*, in the food market. There's a native restaurant there, run by a former Vietnamese. We'll meet there at approximately noon."

"Right. Anything else?"

Homer said, "Tell Bey to bring along an extra 9mm Recoilless for me."

"Yes, El Hassan," she said, her voice expressionless. She didn't waste time. Homer Crawford heard the phone click as she hung up.

He was in a branch building of the post and telegraph network on the Rue des Resistance. Before leaving it, he looked out a window. Half a block away was the office of the Sahara Division of the African Development Project. Even as he watched, a dozen men hurried out the front door, fanned out in all directions.

Homer grinned sourly. Old Sven was moving fast.

He shot a quick glance around the lobby of the building. He had to get going. Zetterberg had started with a dozen men to trail down El Hassan. He'd probably have a hundred involved before the hour was out.

A corridor turned off to the right. Homer hurried down it. At each door he looked inside. To whoever occupied the room he murmured a few words of apology in Wolof, the Sengalese lingua franca. The fourth office was empty.

Homer stood there before it for a long, agonizing moment, waiting for the right person to pass. Finally, the man he needed came along. About

six feet tall, about a hundred and eighty; dressed in the local native dress and on the ragged side.

Homer said to him authoritatively, in the Wolof tongue, "You there, come in here!" He opened the door, and pointed into the office.

The other, taken aback, demurred.

Homer's face and tone went still more commanding. "Step in here, before I call the police."

It was all a mistake, of course. The Senegalese made the gesture equivalent to the European's shrug, and entered the office.

Homer came in behind him, closed the door. He wasted no time in preliminaries. Before the native turned, the American's hand lashed out in a karate blow which stunned the other. Homer Crawford caught him, even as he fell, and lowered him gently to the floor.

"Sorry, old boy," he muttered, "but this is probably the most profitable thing that's happened to you this year."

He stripped off the other's clothes, as rapidly as he could make his hands fly. The other was still out and probably would be for another ten minutes, Crawford estimated. He stripped off his own clothes and donned the native's.

Last of all, he took his wallet from his pocket, divided the money it contained and stuffed a considerable wad of it into the European clothing he was abandoning.

"Don't spend all of that in one place," he growled softly.

Homer dragged the other to a side of the room so that the body could not be spotted from the entrance. Then he crossed to the door, opened it and stepped into the corridor beyond.

There was no need for sulking. He walked out the front door and headed away from the dock and administration buildings area and toward the native section, passing the Reunited Nations building on the way.

Dakar teems with multitudes of a dozen tribes come in from the jungles and the bush, the desert and the swamp areas of the sources of the Niger, to look for work on the new projects, to visit relatives, to market for the products of civilization—or to gawk. Homer Crawford disappeared into them. One among many.

Toward noon, he entered the cleared area which was the restaurant he had named to Isobel and squatted before the pots to the far end of the Vietnamese owned eatery, examining them with care. He chose a large chunk of barbequed goat and was served it with a half pound piece of unsalted Senegalese bread, torn from a monstrous loaf, and a twisted piece of newspaper into which had been measured an ounce or so of coarse salt. He took his meal and went to as secluded a corner as he could find.

Homer Crawford chuckled inwardly. That morning he had breakfasted in the most swank hotel in West Africa. He wished there was some manner in which he could have invited Sven Zetterberg to dine here with him. Or, come to think of it, a

group of the students he had once taught sociology at the University of Michigan. Or, possibly, prexy Wallington, under whom he had worked while taking his doctor's degree.

Yes, it would have been interesting to have had a luncheon companion.

A native woman, on the stoutish side but with her hair done up in one of the fabulously ornate hair styles specialized in by the Senegalese, and wearing a flowing, shapeless dress of the garish textiles run off purposely for this market in Japan and Manchester, waddled up to take a place nearby. She bore a huge skewar of barbequed beef chunks, and a hunk of bread not unlike Homer's own.

She grumbled uncomfortably, her back to the American, as she settled into a position on the floor. And she mumbled as she began chewing at the meat.

No table manners, Homer Crawford grinned inwardly. He wondered how long it would take for the others to get here. He wasn't worried about Isobel, Cliff Jackson and Jake Armstrong. It would take time before Zetterberg's Reunited Nations cloak and dagger boys got around to them, but he wasn't sure that she'd be able to locate his own team in time. That bit he'd given the Swede official about his being so bully-bully with the other Reunited Nations teams was in the way of being an exaggeration, with the idea of throwing the other off. Actually, working in the field on definite assignments, it was seldom you ran into other African Development Project men. But perhaps it would tie Zetterberg up, wondering just who he could trust to send looking for El Hassan.

He finished off his barbequed goat and the bread and wiped his hands on his clothes. Nobody here yet. To have an excuse for staying, he would have to buy a bottle of Gazelle beer, the cheap Senegalese brew which came in quart bottles and was warm and on the gassy side.

It was then that the woman in front of him, without turning, said softly, "El Hassan?"

II

Homer Crawford stared at her, unbelievingly. The woman couldn't possibly be an emmissary from Isobel or from one of his own companions. This situation demanded the utmost secrecy, they hadn't had time to screen any outsiders as to trustworthiness.

She turned. It was Isobel. She chuckled softly, "You should see your face."

His eyes went to her figure.

"Done with mirrors," Isobel said. "Or, at least, with pillows."

Homer didn't waste time. "Where are the others? They should be here by now."

"We figured that the fewer of us seen on the streets, the better. So they're waiting for you. Since I was the most easily disguised, the least suspicious looking, I was elected to come get you."

"Waiting where?"

She licked the side of her mouth, a disconcerting characteristic of hers, and looked at him archly. "Those pals of yours have quite a bit on the ball on their own. They decided that there was a fairly good chance that Sven Zetterberg wasn't exactly going to fall into your arms, so they took preliminary measures. Kenny Ballalou rented a small house, here in the native quarter. We've all rendezvoused there. See, you aren't the only one on the ball."

Homer frowned at her, for the moment being in no mood for humor. "What was the idea of sitting here for the past five minutes without even speaking? You must have recognized me, knowing what to look for."

She nodded. "I . . . I wasn't sure, Homer, but I had the darnedest feeling I was being followed."

His glance was sharp now. First at her, then a quick darting around the vicinity. "Woman's intuition," he snapped, "or something substantial?"

She frowned at him. "I'm not a ninny, Homer."

His voice softened and he said quickly, "Don't misunderstand, Isobel. I know that."

She forgot about her objection to his tone. "Even intuition doesn't come out of a clear sky. Something sparks it. Subconscious psi, possibly, but a spark."

"However?" he prodded.

"I took all precautions. I can't seem to put my finger on anything."

"O.K.," he said decisively. "Let's go then." He came to his feet and reached a hand down for her.

"Heavens to Betsy," she said, "don't do that."

"What?"

"Help a woman in public. You'll look suspicious." She came to her own feet, without aid.

Damn, he thought. She was right. The last thing he wanted was to draw attention to a man who acted peculiarly.

They made their way out of the food market and into the *souk* proper, Homer walking three or four paces ahead of her, Isobel demurely behind, her eyes on the ground. They passed the native stands and tiny shops, and the even smaller venders and hucksters with their products of the mass production industries of East and West, side by side with the native handicrafts ranging from carved wooden statues, jewelry, *gris gris* charms and kambu fetishes, to ceramics whose designs went back to an age before the Portuguese first cruised off this coast. And everywhere was color; there are no people on earth more color conscious than the Senegalese.

Isobel guided him, her voice quiet and still maintaining its uncharacteristic demure quality.

He would never have recognized Isobel, Homer Crawford told himself. Isobel Cunningham, late of Columbia University where she'd taken her Master's in anthropology. Isobel Cunningham, whom he had told on their first meeting that she looked like the

former singing star, Lena Horne. Isobel Cunningham, slight of build, pixie of face, crisply modern American with her tongue and wit. Was he in love with her? He didn't know. El Hassan had no time, at present, for those things love implied.

She said, "Here," and led the way down a brick paved passage to a small house, almost a hut, that lay beyond.

Homer Crawford looked about him critically before entering. He said, "I suppose this has been scouted out adequately. Where's the back entrance?" He scowled. "Haven't the boys posted a sentry?"

A voice next to his ear said pleasantly, "Stick 'em up, stranger. Where'd you get that zoot suit?"

He jerked his head about. There was a very small opening in the wooden wall next to him. It was Kenny Ballalou's voice.

"Zoot suit, yet!" Homer snorted. "I haven't heard that term since I was in rompers."

"You in rompers I'd like to see," Kenny snorted in his turn. "Come on in, everybody's here."

The aged, unpainted, warped, wooden house consisted of two rooms, the one three times as large as the second. The furniture was minimal, but there was sitting room on chair, stool and bed for the seven of them.

"Hail, O El Hassan!" Elmer Allen called sourly, as Homer entered.

"And the hail with you," Homer called back, then, "Oops, sorry, Isobel."

Isobel put her hands on her hips, greatly widened by the stuffing she'd placed beneath her skirts. "Look," she said. "Thus far, the El Hassan organization, which claims rule of all North Africa, consists of six men and one dame . . . ah, that is, one lady. Just so the lady won't continually feel that she's being a drag on the conversation, you are hearby allowed in moments of stress such shocking profanity as an occasional damn or hell. But only if said lady is also allowed such expletives during periods of similar stress."

Everyone laughed, and found chairs.

"I'm in love with Isobel Cunningham," Bey announced definitely.

"Second the motion," Elmer said.

The rest of them called, "Aye."

"O.K.," Homer Crawford said glumly, "I can see that this is going to be one tight knit organization. Six men in love with the one dame . . . ah, that is, lady. Kind of a reverse harem deal. Oh, this is going to lead to great co-operation."

They laughed again and then Jake said, "Well, what's the story, Homer? How does the El Hassan project sound to Zetterberg and the Reunited Nations?"

Cliff Jackson laughed bitterly. "Why do you think we're in hiding?" Only he and Jake Armstrong wore western clothing. Kenny Ballalou, Bey-ag-Akhamouk and Elmer Allen were in native dress, similar to that of Homer Crawford. Elmer Allen even bore a pilgrim's staff.

Crawford, glad that the edge of tenseness had been taken off the group by the banter with Isobel, turned serious now.

He said, "This is where we each take our stand. You can turn back at this point, any one of you, and things will undoubtedly go on as before. You'll keep your jobs, have no marks against you. Beyond this point, and there's no turning back. I want you all to think it over, before coming to any snap decisions."

Elmer Allen said, his face wearing its usual all but sullen expression. "How about you?"

Homer said evenly, "I've already taken my stand."

Kenny Ballalou yawned and said, "I've been in this team for three or four years, I'm too lazy to switch now Besides, I've always wanted to be a corrupt politician. Can I be treasurer in this El Hassan regime?"

"No," Homer said. "Bey?"

Bey-ag-Akhamouk said, "I've always wanted to be a general. I'll come in under those circumstances."

Homer said, his voice still even. "That's out. From this point in, you're a Field Marshal and Minister of Defense."

"Shucks," Bey said. "I'd always wanted to be a general."

Homer Crawford said dryly, "Doesn't anybody take this seriously? It's probably going to mean all your necks before it's through, you know."

Elmer Allen said dourly, "I take it seriously. I spent the idealistic years, the school years, working for peace, democracy, a better world. Now, here

I am, helping to attempt to establish a tyranny over half the continent of my racial background. But I'm in."

"Right," Homer said, the side of his mouth twitching.. "You can be our Minister of Propaganda."

"Minister of Propaganda!" Elmer wailed. "You mean like Goebbels? Me!"

Homer laughed. "O.K., we'll call it Minister of Information, or Press Secretary to El Hassan. It all means the same thing." He looked at Jacob Armstrong and said, "How old are you, Jake?"

"That's none of your business," the white-haired Jake said aggressively. "I'm in. El Hassan is the only answer. North Africa has got to be united, both for internal and external purposes. If you . . . if we . . . don't do the job first, somebody else will, and off hand, I can't think of anybody else I trust. I'm in."

Homer Crawford looked at him for a long moment. "Yes," he said finally. "Of course you are. Jake, you've just been made our combined Foreign Minister and Plenipotentiary Extraordinary to the Reunited Nations. You'll leave immediately, first for Geneva, to present our demands to the Reunited Nations, then to New York."

"What do I do in New York?" Jake Armstrong said blankly, trying to assimilate the curves that were being thrown to him.

"You raise money and support from starry eyed Negro groups and individuals. You line up such organizations as the Africa for Africans Association behind El Hassan. You give speeches, and ruin your liver eating at banquets every night in the week. You send out releases to the press. You get all the publicity for the El Hassan movement you can. You send official protests to the governments of every country in the world, every time they do something that doesn't fit in with our needs. You locate recruits and send them here to Africa to take over some of the load. I don't have to tell you what to do. You can think on your feet as well as I can. Do what is necessary. You're our Foreign Minister. Don't let us see your face again until El Hassan is in control of North Africa."

Jake Armstrong blinked. "How will I prove I'm your representative? I'll need more than just a note *To Whom It May Concern.*"

Homer Crawford thought about that.

Bey said, "One of our first jobs is going to have to be to capture a town where they have a broadcast station, say Zinder or In Salah. When we do, we'll announce that you're Foreign Minister."

Crawford nodded. "That's obviously the ticket. By that time you should be in New York, with an office opened."

Jake rubbed a black hand over his cheek as though checking his morning shave. "It's going to take some money to get started. Once started I can depend on contributions, perhaps, but at first . . ."

Homer interrupted with, "Cliff,

you're Minister of the Treasury. Raise some money."

"Eh?" Cliff Jackson said blankly. The king-size, easy-going Californian looked more like the early Joe Louis than ever.

Everybody laughed. Elmer Allen came forth with his wallet and began pulling out such notes as it contained. "I don't know what we'd be doing with this in the desert," he said.

Isobel said, "I have almost three thousand dollars in a checking account in New York. Let's see if I have my checkbook here."

The others were going through their pockets. As bank notes in British pounds, American dollars, French francs and Common Europe marks emerged they were tossed to the center of the small table which wobbled on three legs in the middle of the room.

Elmer Allen said, "I have an account with the Bank of Jamaica in Kingston. About four hundred pounds, I think. I'll have it transfered."

Cliff took up the money and began counting it, making notations on a notebook pad as he went.

Bey said, "We're only going to be able to give Jake part of this."

"Hows' that?" Elmer growled. "What use have we for money in the Sahara? Jake's got to put up a decent front in Geneva and New York."

Bey said doggedly, "As Defense Minister, I'm opposed to El Hassan's followers *ever* taking anything without generous payment. We'll need food and various services. From the beginning, we're going to have to pay our way. We can't afford to let rumors start going around that we're nothing but a bunch of brigands."

"Bey's right," Homer nodded. "The El Hassan movement is going to have to maintain itself on the highest ethical level. We're going to take over where the French Camel Corps left off and police North Africa. There can't be a man from Somaliland to Mauretania who can say that one of El Hassan's followers liberated him from as much as a date."

Kenny Ballalou said, "You can always requisition whatever you need and give them a receipt, and then we'll pay off when we come to power."

"That's out!" Bey snapped. "Most of these people can't read. And even those that do don't trust what they read. A piece of paper, in their eyes, is no return for some goats, or flour, camels, horses, or whatever else it might be we need. No, we're going to have to pay our way."

Crawford raked a hand back through his wiry hair. "Bey's right, Kenny. It's going to be a rough go, especially at first."

Kenny snorted. "What do you mean, *at first?* What's going to happen, *at second* to make it any easier? Where're we going to get all this money we'll need to pay for even what we ourselves use, not to speak of the thousands of men we're going to have to have if El Hassan is ever to come to power?"

Bey's eyebrows went up in shocked innocence. "Kenny, dear boy, don't

misunderstand. We don't requisition anything from individuals, or clans, or small settlements. But if we take over a town such as Gao, or Niamey, or Colomb-Béchar, or wherever, there is nothing to say that a legal government such as that of El Hassan, can't requisition the contents of the local banks."

Homer Crawford said with dignity, "The term, my dear Minister of Defense, currently is to *nationalize* the bank. Whether or not we wish to have the banks remain nationalized, after we take over, we can figure out later. But in the early stages, I'm afraid we're going to have to nationalize just about every bank we come in contact with."

Cliff Jackson said cautiously, "I haven't said whether or not I'll come in yet, but just as a point, I might mention issuing your own legal tender. As soon as you liberate a printing press somewhere, of course."

Everyone was charmed at the idea.

Isobel said, "You can see Cliff was *meant* to be Minister of Treasury. He's got *wholesale* larceny in his soul, none of this picayunish stuff such as robbing nomads of their sheep."

Elmer Allen was shaking his head sadly. "This whole conversation started with Bey protesting that we couldn't allow ourselves to be thought of as brigands. Now listen to you all."

Kenny Ballalou said with considerable dignity, "See here, friend. Don't you know the difference between brigandage and international finance?"

"No," Elmer said flatly.

"Hm-m-m," Kenny said.

"Let's get on with this," Homer said. "The forming of El Hassan's basic government is beginning to take on aspects of a minstrel show. Then we've all declared ourselves in . . . except Cliff."

All eyes turned to the bulky Californian.

He sat scowling.

Homer said, easily, "You're not being urged, Cliff. You can turn back at this point."

Elmer Allen growled, "You came to Africa to help your race develop its continent. To conquer such problems as sufficient food, clothing and shelter for all. To bring education and decent medical care to a people who have had possibly the lowest living standards anywhere. Can you see any way of achieving this beyond the El Hassan movement?"

Cliff looked at him, still scowling stubbornly. "That's not why I came to Africa."

Their eyes were all on him, but they remained silent.

He said, defensively, "I'm no do-gooder. I took a job with the Africa for Africans Association because it was the best job I could find."

Isobel broke the silence by saying softly. "I doubt it, Cliff."

The big man stood up from where he'd been seated on the bed. "O.K., O.K. Possibly there were other angles. I wanted to travel. Wanted to see Africa. Besides, it was good background for some future job. I figured it wouldn't hurt me any, in later

years, applying for some future job. Maybe with some Negro concern in the States. I'd be able to say I'd put in a few years in Africa. Something like a Jew in New York who was a veteran of the Israel-Arab wars, before the debacle."

They still looked at him, none of them accusingly.

He was irritated as he paced. "Don't you see? Everybody doesn't have this *dream* that Homer's always talking about. That doesn't mean I'm abnormal. I just don't have the interest you do. All I want is a good job, some money in the bank, security back in the States. I'm not interested in dashing all over the globe, getting shot at, dying for some ideal."

Homer said gently, "It's up to you, Cliff. Nobody's twisting your arm."

There was sweat on the big man's forehead. "All I came to Africa for was the job, the money I got out of it," he repeated, insisting.

To Homer Crawford suddenly came the realization that the other needed an out, an excuse. An explanation to himself for doing something he wanted to do but wouldn't admit because it went against the opportunistic code he told himself he followed.

Homer said, "All right. How much are you making as a field worker for the Africa for Africans Association?"

Cliff looked at him, uncomprehending. "Eight thousand dollars, plus expenses."

"O.K., we'll double that. Sixteen thousand to begin with, as El Hassan's Minister of Treasury and whatever other duties we can think of to hang on you."

There was a long moment of silence, unbroken by any of the others. Finally in a gesture of desperation, Cliff Jackson waved at the money and checks sitting on the center table. "Sixteen thousand a year! The whole organization doesn't have enough to pay me six months' salary."

Homer said mildly, "That's why your pay was doubled. You have to take risks to make money in this world, Cliff. If El Hassan does come to power, undoubtedly you'll get other raises—along with greater responsibility."

He looked into Cliff Jackson's face, and although his words had dealt with money, a man's dream looked out from his eyes. And the force of personality that could emanate from Homer Crawford, possibly unbeknownst to himself, flooded over the huge Californian. The others in the room could feel it. Elmer Allen cleared his throat; Isobel held her elbows to her sides, in a feminine protest against naked male psychic strength.

Kenny Ballalou said without inflection, "Put up or shut up, Cliff old pal."

Cliff Jackson sank back onto the spot on the bed he'd occupied before. "I'm in," he muttered, so softly as hardly to be heard.

"None of you are in," a voice from the doorway said.

The figure that stood there held a

thin, but heavy calibered automatic in his hand.

He was a dapper man, neat, trim, smart. His clothes were those of Greater Washington, rather than Dakar and West Africa. His facial expression seemed overly alert, overly bright, and his features were more Caucasian than Negroid.

He said, "I believe you all know me. Fredric Ostrander."

"Of the Central Intelligence Agency," Homer Crawford said dryly. He as well as Bey, Elmer and Kenny had risen to their feet when the newcomer entered from the smaller of the hut's two rooms. "What's the gun for Ostrander?"

"You're under arrest," the C.I.A. man said evenly.

Elmer Allen snorted. "Under whose authority are you working? As a Jamaican, I'm a citizen of the West Indies and a subject of Her Majesty."

"We'll figure that out later," Ostrander rapped. "I'm sure the appropriate Commonwealth authorities will co-operate with the State Department and the Reunited Nations in this matter." The gun unwaveringly went from one of them to the other, retraced itself.

Bey looked at Homer Crawford.

Crawford shook his head gently.

He said to the newcomer, "The question still stands, Ostrander. Under whose authority are you operating? I don't think you have jurisdiction over us. We're in Africa, not in the United States of the Americas."

Ostrander said tightly, "Right now I'm operating under the authority of this weapon in my hand. Dr. Crawford. Do you realize that all of you Americans here are risking your citizenship?"

Kenny Ballalou said, "Oh? Tell us more, Mr. State Department man."

"You're serving in the armed forces of a foreign power."

Even the dour Elmer Allen laughed at that one.

Crawford said, "The fact of the matter is, we *are* the foreign power."

"Your'e not amusing, Dr. Crawford," Ostrander said. "I've kept up with this situation since you had that conference in Timbuktu. The State Department has no intention of allowing some opportunist, backed by known communists and fellow-travelers, to seize power in this portion of the world. In a matter of months the Soviets would be in here."

Isobel said evenly, "I was formerly a member of the Party. I no longer am. I am an active opponent of the Soviet Complex at the moment, especially in regard to its activity in Africa."

Ostrander snorted his disbelief.

Elmer Allen said, "You chaps never forget, do you?" He looked at the others and explained. "Back during college days, I signed a few peace petitions, that sort of thing. Ever since, every time I come in contact with these people, you'd think I was Lenin or Trotsky."

Homer Crawford said, "My opinion is, Ostrander, that you've had to

move too quickly to check back with your superiors. Has the State Department actually instructed you to arrest me and my companions here on foreign soil, without a warrant?"

Ostrander clipped, "That's my responsibility. I'm taking you all in. We'll solve such problems as jurisdiction and warrants when I get you to the Reunited Nations headquarters."

"Ah?" Homer Crawford said. "And then what happens to us?"

Ostrander jiggled the gun, impatiently. "Sven Zetterberg is of the opinion that you should immediately be flown out of Africa and the case brought before the High Council of the African Development Project. What measures will be taken beyond that point I have no way of knowing."

Bey took a step to the left, Kenny Ballalou one to the right. Homer Crawford remained immediately before the C.I.A. operative, his hands slightly out from his sides, palms slightly forward.

Ostrander snapped, "I'm prepared to fire, you men. I don't underestimate the importance of this situation. If your crazy scheme makes any progress at all, it might well result in the death of thousands. I know your background, Crawford. You once taught judo in the Marines. I'm not unfamiliar with the art myself."

Isobel had a hand to her mouth, her eyes were wide. "Boys, don't . . ." she began.

Elmer Allen had been leaning on his pilgrim's staff, as though weary with this whole matter. He said to Ostrander, interestedly, "So you've been checked out on judo? Know anything about the use of the quarterstaff?"

Ostrander kept his gun traversing between the four of them. "Eh?" he said.

Elmer Allen shifted his grip on his staff infinitesimally. Of a sudden, the end of the staff, now gripped with both hands near the center, moved at invisibly high speed. There was a crack of the wrist bone, and the gun went flying. The other end of the staff flicked out and rapped the C.I.A. operative smartly on the head.

Fredric Ostrander crumbled to the floor.

"Confound it, Elmer," Crawford said. "What'd you have to go and do that for? I wanted to talk to him some more and send a message back to Zetterberg. Sooner or later we've got to make our peace with the Reunited Nations."

Elmer said embarrassedly, "Sorry, it just happened. I was merely going to knock the gun out of his hand, but then I couldn't help myself. I was tired of hearing that holier-than-thou voice of his."

Kenny Ballalou looked down at the fallen man gloomily. "He'll be out for an hour. You're lucky you didn't crack his skull."

"Holy Mackerel," Cliff Jackson said. "I'm going to have to learn to operate one of those things."

Elmer Allen handed him the supposed pilgrim's staff. "Best hand-to-

hand combat weapon ever invented," he said. "The British yeoman's quarterstaff. Of course, this is a modernized version. Made of epoxy resin glass-fiber material, treated to look like wood. That stuff can turn a high-velocity bullet, let alone a sword, and it can be bent in a ninety degree arc without the slightest effect, although it'd take a power-driven testing machine to do it."

"All right, all right," Homer said. "We haven't got time for lessons in the use of the quarterstaff. Let's put some thought to this situation. If Ostrander here was able to find us, somebody else would, too."

Isobel licked the side of her mouth. "He was probably following me. Remember, I told you Homer?"

Kenny said, "If he had anyone with him, he'd have brought them along to cover him. You've got to give him credit for bravery, taking on the whole bunch of us by himself."

"Um-m-m," Homer said. "I wish he was with us instead of against us."

Jake Armstrong said, "Well, this solves one problem."

They looked at him.

He said, "Just as sure as sure, he's got a car parked somewhere. A car with some sort of United States or Reunited Nations emblem on it."

"So what?" Kenny said.

"So you've got to get out of town before the search for you *really* gets under way. With such a car, you can get past any roadblock that might already be up between here and the Yoff airport."

Elmer Allen had sunk to his knees and was searching the fallen C.I.A. man. He came up with car keys and a wallet.

Homer said to Jake Armstrong, "Why the Yoff airport?"

"Our plane is there," Jake told him. "The one assigned Isobel, Cliff and me by the AFAA. You're going to have to make time. Get somewhere out in the ah, boondocks, where you can begin operations."

Bey said thoughtfully, "He's right, Homer. Anybody against us, like our friend here"—he nodded at Ostrander—"is going to try to get us quick, before we can get the El Hassan movement under way. We've got to get out of Dakar and into some area where they'll have their work cut out trying to locate us."

Homer Crawford accepted their council. "O.K., let's get going. Jake, you'll stay in Dakar, and at first play innocent. As soon as possible, take plane for Geneva. As soon as you're there, send out press releases to all the news associations and the larger papers. Announce yourself as Foreign Minister of El Hassan and demand that he be recognized as the legal head of state of all North Africa."

"Wow," Cliff Jackson said.

"Then play it by ear," Homer finished.

He turned to the others. "Bey, where'd you leave our two hover-lorries when you came here to Dakar?"

"Stashed away in the ruins of a former mansion in Timbuktu. Hired two Songhai to watch them."

"O.K. Cliff, you're the only one in

European dress. Take this wallet of Ostrander's. You'll drive the car. If we run into any roadblocks between here and the Yoff airport, slow down a little and hold the wallet out to show your supposed identification. They won't take the time to check the photo. Bluff your way past, don't completely stop the car."

"What happens if they do stop us?" Cliff said worriedly.

Kenny Ballalou said, "That'll be just too bad for them."

Bey stooped and scooped up the fallen automatic of Fredric Ostrander and tucked it into the voluminous folds of his native robe. "Here we go again," he said.

III

The man whose undercover name was Anton, landed at Gibraltar in a BEA roco-jet, passed quickly through customs and immigration with his Commonwealth passport and made his way into town. He checked with a Bobby and found that he had a two-hour wait until the Mons Capa ferry left for Tangier, and spent the time wandering up and down Main Street, staring into the Indian shops with their tax-free cameras from Common Europe, textiles from England, optical equipment from Japan, and cheap souvenirs from everywhere. Gibraltar, the tourist's shopping paradise.

The trip between Gibraltar and Tangier takes approximately two hours. If you've never made it before, you stand on deck and watch Spain recede behind you, and Africa loom closer. This was where Hercules supposedly threw up his Pillars, Gibraltar being the one on the European shore. Those who have made the trip again and again, sit down in the bar and enjoy the tax-free prices. The man named Anton stood on the deck. He was African by birth, but he'd never been to Morocco before.

When he landed, he made the initial error of expecting the local citizenry to speak Arabic. They didn't. Rif, a Berber tongue, was the first language. The man called Anton had to speak French to make known his needs. He took a Chico cab up from the port to the El Minza hotel, immediately off the Plaza de France, the main square of the European section.

At the hotel entrance were two jet-black doormen attired in a pseudo-Moroccan costume of red fez, voluminous pants and yellow barusha slippers. They made no note of his complexion, there is no color bar in the Islamic world.

He had reservations at the desk. He left his passport there to go through the standard routine, including being checked by the police, had his bag sent up to his room and, a few minutes later, hands nonchalantly in pockets, strolled along the Rue de Liberté toward the casbah area of the medina. Up from the native section of town streamed hordes of costumed Rifs, Arabs, Berbers of a dozen tribes, even an occasional Blue Man. At least half the women still wore the haik and veil, half the men the

burnoose. Africa changes slowly, the man called Anton admitted to himself all over again—so slowly.

Down from the European section, which could have been a Californian city, filtered every nation of the West, from every section of Common Europe, the Americas, the Soviet Complex. If any city in the world is a melting pot, it is Tangier, where Africa meets Europe and where East meets West.

He passed through the teaming Grand Zocco market, and through the gates of the old city. He took Rue Singhalese, the only street in the medina wide enough to accommodate a vehicle and went almost as far as the Zocco Chico, once considered the most notorious square in the world.

For a moment the man called Anton stood before one of the Indian shops and stared at the window's contents. Carved ivory statuettes from the Far East, cameras from Japan, ebony figurines, chess sets of water jade, gimcracks from everywhere.

A Hindu stood in the doorway and rubbed his hands in a gesture so stereotyped as to be ludicrous. "Sir, would you like to enter my shop? I have amazing bargains."

The man they called Anton entered.

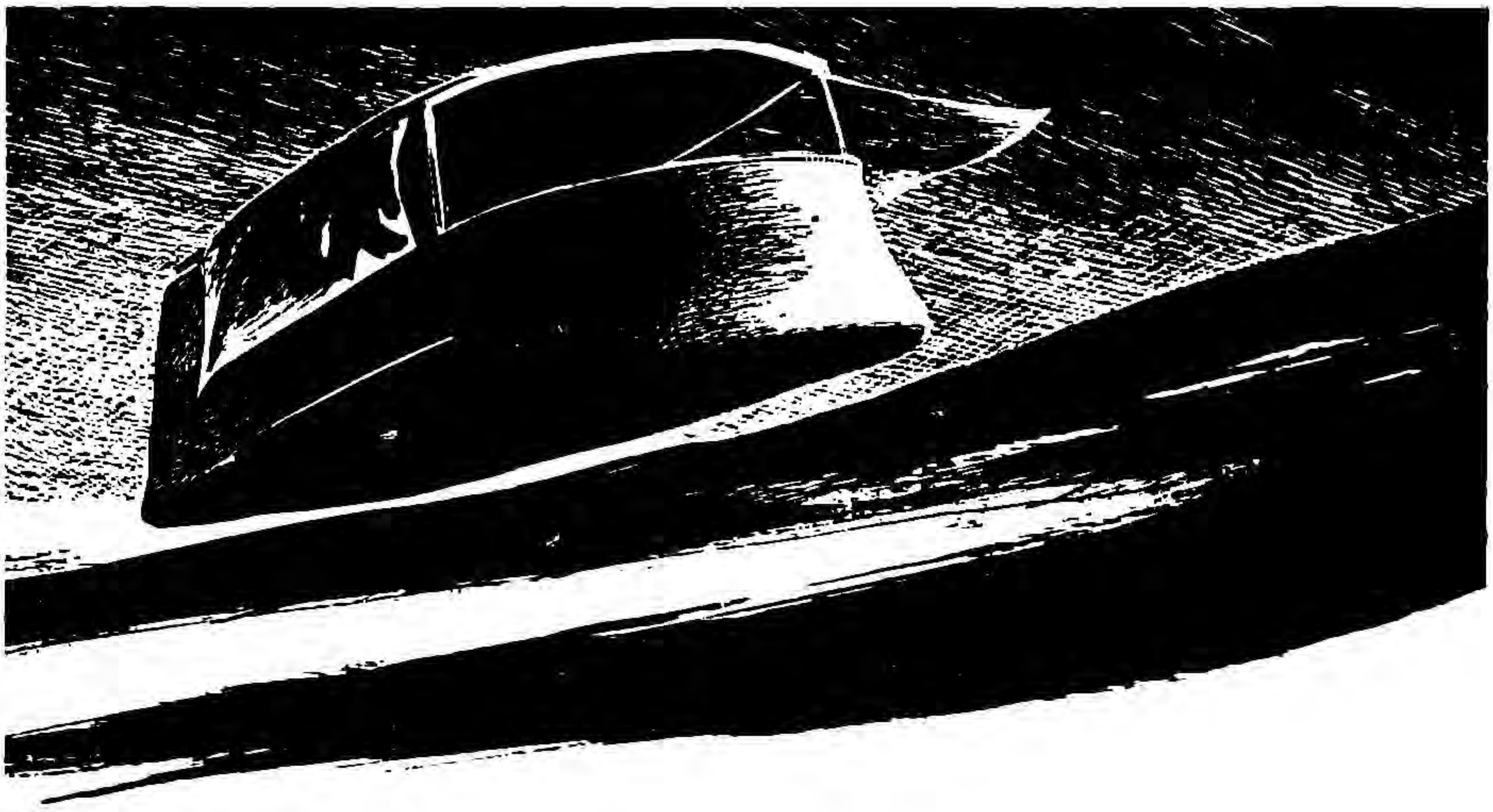
He looked about the shop, otherwise empty of customers. Vaguely, he wondered if the other ever sold anything, and, if so, to whom.

He said, "I was looking for an ivory elephant, from the East."

The Indian's eyebrows rose. "A white elephant?"

"A red elephant," the man called Anton said.

"In here," the Hindu said evenly, and led the way to the rear.



The rooms beyond were comfortable but not ostentatious. They passed through a livingroom-study to an office beyond. The door was open and the Indian merely gestured in the way of introduction, and then left.

Kirill Menzhinsky, agent superior of the *Chrezvychainaya Komissiya* for North Africa, looked up from his desk, smiled his pleasure, came to his feet and held out his hand.

"Anton!" he said. "I've been expecting you."

The man they called Anton smiled honestly and shook. "Kirill," he said. "It's been a long time."

The other motioned to a comfortable armchair, resumed his own seat. "It's been a long time all right—almost five years. As I recall, I was slung over your shoulder, and you were wading through those confounded swamps. The . . ."

"The Everglades."

"Yes." The heavy-set Russian espionage chief chuckled. "You are much stronger than you look, Anton. As I recall, I ordered you to abandon me."

The wiry Negro grunted deprecation. "You were delirious from your wound."

The Russian came to his feet, turned his back and went to a small improvised bar. He said, his voice low, "No, Anton, I wasn't delirious. Perhaps a bit afraid, but then the baying of dogs in disconcerting."

The man they called Anton said, "It is all over now."

The Russian returned and said, "A drink, Anton? As I recall you were never the man to refuse a drink. Scotch, bourbon, vodka?"

The other shrugged. "I believe in drinking the local product. What is the beverage of Tangier?"

Kirill Menzhinsky took up a full bottle the contents of which had a greenish, somewhat *oily* tinge. "Absinthe," he said. "Guaranteed to turn your brains to mush if you take it long enough. What was the name of that French painter . . . ?"

"Toulouse Lautrec," Anton supplied. "I thought the stuff was illegal these days." He watched the other add water to the potent liqueur.

The Russian chuckled. "Nothing is illegal in Tangier, my dear Anton, except the Party." He laughed at his own joke and handed the other his glass. He poured himself a jolt of vodka and returned to his chair. "To the world revolution, Anton."

The Negro saluted with his drink. "The revolution!"

They drank.

The Russian put down his glass and sighed. "I wish we were some place in our own lands, Anton. Dinner, many drinks, perhaps some girls, eh?"

Anton shrugged. "Another time, Kirill."

"Yes. As it is, we should not be seen together. Nor, for that matter should you even return here. The imperialists are not stupid. Very possibly, American and Common Europe espionage agents know of this headquarters. Not to speak of the Arab Union. I shall try to give you the whole story and your assignment in this next half hour. Then you should depart immediately."

The man they called Anton sipped his drink and relaxed in his chair. He looked at his superior without comment.

The Russian took another jolt of his water-clear drink. "Have you ever heard of El Hassan?"

The Negro thought a moment before saying, "Vaguely. Evidently an Arab, or possibly a Tuareg. North African nationalist. No, that wouldn't be the word, since he is international. At any rate, he seems to be drawing a following in the Sahara and as far south as the Sudan. Backs modernization and wants unity of all North Africa. Is he connected with the Party?"

The espionage chief was shaking his head. "That is the answer I expected you to give, and is approximately what anyone else would have said. Actually, there is no such person as El Hassan."

Anton frowned. "I'm afraid you're wrong there, Kirill. I've heard about him in half a dozen places. Very mysterious figure. Nobody seems to have seen him, but word of his program is passed around from Ethiopia to Mauretania."

The Russian was shaking his head negatively. "That I know. It's a rather strange story and one rather hard to believe if it wasn't for the fact that one of my operatives was in on the, ah, *manufacturing* of this Saharan leader."

"Manufacturing?"

"I'll give you the details later. Were you acquainted with Abraham Baker, the American comrade?"

"Were? I *am* acquainted with him. Abe is a friend as well as a comrade."

The Russian shook his head again. "Baker is dead, Anton. As you possibly know, his assignment for the past few years has been with a Reunited Nations African Development Project team, working in the Sahara region. We planted him there expecting the time to arrive when his services would be of considerable value. He worked with a five-man team headed by a Dr. Homer Crawford and largely the team's task was to eliminate bottlenecks that developed as the various modernization projects spread over the desert."

"But what's this got to do with *manufacturing* El Hassan?"

"I'm coming to that. Crawford's team, including Comrade Baker, usually disguised themselves as Enaden smiths. As such, their opinions carried little weight so in order to spread Reunited Nations propaganda, they hit upon the idea of imputing everything they said to this great hero of the desert, El Hassan."

"I see," the man called Anton said.

"Others, without knowing the origin of our El Hassan, took up the idea and spread it. These nomads are at an ethnic level where they want a hero to follow, a leader. So in order to give prestige to their teachings the various organizations trying to advance North Africa followed in Crawford's footsteps and attributed their teachings to this mysterious El Hassan."

"And it snowballed."

"Correct! But the point is that after a time Crawford came around to the belief that there should be a real El Hassan. That the primary task at this point is to unite the area, to break down the old tribal society and introduce the populace to the new world."

"He's probably right," the man called Anton growled. He finished his drink, got up from his chair and on his own went over and mixed another. "More vodka?" he asked.

"Please." The Russian held up his glass and went on talking. "Yes, undoubtedly that is what is needed at this point. As it is, things are trending toward a collapse. The imperialists, especially the Americans, of course, wish to dominate the area for their capitalistic purposes. The Arab Union wishes to take over *in toto* and make it part of their Islamic world. We, of course, cannot afford to let either succeed."

The Negro resumed his chair, sipped at his drink and listened, nodding from time to time.

Kirill Menzhinsky said, "As you know, Marx and Engels when founding scientific socialism had no expectation that their followers would first come to power in such backward countries as the Russia of 1917 or the China of 1949. In fact, the establishment of true socialism presupposes a highly developed industrial economy. It is simply impossible without such an economy. When Lenin came to power in 1917, as a result of the chaotic conditions that prevailed upon the military collapse of Imperial Russia, he had no expectation of going it alone, as the British would say. He expected immediate revolutions in

such countries as Germany and France and supposed that these more advanced countries would then come to the assistance of the Soviet Union and all would advance together to true socialism."

"It didn't work out that way," the man called Anton said dryly.

"No, it didn't. And Lenin didn't live to see the steps that Stalin would take in order to build the necessary industrial base in Russia." Kirill Menzhinsky looked about the room, almost as though checking to see if anyone else was listening. "Some of our more unorthodox theoreticians are inclined to think that had Lenin survived the assassin's bullet, that Comrade Stalin would have found it necessary to, ah, liquidate him."

The Russian cleared his throat. "Be that as it may, basic changes were made in Marxist teachings to fit into Stalin's and later Khrushchev's new concepts of the worker's State. And the Soviet Union muddled through, as the British have it. Today, the Soviet Complex is as powerful as the imperialist powers."

The espionage leader knocked back his vodka with a practiced stiff wristed motion. "Which brings us to the present and to North Africa." He leaned forward in emphasis. "Comrade, if the past half century and more has taught us anything, it is that you cannot establish socialism in a really backward country. In short, communism is impossible in North Africa at this point in her social evolution. Impossible. You cannot go directly from tribal society to communism. At this historic point, there is no place for the party's program in North Africa."

The man called Anton scowled.

The Russian waggled his hand negatively. "Yes, yes. I know. Ultimately, the whole world must become Soviet. Only that way will we achieve our eventual goal. But that is the long view. Realistically, we must face it, as the Yankees say. This area is not at present soil for our seed."

"Things move fast these days," the Negro growled. "Industrialization, education, can be a geometric progression."

His superior nodded emphatically. "Of course, and as little as ten or fifteen years from now, given progress at the present rate, perhaps there will be opportunity for our movement. But now? No."

The other said, "What has all this to do with El Hassan, or Crawford, or whatever the man's name is?"

"Yes," the Russian said. "Homer Crawford has evidently decided to become El Hassan."

"Ahhh."

"Yes. At this point, in short, he is traveling in our direction. He is doing what we realize must be done."

"Then we will support him?"

"Now we come to the point, Anton. Homer Crawford is not sympathetic to the Party. To the contrary. Our suspicion, although we have no proof, is that he killed Comrade Abe Baker, when Baker approached him on his stand in regard to the Party's long view."

"I see," the man called Anton said.

The Russian nodded. "We must keep in some sort of touch with him —some sort of control. If this El Hassan realizes his scheme and unites all North Africa, sooner or later we will have to deal with him. If he is antagonistic, we will have to find means to liquidate him."

"And my assignment . . . ?"

"He will be gathering followers at this point. Many followers, most of whom will be unknown to him. You will become one of them. Raise yourself to as high a rank as you find possible in his group. Become a close friend, if that can be done . . ."

"He killed Abe Baker, eh?"

The Russian frowned. "This is an assignment, Comrade Anton. There is no room for personal feelings. You are a good field man. Among the best. You are being given this task because the Party feels you are the man for it. Possibly it is an assignment that will take years in the fulfilling."

The Negro said nothing.

"Are there any questions?"

"Do we have any other operatives working on this?"

The frown became a scowl. "An Isobel Cunningham worked with Comrade Baker, but it has been suspected that she has been drifting away from the party these past few years. Her present status is unknown, but she is believed to be with Homer Crawford and his followers. Possibly she has defected. If so, you will take whatever measures seem necessary. You will be working almost completely on your own, Comrade. You must think on your feet, as the Yankees say."

The man called Anton thought a moment. He said, "You'd better give me as thorough a run down as possible on this Homer Crawford and his immediate followers."

Menzhinsky settled back in his chair and took up a sheaf of papers from the desk. "We have fairly complete dossiers. I'll give you the highlights, then you can take these with you to your hotel to study at leisure."

He took up the first sheet. "Homer Crawford. Born in Detroit of working-class parents. In his late teens interrupted his education to come to Africa where he joined elements of the F.L.N. in Morocco and took part in several forays into Algeria. Evidently was wounded and invalided back to the States where he resumed his education. When he came of military age, he joined the Marine Corps and spent the usual, ah, hitch I believe they call it. Following that, he resumed his education, finally taking a doctor's degree in sociology. He then taught for a time until the Reunited Nations began its African program. He accepted a position, and soon distinguished himself.'"

The Russian took up another paper. "According to Comrade Baker's reports, Crawford is an outstanding personality, dominating others, even in spite of himself. He would make a top party man. Idealistic, strong, clever, ruthless when ruthlessness is called for."

Menzhinsky paused for a moment, finding words hard to come by from an ultra-materialist. His tone went wry. "Comrade Baker also reported a somewhat mystical quality in our friend Crawford. An ability in times of emotional crisis to break down men's mental barriers against him. A *force* that . . ."

The other raised his eyebrows.

His superior chuckled, ruefully. "Comrade Baker was evidently much swayed by the man's personality. However, Anton, I might point out that similar reports have come down to us of such a dominating personality in Lenin, and, to a lesser degree, in Stalin." He twisted his mouth. "History leads us to believe that such personalities as Jesus and Mohammed seemed to have some power beyond that of we more mundane types."

"And the others?" Anton said.

The Russian took up still another paper. "Elmer Allen. Born of small farmer background on the outskirts of Kingston, on the island of Jamaica. Managed to work his way through the University of Kingston where he took a master's degree in sociology. At one time he was thought to be Party material and was active in several organizations that held social connotations, pacifist groups and so forth. However, he was never induced to join the Party. Upon graduation, he immediately took employment with the Reunited Nations and was assigned to Homer Crawford's team. He is evidently in accord with Crawford's aims as El Hassan."

The espionage chief took up another sheet. "Bey-ag-Akhamouk . . ."

The other scowled. "That can't be an American name."

"No. He is the only real African associated with Crawford at this point. He was evidently born a Taureg and taken to the States at an early age, three or four, by a missionary. At any rate, he was educated at the University of Minnesota where he studied political science. We have no record of where he stands politically, but Comrade Baker rated him as an outstanding intuitive soldier. A veritable genius in combat. He would seem to have had military experience somewhere, but we have no record of it. Our Bey-ag-Akhamouk seems somewhat of a mystery man."

The Russian sorted out another sheet. "Kenneth Ballalou, born in Louisiana, educated in Chicago. Another young man but evidently as capable as the others. He seems to be quite a linguist. So far as we know, he holds no political stand whatsoever."

Menzhinsky pursed his lips before saying, "The Isobel Cunningham I mentioned worked with the Africa for Africans Association with two colleagues, a Jacob Armstrong and Clifford Jackson. It is possible that these two, as well as Isobel Cunningham, have joined El Hassan. If so, we will have to check further upon them, although I understand Armstrong is rather elderly and hardly effective under the circumstances."

The man called Anton said evenly, "And this former comrade, Isobel Cunningham, has evidently joined

with Crawford even though he . . . was the cause of Abe Baker's death?"

"Evidently."

The Negro's eyes narrowed.

The other said, "And evidently she is a most intelligent and attractive young lady. We had rather high hopes for her formerly."

The Negro party member came to his feet and gathered up the sheaf of papers from the desk. "All right," he said. "Is there anything else?"

The espionage chief shook his head. "You do not need a step by step blueprint, Anton, that is why you have been chosen for this assignment. You are strongly based in Party doctrine. You know what is needed, we can trust you to carry on the Party's aims." After a pause, the Russian added, "Without being diverted by personal feelings."

Anton looked him in the face. "Of course," he said.

Fredric Ostrander was on the carpet.

His chief said, "You seem to have conducted yourself rather precipitately, Fred."

Ostrander shrugged in irritation. "I didn't have time to consult anyone. By pure luck, I spotted the Cunningham girl and since I knew she had affiliated herself with Crawford, I followed her."

The chief said dryly, "And tried to arrest the seven of them, all by yourself."

"I couldn't see anything else to do."

The C.I.A. official said, "In the first place, we have no legal jurisdiction here and you could have caused an international stink. The Russkies would just love to bring something like this onto the Reunited Nations floor. In the second place, you failed. How in the world did you expect to take on that number of men, especially Crawford and his team?"

Ostrander flushed his irritation. "Next time . . ." he began.

His chief waved a hand negatively. "Let's hope there isn't going to be next time, of this type." He took up a paper from his desk. "Here's your new job, Fred. You're to locate this El Hassan and keep in continual contact with him. If he meets with any sort of success at all, and frankly our agency doubts that he will, you will attempt to bring home to Crawford and his followers the fact that they are Americans, and orientate them in the direction of the West. Above all, you are to keep in touch with us and keep us informed on all developments. Especially notify us if there is any sign that our El Hassan is in communication with the Russkies or any other foreign element."

"Right," Ostrander said.

His chief looked at him. "We're giving you this job, Fred, because you're more up on it than anyone else. You're in at the beginning, so to speak. Now, do you want me to assign you a couple of assistants?"

"White men?" Ostrander said.

His higher-up scowled. "You know you're the only Negro in our agency, Fred."

Fredric Ostrander, his voice still even, said, "That's too bad, because anyone you assigned me who wasn't a Negro would be a hindrance rather than an assistant."

The other drummed his fingers on the table in irritation. He said suddenly, "Fred, do you think I ought to do a report to Greater Washington suggesting they take more Negro operatives into the agency?"

Ostrander said dryly, "You'd better if this department is going to get much work done in Africa." He stood up. "I suppose that the sooner I get onto the job, the better. Do you have any idea at all where Crawford and his gang headed after they left me unconscious in that filthy hut?"

"No, we haven't the slightest idea of where they might be, other than that they left your car abandoned at the Yoff airport."

"Oh, great," Fredric Ostrander complained. "They've gone into hiding in an area somewhat twice the size of the original fifty United States."

"Good luck," his chief said.

Rex Donaldson, formerly of Nassau in the British Bahamas, formerly of the College of Anthropology, Oxford, now field man for the African Department of the British Commonwealth working at expediting native development, was taking time out for needed and unwonted relaxation. In fact, he stretched out on his back in the most comfortable bed, in the most comfortable hotel, in the Niger town of Mopti. His hands were behind his head, and his scowling eyes were on the ceiling.

He was a small, bent man, inordinately black even for the Sudan and the loincloth costume he wore was ludicrous in the Westernized comfort of the hotel room. He was attired for the bush and knew that it was sheer laziness now that kept him from taking off for the Dogon country of the Canton de Sangha where he was currently working to bring down tribal prejudices against the coming of the schools. He had his work cut out for him in the Dogon, the old men, the tribal elders they called Hogons, instinctively knew that the coming of education meant subversion of their institutions and the eventual loss of Hogon power.

His portable communicator, sitting on the bedside table, buzzed and the little man grumbled a profanity and swung his crooked legs around to the floor. His eyebrows went up when he realized it was a priority call which probably meant from London.

He flicked the reception switch and a girl's face faded onto the screen. She said, "A moment, Mr. Donaldson, Sir Winton wants you."

"Right," Rex Donaldson said. Sir Winton, yet. Head of the African Department. Other than photographs, Donaldson had never seen his ultimate superior, not to mention speaking to him personally.

The girl's face faded out and that of Sir Winton Brett-Homes faded in. The heavy-set, heavy-faced Englishman looked down, obviously check-

ing something on his desk. He looked up again, said, "Rex Donaldson?"

"Yes, sir."

"I won't waste time on preliminaries, Donaldson. We've been discussing, here, some of the disconcerting rumors coming out of your section. Are you acquainted with this figure, El Hassan?"

The black man's eyes widened. He said, cautiously, "I have heard a good many stories and rumors."

"Yes, of course. They have been filtering into this office for more than a year. But thus far little that could be considered concrete has developed."

Rex Donaldson held his peace, waited for the other to go on.

Sir Winton said impatiently; "Actually, we are still dealing with rumors, but they are beginning to shape up. Evidently, this El Hassan has finally begun to move."

"Ahhh," the wiry little field man breathed.

The florid faced Englishman said, "As we understand it, he wishes to cut across tribal, national and geographic divisions in all North Africa, wishes to unite the whole area from Sudan to the Mediterranean."

"Yes," Donaldson nodded. "That seems to be his program."

Sir Winton said, "It has been decided that the interests of Her Majesty's government and that of the Commonwealth hardly coincide with such an attempt at this time. It would lead to chaos."

"Ahhh," Donaldson said.

Sir Winton wound it up, all but beaming. "Your instructions, then, are to seek out this El Hassan and combat his efforts with whatever means you find necessary. We consider you one of our most competent operatives, Donaldson."

Rex Donaldson said slowly, "You mean that he is to be stopped at all cost?"

The other cleared his throat. "You are given carte blanche, Donaldson. You and our other operatives in the Sahara and Sudan. Stop Al Hassan."

Rex Donaldson said flatly, "You have just received my resignation, Sir Winton."

"What . . . what!"

"You heard me," Donaldson said.

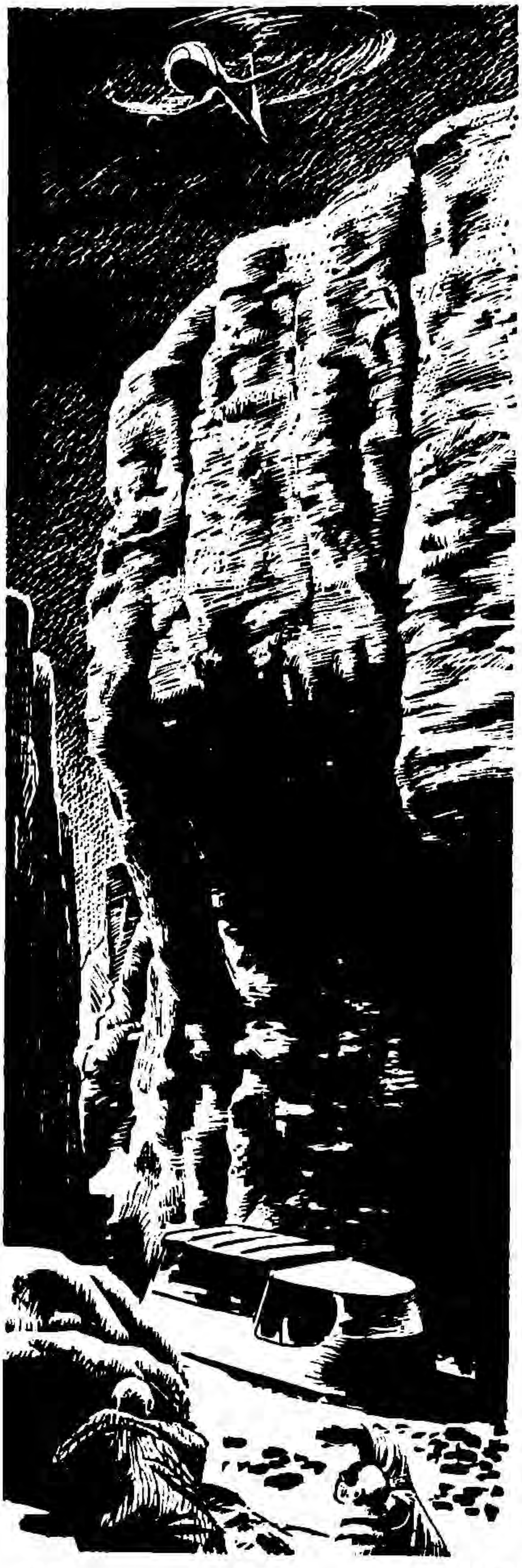
"But . . . but what are you going to do?" The heavy face of the African Department head was going a reddish-purple, which rather fascinated Donaldson but he had no time to further contemplate the phenomenon.

"I'm going to round up a few of my colleagues, of similar mind to my own, and then I'm going to join El Hassan," the little man snapped. "Good-by, Sir Winton."

He clicked the set off and then looked down at it. His dour face broke into a rare grin. "Now there's an ambition I've had for donkey's years," he said aloud. "To hang up on a really big mucky-muck."

IV

Following the attack of the unidentified rocketcraft, El Hassan's party was twice again nearly flushed by reconnoitering planes of unknown ori-



gin. They weren't making the time they wanted.

Beneath a projecting rock face over a gravel bottomed wadi, the two hover-lorries were hidden, whilst a slow-moving helio-jet made sweeping, high-altitude circlings above them.

The six stared glumly upward.

Cliff Jackson who was on the radio called out, "I just picked him up. He's called in to Fort Lamy reporting no luck. His fuel's running short and he'll be knocking off soon."

Homer Crawford rapped, "What language?"

"French," Cliff said, "but it's not his. I mean he's not French, just using the language."

Bey's face was as glum as any and there was a tic at the side of his mouth. He said now, "We've got to come up with something. Sooner or later one of them will spot us and this next time we won't have any fantastic breaks like Homer being able to knock him off with a Tommy-Noiseless. He'll drop a couple of neo-palms and burn up a square mile of desert including El Hassan and his whole crew."

Homer looked at him. "Any ideas. Bey?"

"No," the other growled.

Homer Crawford said, "Any of the rest of you?"

Isobel was frowning, bringing something back. "Why don't we travel at night?"

"And rest during the day?" Homer said.

Kenny said, "Parking where? We

just made it to this wadi. If we're caught out in the dunes somewhere when one of those planes shows up, we've had it. You couldn't hide a jackrabbit out there."

But Bey and Homer Crawford were still looking at Isobel.

She said, "I remember a story the Tuaregs used to tell about a raid some of them made back during the French occupation. They stole four hundred camels near Timbuktu one night and headed north. The French weren't worried. The next morning, they simply sent out a couple of aircraft to spot the Tuareg raiders and the camels. Like Kenny said, you couldn't hide a jackrabbit in dune country. But there was nothing to be seen. The French couldn't believe it, but they still weren't really worried. After all a camel herd can travel only thirty or so miles a day. So the next day the planes went out again, circling, circling, but they still didn't spot the thieves and their loot, nor the next day. Well, to shorten it, the Tuareg got their four hundred camels all the way up to Spanish Rio de Oro where they sold them."

She had their staring attention. "How?" Elmer blurted.

"It was simple. They traveled all night and then, at dawn, buried the camels and themselves in the sand and stayed there all day."

Homer said, "I'm sold. Boys, I hope you're in physical trim because there's going to be quite a bit of digging for the next few days."

Cliff groaned. "Some Minister of the Treasury," he complained. "They give him a shovel instead of a bankbook."

Everyone laughed.

Bey said, "Well, I suppose we stay here until nightfall."

"Right," Homer said. "Whose turn is it to pull cook duty?"

Isobel said menacingly, "I don't know whose turn it is, but I know I'm going to do the cooking. After that slumgullion Kenny whipped up yesterday, I'm a perpetual volunteer for the job of chef—strictly in self-defense."

"That was a cruel cut," Kenny protested, "however, I hereby relinquish all my rights to cooking for this expedition."

"And me!"

"And me!"

"O.K.," Homer said, "so Isobel is Minister of the Royal Kitchen." He looked at Elmer Allen. "Which reminds me. You're our junior theoretician. Are we a monarchy?"

Elmer Allen scowled sourly and sat down, his back to the wadi wall. "I wouldn't think so."

Isobel went off to make coffee in the portable galley in the rear of the second hovercraft. The others brought forth tobacco and squatted or sat near the dour Jamaican. Years in the desert had taught them the nomad's ability to relax completely given opportunity.

"So if it's not a monarchy, what'll we call El Hassan?" Kenny demanded.

Elmer said slowly, thoughtfully, "We'll call him simply *El Hassan.* Monarchies are of the past, and El

Hassan is the voice of the future, something new. We won't admit he's just a latter-day tyrant, an opportunist seizing power because it's there crying to be seized. Actually, El Hassan is in the tradition of Genghis Khan, Tamerlane, or, more recently, Napoleon. But he's a modern version, and we're not going to hang the old labels on him."

Isobel had brought the coffee. "I think you're right," she said.

"Sold," Homer agreed. "So we aren't a monarchy. We're a tyranny." His face had begun by expressing amusement, but that fell off. He added, "As a young sociologist, I never expected to wind up a literal tyrant."

Elmer Allen said, "Wait a minute. See if I can remember this. Comes from Byron." He closed his eyes and recited:

"The tyrant of the Chersonese
Was freedom's best and bravest friend.
That tyrant was Miltiades,
Oh that the present hour would lend
Another despot of the kind.
Such bonds as his were sure to bind."

Isobel, pouring coffee, laughed and said, "Why Elmer, who'd ever dream you read verse, not to speak of memorizing it, you old sourpuss."

Elmer Allen's complexion was too dark to register a flush.

Homer Crawford said, "Yeah, Miltiades. Seized power, whipped the Athenians into shape to the point where they were able to take the Persians at Marathon, which should have been impossible." He looked around at the others, winding up with Elmer. "What happened to Miltiades after Marathon and after the emergency was over?"

Elmer looked down into his coffee. "I don't remember," he lied.

There was a clicking from the first hover-lorry, and Cliff Jackson put down his coffee, groaned his resentment at fate, and made his way to the vehicle and the radio there.

Bey motioned with his head. "That's handy, our still being able to tune in on the broadcasts the African Development Project makes to its teams."

Kenny said, "Not that what they've been saying is much in the way of flattery."

Bey said, "They seem to think we're somewhere in the vicinity of Bidon Cinq."

"That's what worries me," Homer growled. He raked his right hand back through his short hair. "If they think we're in Southern Algeria, what are these planes doing around here? We're hundreds of miles from Bidon Cinq."

Bey shot him an oblique glance. "That's easy. That plane that tried to clobber us, and these others that have been trying to search us out, aren't really Reunited Nations craft. They're someone else."

They all looked at him. "Who?" Isobel said.

"How should I know? It could be almost anybody with an iron in the North African fire. The Soviet Com-

plex? Very likely. The British Commonwealth or the French Community? Why not? There're elements in both that haven't really accepted giving up the old colonies and would like to regain them in one way or the other. The Arab Union? Why comment? Common Europe? Oh, Common Europe would love to have a free hand exploiting North Africa."

"You haven't mentioned the United States of the Americas," Elmer said dryly. "I hope you haven't any prejudices in favor of the land of your adoption, Mr. Minister of War."

Bey shrugged. "I just hadn't got around to her. Admittedly with the continued growth of the Soviet Complex and Common Europe, the States have slipped from the supreme position they occupied immediately following the Second War. The more power-happy elements are conscious of the ultimate value of control of Africa and doubly conscious of the danger of it falling into the hands of someone else. Oh, never fear, those planes that have been pestering us might belong to anybody at all."

Cliff Jackson hurried back from his radio, his face anxious. "Listen," he said. "That was a high priority flash, to all Reunited Nations teams. The Arab Union has just taken Tamanrasset. They pushed two columns out of Libya, evidently one from Ghat and one from further north near Ghadamès."

Homer Crawford was on his feet, alert. "Well . . . why?"

Cliff had what amounted to accusation on his face. "Evidently, the El Hassan rumors are spreading like wildfire. There've been more riots in Mopti, and the Reunited Nations buildings in Adrar have been stormed by mobs demonstrating for him. The Arab Union is moving in on the excuse of protecting the country against El Hassan."

Kenny Ballalou groaned, "They'll have half their Arab Legion in here before the week's out."

Cliff finished with, "The Reunited Nations is throwing a wingding. Everybody running around accusing and threatening, and, as per usual, getting nowhere."

Homer Crawford's face was working in thought. He shook his head at Kenny. "I think you're wrong. They won't send the whole Arab Legion in. They'll be afraid to. They'll want to see first what everybody else does. They know they can't stand up to a slugging match with any of the really big powers. They'll stick it out for a while and watch developments. We have, perhaps, two weeks in which to operate."

"Operate?" Cliff demanded. "What do you mean, operate?"

Homer's eyes snapped to him. "I mean to recapture Tamanrasset from the Arab Union, seize the radio and television station there, and proclaim El Hassan's regime."

The big Californian's eyes bugged at him. "You mean the six of us? There'll be ten thousand of them."

"No," Homer said decisively. "Nothing like that number. Possibly a thousand, if that many. Logistics simply doesn't allow a greater num-

ber, not on such short notice. They've put a thousand or so of their crack troops into the town. No more."

Cliff wailed, "What's the difference between a thousand and twenty thousand, so far as five men and a girl are concerned?"

The rest were saying nothing, but following the debate.

Crawford explained, not to just Cliff but to all of them. "Actually, the Arab Union is doing part of our job for us. They've openly declared that El Hassan is attempting to take over North Africa, that he's raising the tribes. Well, good. We didn't have the facilities to make the announcement ourselves. But now the whole world knows it."

"That's right," Elmer said, his face characteristically sullen. "Every news agency in the world is playing up the El Hassan story. In a matter of days, the most remote nomad encampment in the Sahara will know of it, one way or the other."

Homer Crawford was pacing, socking his right fist into the palm of the left. "They've given us a rallying *raison d'etre.* These people might be largely Moslem, especially in the north, but they have no love for the Arab Union. For too long the slave raiders came down from the northeast. Given time, Islam might have moved in on the whole of North Africa. But not this way, not in military columns."

He swung to Bey. "You worked over in the Teda country, before joining my team, and speak the Sudanic dialects. Head for there, Bey. Proclaim El Hassan. Organize a column. We'll rendezvous at Tamanrasset in exactly two weeks."

Bey growled, "How am I supposed to get to Faya?"

"You'll have to work that out yourself. Tonight we'll drop you near In Guezzam, they have one of the big solar pump, afforestation developments there. You should be able to, ah, requisition a truck, or possibly even a 'copter or aircraft. You're on your own, Bey."

"Right."

Homer spun to Kenny Ballalou. "You're the only one of us who gets along in the dialect of Hassania. Get over to Nemadi country and raise a column. There are no better scouts in the world. Two weeks from today at Tamanrasset."

"Got it. Drop me off tonight with Bey, we'll work together until we liberate some transport."

Bey said, "It might be worth while scouting in In Guezzam for a day or two. We might pick up a couple of El Hassan followers to help us along the way."

"Use your judgment. Elmer!"

Elmer groaned sourly, "I knew my time'd come."

"Up into Chaambra country for you. Take the second lorry. You've got a distance to go. Try to recruit former members of the French Camel Corps. Promise just about anything, but only remember that one day we'll have to keep the promises. El Hassan can't get the label of phony hung on him."

"Chaambra country," Elmer said. "Oh great. Arabs. I can just see what luck I'm going to have rousing up Arabs to fight other Arabs, and me with a complexion black as . . ."

Homer snapped at him, "They won't be following you, they'll be following El Hassan . . . or at least the El Hassan dream. Play up the fact that the Arab Union is largely not of Africa but of the Middle East. That they're invading the country to swipe the goats and violate the women. Dig up all the old North African prejudices against the Syrians and Egyptians, and the Saudi-Arabian slave traders. You'll make out."

Cliff said, nervously, "How about me, Homer?"

Homer looked at him. Cliff Jackson, in spite of his fabulous build, hadn't a fighting man's background.

Homer grinned and said, "You'll work with me. We're going into Tuareg country. Whenever occasion calls for it, whip off that shirt and go strolling around with that overgrown chest of yours stuck out. The Tuareg consider themselves the best physical specimens in the Sahara, which they are. They admire masculine physique. You'll wow them."

Cliff grumbled, "Sounds like vaudeville."

Isobel said softly, "And me, El Hassan? What do I do?"

Homer turned to her. "You're also part of headquarters staff. The Tuareg women aren't dominated by their men. They still have a strong element of descent in the matrilinear line and women aren't second-class citizens. You'll work on pressuring them. Do you speak Tamaheq?"

"Of course."

Homer Crawford looked up into the sky, swept it. The day was rapidly coming to an end and nowhere does day become night so quickly as in the ergs of the Sahara.

"Let's get underway," Crawford said. "Time's a wastin'."

The range of the Ahaggar Tuareg was once known, under French administration, as the Annexe du Hoggar, and was the most difficult area ever subdued by French arms—if it was ever subdued. At the battle of Tit on May 7, 1902 the Camel Corps, under Cottenest, broke the combined military power of the Tuareg confederations, but this meant no more than that the tribes and clans carried on nomadic warfare in smaller units.

The Ahaggar covers roughly an area the size of Pennsylvania, New York, Virginia and Maryland combined, and supports a population of possibly twelve thousand, which includes about forty-five hundred Tuareg, four thousand Negro serf-slaves, and some thirty-five hundred scorned sedentary Haratin workers. The balance of the population consists of a handful of Enaden smiths and a small number of Arab shopkeepers in the largest of the sedentary centers. Europeans and other whites are all but unknown.

It is the end of the world.

Contrary to Hollywood inspired belief, the Sahara does not consist

principally of sand dunes, although these, too, are present, and all but impassable even to camels. Traffic, through the millennia, has held to the endless stretches of gravelly plains and the rock ribbed plateaus which cover most of the desert. The great sandy wastes or ergs cover roughly a fifth of the entire Sahara, and possibly two thirds of this area consists of the rolling sandy plains dotted occasionally with dunes. The remaining third, or about one fifteenth of the total Sahara, is characterized by the dune formations of popular imagination.

It was through this latter area that Homer Crawford, now with but one hover-lorry, and accompanied by Isobel Cunningham and Clifford Jackson, was heading.

For although the spectacular major dune formations of the Great Erg have defied wheeled vehicles since the era of the Carthaginian chariots, and even the desert born camel limits his daily travel in them to but a few miles, the modern hovercraft, atop its air cushion jets, finds them of only passing difficulty to traverse. And the hovercraft leaves no trail.

Cliff Jackson scowled out at the identical scenery. Identical for more than two hundred miles. For twice that distance, they had seen no other life. No animal, no bird, not a sprig of cactus. This was the Great Erg.

He muttered, "This country is so dry even the morning dew is dehydrated."

Isobel laughed—she, too, had never experienced this country before. "Why, Cliff, you made a funny!"

They were sitting three across in the front seat, with Homer Crawford at the wheel, and now all three were dressed in the costume of the Kel Rela tribe of the Ahaggar Tuareg confederation. In the back of the lorry were the jerrycans of water and the supplies that meant the difference between life and mumification from sun and heat.

Cliff turned suddenly to the driver. "Why here?" he said bitterly. "Why pick this for a base of operations? Why not Mopti? Ten thousand Sudanese demonstrated for El Hassan there less than two weeks ago. You'd have them in the palm of your hand."

Homer didn't look up from his work at wheel, lift and acceleration levers. To achieve maximum speed over the dunes, you worked constantly at directing motion not only horizontally but vertically.

He said, "And the twenty and one enemies of the El Hassan movement would have had us in their palms. Our followers in Mopti can take care of themselves. If this movement is ever going to be worth anything, the local characters are going to have to get into the act. The current big thing is not to allow El Hassan and his immediate troupe to be eliminated before full activities can get under way. For the present, we're hiding out until we can gather forces enough to free Tamanrasset."

"Hiding out is right," Cliff snorted. "I have a sneaking suspicion that not only will they never find us, but we'll never find them again."

Homer laughed. "As a matter of fact, we're not so far right now from Silet where there's a certain amount of water—if you dig for it—and a certain amount of the yellowish grass and woody shrubs that the bedouin depend on. With luck, we'll find the Amenokal of the Tuareg there."

"Amenokal?"

"Paramount chief of the Ahaggar Tuaregs."

The dunes began to fall away and with the butt of his left hand Crawford struck the acceleration lever. He could make more time now when less of his attention was drawn to the ups and downs of erg travel.

Patches of thorny bush began to appear, and after a time a small herd of gazelle were flushed and high tailed their way over the horizon.

Isobel said, "Who is this Amenokal you mentioned?"

"These are the real Tuareg, the comparatively untouched. They've got three tribes, the Kel Rela, the Tégéhé Mellet and the Taitoq, each headed by a warrior clan which gives its name to the tribe as a whole. The chief of the Kel Rela clan is also chief of the Kel Rela tribe and automatically paramount chief, or Amenokal, of the whole confederation. His name is Melchizedek."

"Do you think you can win him over?" Isobel said.

"He's a smart old boy. I had some dealings with him over a year ago. Gave him a TV set in the way of a present, hoping he'd tune in on some of our Reunited Nations propaganda. He's probably the most conservative of the Tuareg leaders."

Her eyebrows went up. "And you expect to bring him around to the most liberal scheme to hit North Africa since Hannibal?"

He looked at her from the side of his eyes and grinned. "Remember Roosevelt, the American president?"

"Hardly."

"Well, you've read about him. He came into office at a time when the country was going to economic pot by the minute. Some of the measures he and his so-called brain trust took were immediately hailed by his enemies as socialistic. In answer, Roosevelt told them that in times of social stress the true conservative is a liberal, since to preserve, you have to reform. If Roosevelt hadn't done the things he did, back in the 1930s, you probably would have seen some *real* changes in the American socio-economic system. Roosevelt didn't undermine the social system of the time, he preserved it."

"Then, according to you, Roosevelt was a conservative," she said mockingly.

Crawford laughed. "I'll go even further," he said. "When social changes are pending and for whatever reason are not brought about, then reaction is the inevitable alternative. At such a time then—when sweeping socio-economic change is called for—any reform measures proposed are concealed measures of reaction, since they tend to maintain the *status quo*."

"Holy Mackerel," Cliff protested.

Accept that and Roosevelt was not only not a liberal, but a reactionary. Stop tearing down my childhood heroes."

Isobel said, "Let's get back to this Amenokal guy. You think he's smart enough to see his only chance is in going along with . . ."

Homer Crawford pointed ahead and a little to the right. "We'll soon find out. This is a favorite encampment of his. With luck, he'll be there. If we can win him over, we've come a long way."

"And if we can't?" Isobel said, her eyebrows raised again.

"Then it's unfortunate that there are only three of us," Homer said simply, without looking at her.

There were possibly no more than a hundred Tuareg in all in the nomad encampment of goat leather tents when the solar powered hovercraft drew up.

When the air cushion vehi-

cle stopped before the largest tent, Crawford said beneath his breath, "The Amenokal is here, all right. Cliff, watch your teguelmoust. If any of these people see more than your eyes, your standing has dropped to a contemptible zero."

The husky Californian secured the lightweight cotton, combination veil and turban well up over his face. Earlier, Crawford had shown him how to wind the ten-foot long, indigo-blue cloth around the head and features.

Isobel, of course, was unveiled, Tuareg fashion, and wore baggy trousers of black cotton held in place with a braided leather cord by way of drawstring and a gandoura upper-garment consisting of a huge rectangle of cloth some seven to eight feet square and folded over on itself with the free corners sewed together so as to

leave bottom and most of both sides open. A V-shaped opening for her head and neck was cut out of a fold at the top, and a large patch had been sewed inside to make a pocket beneath her left breast. She wasn't exactly a Parisian fashion plate.

Even as they stepped down from the hovercraft, immediately after it had drifted to rest on the ground, an elderly man came from the tent entrance.

He looked at them for a moment, then rested his eyes exclusively on Homer Crawford.

"*La Bas,* El Hassan," he said through the cloth that covered his mouth.

Homer Crawford was taken aback, but covered the fact. "There is no evil," he repeated the traditional greeting. "But why do you name me El Hassan?"

A dozen veiled desert men, all with the Tuareg sword, several with modern rifles, had formed behind the Tuareg chief.

Melchizedek made a movement of hand to mouth, in a universal gesture of amusement. "Ah, El Hassan," he said, "you forget you left me the magical instrument of the Roumi."

Crawford was mystified, but he stood in silence. What the Tuareg paramount chief said now made considerable difference. As he recalled his former encounter with the Ahaggar leader, the other had been neither friendly nor antagonistic to the Reunited Nations team Crawford had headed in their role as itinerant desert smiths.

The Amenokal said, "Enter then my tent, El Hassan, and meet my chieftains. We would confer with you."

The first obstacle was cleared. Subduing a sigh of relief, Homer Crawford turned to Cliff. "This, O Amenokal of all the Ahaggar, is Clif ben Jackson, my Vizier of Finance."

The Amenokal bowed his head slightly, said, "*La Bas.*"

Cliff could go that far in the Tuareg tongue. He said, "*La Bas.*"

The Amenokal said, looking at Isobel, "I hear that in the lands of the Roumi women are permitted in the higher councils."

Homer said steadily, "This I have also been amazed to hear. However, it is fitting that my followers remain here while El Hassan discusses matters of the highest importance with the Amenokal and his chieftains. This is the Sitt Izubahil, high in the councils of her people due to the great knowledge she has gained by attending the new schools which dispense rare wisdom, as all men know."

The Amenokal courteously said, "*La Bas,*" but Isobel held her peace in decency amongst men of chieftain rank.

When Homer and the Tuaregs had disappeared into the tent, she said to Cliff, "Stick by the car, I'm going to circulate among the women. Women are women everywhere. I'll pick up the gossip, possibly get something Homer will miss in there."

A group of Tuareg women and children, the latter stark naked, had gathered to gape at the strangers. Iso-

bel moved toward them, began immediately breaking the ice.

Under his breath, Cliff muttered, "What a gal. Give her a few hours and she'll form a Lady's Aid branch, or a bridge club, and where else is El Hassan going to pick up so much inside information?"

The tent, which was of the highly considered mouflon skins, was mounted on a wooden frame which consisted of two uprights with a horizontal member laid across their tops. The tent covering was stretched over this framework with its back and sides pegged down and the front, which faced south, was left open. It was ten feet deep, fifteen feet wide and five feet high in the middle.

The men entered and filed to the right of the structure where sheepskins and rugs provided seating. The women and children, who abided ordinarily to the left side, had vanished for this gathering of the great.

They sat for a time and sipped at green tea, syrup sweet with mint and sugar, the tiny cups held under the teguelmoust so as not to obscenely reveal the mouth of the drinker.

Finally, Homer Crawford said, "You spoke of the magical instrument of the Roumi which I gave you as gift, O Amenokal, and named me El Hassan."

Several of the Tuareg chuckled beneath their veils but Crawford could read neither warmth nor antagonism in their amusement.

The elderly Melchizedek nodded. "At first we were bewildered, O El Hassan, but then my sister's son, Guémama, fated perhaps one day to become chief of the Kel Rela and Amenokal of all the Ahaggar, recalled the tales told by the storytellers at the fire in the long evenings."

Crawford looked at him politely.

Melchizedek's laugh was gentle. "But each man has heard, in his time, O El Hassan, of the ancient Calif Haroud El Raschid of Baghdad."

Crawford's mind went into high gear, as the story began to come back to him. From second into high gear, and he could have blessed these bedouin for handing him a piece of publicity gobblydygook worthy of Fifth Avenue's top agency.

He held up a hand as though in amusement at being discovered. "Wallahi, O Amenokal, you have discovered my secret. For many months I have crossed the deserts disguised as a common Enaden smith to seek out all the people and to learn their wishes and their needs."

"Even as Haroud el Raschid in the far past," one of the subchiefs muttered in satisfaction, "used to disguise himself as a lowborn dragoman and wander the streets of Baghdad."

"But how did you recognize me?" Homer said.

The Amenokal said in reproof, "But verily, your name is on all lips. The Roumi have branded you common criminal. You are to be seized on sight and great reward will be given he who delivers you to the authorities." He spoke without inflection, and Crawford could read neither support nor animosity—nor

greed for the reward offered by El Hassan's enemies. He gathered the impression that the Tuareg chief was playing his cards close to his chest.

"And what else do they say?"

The elderly Melchizedek went on slowly, "They say that El Hassan is in truth a renegade citizen of a far away Roumi land and that he attempts to build a great confederation in North Africa for his own gain."

One of the others chuckled and said, "The Roumi on the magical instrument are indeed great liars as all can see."

Homer looked at him questioningly.

The other said, laughing, "Who has ever heard of a black Roumi? And you, O El Hassan, are as black as a Bela."

The Amenokal finished off the mystery of Crawford's recognition. "Know, El Hassan, that whilst you were here before, one of the slaves that served you for pay shamelessly looked upon your face in the privacy of your tent. It was this slave who recognized your face when the Roumi presented it on the magic instrument, calling upon all men to see you and to brand you enemy."

So that was it. The Reunited Nations, and probably all the rest, had used their radio and TV stations to broadcast a warning and offer a reward for Homer and his followers. Old Sven was losing no time. This wasn't so good. A Tuareg owes allegiance to no one beyond clan, tribe and confederation. All others are outside the pale and any advantage, monetary or otherwise, to be gained by exploiting a stranger is well within desert mores.

He might as well bring it to the point. Crawford said evenly, "And I have entered your camp alone except for two followers. Your people are many. So why, O Amenokal, have you not seized me for the reward the Roumi offer?"

There was a moment of silence and Homer Crawford sensed that the subchieftains had leaned forward in anticipation, waiting for their leader's words. Possibly they, too, could not understand.

The Tuareg leader finished his tea.

"Because, El Hassan, we yet have not heard the message which the Roumi are so anxious that you not be allowed to bring the men of the desert. The Roumi are great liars, and great thieves, as each man knows. In the memory of those still living, they have stolen of the bedouin and robbed him of land and wealth. So now we would hear of what you say, before we decide."

"Spoken like a true Amenokal, a veritable Suliman ben Davud," Homer said with a heartiness he could only partly feel. At least they were open to persuasion.

For a long moment he stared down at the rug upon which they sat, as though deep in contemplation.

"These words I speak will be truly difficult to hear and accept, O men of the veil," he said at last. "For I speak of great change, and no man loves change in the way of his life."

"Speak, El Hassan," Melchizedek said flatly. "Great change is everywhere upon us, as each man knows, and none can tell how to maintain the ways of our fathers."

"We can fight," one of the younger men growled.

The Amenokal turned to him and grunted scorn. "And would you fight against the weapons of the djinn and afrit, O Guémama? Know that in my youth I was distant witness to the explosion of a great weapon which the accursed Franzawi discharged south of Reggan. Know, that this single explosion, my sister's son, could with ease have destroyed the total of all the tribesmen of the Ahaggar, had they been gathered."

"And the Roumi have many such weapons," Crawford added gently.

The eyes of the tribal headmen came back to him.

"As each man knows," Crawford continued, "change is upon the world. No matter how strongly one wills to continue the traditions of his fathers, change is upon us all. And he who would press against the sand storm, rather than drifting with it, lasts not long."

One of the subchiefs growled, "We Tuareg love not change, El Hassan."

Crawford turned to him. "That is why I and my viziers have spent long hours in *ekhwan*, in great council, devoted to the problems of the Tuareg and how they can best fit into the new Africa that everywhere awakes."

They stirred in interest now. The Tuareg, once the Scourge of the Sahara, the Sons of Shaitan and the Forgotten of Allah, to the Arab, Teda, Moroccan and other fellow inhabitants of North Africa, were of recent decades developing a tribal complex. Robbed of their nomadic-bandit way of life by first the French Camel Corps and later by the efforts of the Reunited Nations, they were rapidly descending into a condition of poverty and defensive bewilderment. Not only were large numbers of former bedouin drifting to the area's sedentary centers, an act beyond contempt within the memory of the elders, but the best elements of the clans were often deserting Tuareg country completely and defecting to the new industrial centers, the dam projects, the afforestation projects, the new oases irrigated with the solar-powered pumps.

"Speak, El Hassan," the Amenokal ordered. And unconsciously, he, too, leaned forward, as did his subchiefs. The Ahaggar Tuareg were reaching for straws, unconsciously seeking shoulders upon which to lay their unsolvable problems.

"Let me, O chiefs of the Tuareg, tell of a once strong tribe of warriors and nomads who lived in the far country in which I was born," Crawford said. The desert man loves a story, a parable, a tale of the strong men of yesteryear.

Melchizedek clapped his hands in summons and when a slave appeared, called for *narghileh* water pipes. When all had been supplied, they relaxed, bits in mouths and looked again at Homer Crawford.

"They were called," he intoned,

"the Cheyenne. The Northern Cheyenne, for they had a sister tribe to the South. And on all the plains of this great land, a land, verily, as large as all that over which the Tuareg confederations now roam, they were the greatest huntsmen, the greatest warriors. All feared them. They were the lords of all."

"Ai," breathed one of the older men. "As were the Tuareg before the coming of the cursed Franzawi and the other Nazrani."

"But in time," Crawford pursued, "came the new ways to the plains, and these men who lived largely by the chase began to see the lands fenced in for farmers, began to see large cities erected on what were once tribal areas, and to see the iron railroads of the new ways begin to spread out over the whole of the territory which once was roamed only by the Cheyennes and such nomadic tribes."

"Ai," a muffled mouth ejected.

Homer Crawford looked at the younger Targui, Guémama, the Amenokal's nephew. "And so," he said, "they fought."

"Wallahi!" Guémama breathed.

Homer Crawford looked about the circle. "Never has tribe fought as did the Cheyenne. Never has the world seen such warriors, with the exception, of course, of the Ahaggar Tuareg. Never were such raids, never such bravery, never such heroic deeds as were performed by the warriors of the Cheyennes and their women, and their old people and their children. Over and over they defeated the cavalry and the infantry of the newcomers who would change the old ways and bring the new to the lands of the Cheyennes."

The bedouin were staring in fascination, their water pipes forgotten.

"And then ?" the Amenokal demanded.

"The new ways taught the enemy how to make guns, and artillery, and finally Gatling guns, which today we call machine guns. And once a brave warrior might prevail against a common man armed with the weapons of the new ways, and even twice he might. But the numbers of the followers of the new ways are as the sands of the Great Erg and in time bravery means nothing."

"It is even so," someone growled. "They are as the sands of the erg, and they have the weapons of the djinn, as each man knows."

"And what happened in the end, O El Hassan?"

His eyes swept them all. "They perished," Homer said. "Today in all the land where once the Cheyenne pursued the game there is but a handful of the tribe alive. And they have become nothing people, no longer warriors, no longer nomads, and they are scorned by all for they are poor, poor, poor. Poor in mind and spirit and in property and they have not been able to adjust to the ways of the new world."

Air went out of the lungs of the assembled Tuareg.

The Amenokal looked at him. "This is verily the truth, El Hassan?"

"My head upon it," Crawford said.

"And why do you tell us of these Cheyenne, these great warriors of the plains of the land of your birth? The story fails to bring joy to hearts already heavy with the troubles of the Tuareg."

It was time to play the joker.

Crawford said carefully, "Because there was no need, O Amenokal of all the Ahaggar, for the Cheyenne to disappear before the sandstorm of the future. They could have ridden before it and today occupy a position of honor and affluence in their former land."

They stared at him.

"And give up the old ways?" Guémama demanded. "Become no longer nomads, no longer honorable warriors, but serfs, slaves, working with one's hands upon the land and with the oil-dirty machines of the Roumi?"

The chiefs muttered angrily.

Crawford said hurriedly, "No! Never! In our great conferences, my viziers and I decided that the Tuareg could never so change. The Tuareg must die, as did the Northern Cheyenne before he would become a city dweller, a worker of the land."

"Bismillah!" someone muttered.

"Too often," Crawford explained, "do the bringers of these things of the future, be they Roumi or others, fail to utilize the potential services of the people of the lands they oversweep."

"I do not understand you, El Hassan," Melchizedek grumbled. "There is no room for the Tuareg in this new world of bringing trees to the desert, of the great trucks which speed across the erg a score of time the pace of a *hejin* racing camel, of larger and ever larger oases with their great towns, their schools, their new industries. If the Tuareg remains Tuareg, he cannot fit into this new world, it destroys the old traditions, the old way which is the Tuareg way."

Homer Crawford now turned on the pressure. His voice took on overtones of the positive, his personality seemed to reach out and seize them, and even his physical stature seemed to grow.

"Some indeed of the ways of the bedouin must go," he entoned, "but the Tuareg will survive under my leadership. A people who have throve a millennium and more in the great wastes of the Sahara have strong survival characteristics and will blossom, not die, in my new world. Know, O Melchizedek, that it has been decided that the Ahaggar Tuareg will be the heart of my Desert Legion. In times of conflict, armed with the new arms, and riding the new vehicles, they will adapt their old methods of warfare to this new age. In times of peace they will patrol the new forests, watching for fire and other disaster, they will become herdsmen of the new herds and be the police and rescue forces of this wide area. As the Cheyennes of the olden times of the land of my birth could have become herdsmen and forest rangers and have performed similar tasks had they been shown the way."

Homer Crawford let his eyes go

from one of them to the next, and his personality continued to dominate them.

The Amenokal ran his thin, aged hand through the length of his white beard beneath his teguelmoust and contemplated this stranger come out of the ergs to lead his people to still greater changes than those they had thus far rebelled against.

Crawford realized that the Targui was divided in opinion and inwardly the American was in a cold sweat. But his voice registered only supreme confidence. "Under my banner, all North Africa will be welded into one. And all the products of the land will be available in profusion to my faithful followers. The finest wheat for cous cous from Algeria and Tunis, the finest dates and fruits from the oases to the north, the manufactured products of the factories of Dakar and Casablanca. For Africa has always been a poor land but will become a rich one with the new machines and techniques that I will bring."

The Amenokal raised a hand to stem the tide of oratory. "And what do you ask of us now, El Hassan?"

Instead of to the older man, Crawford turned his eyes to the face of Guémama, the leader of the young clansmen. "Now my people are gathering to establish the new rule. Teda from the east, Chaambra from the north, Sudanese from the south, Nemadi, Moors and Rifs from the west. We rendezvous in ten days from now at Tamanrasset where the Arab Legion dogs have seized the city as they wish to seize all the lands of the Sahara and Sudan for the corrupt Arab Union politicians."

Crawford came to his feet. His voice took on an edge of command. "You will address your scouts and warriors and each will ride off on the swiftest camels at your command to raise the Tuareg tribes. And the clans of the Kel Rela will unite with the Taitoq and the Tégéhé Mellet in a great harka at this point and we will ride together to sweep the Arab Legion from the lands of El Hassan."

Guémama was on his feet, too. "Bilhana!" he roared. "With joy."

The others were arising in excitement, all but Melchizedek, who still stroked his gray streaked beard beneath his teguelmoust. The Amenokal had seen much of desert war in his day and knew the horror of the new weapons possessed by the crack troops of the Arab Legion.

But his aged shoulders shrugged against the inevitable.

Crawford said, the ring of authority in his voice. "What does the Amenokal of all the Ahaggar say?" He had no intention of antagonizing the Tuareg chief by going over his head and directly to the people.

"Thou art El Hassan," Melchizedek said, his voice low, "and undoubtedly it is fated that the Tuareg follow you, for verily there is no way else to go, as each man knows."

"Wallahi!" Guémama crowed jubilantly.

« To be concluded »

The Analytical Laboratory

Every now and then, readers who haven't spotted our method of figuring out this point-score business ask questions . . . so every now and then we have to repeat the system.

Reader votes are recorded on a tabulation sheet; a vote for first place gives a story a "1"; second place gets it a "2", *und so weiter.*

When count-up time comes, each story's vote-score is totaled, and then divided by the number of votes on that story. If the story had got nothing but "1" votes, this would, of course, give a quotient of "1"—and we'd throw out the votes and start looking for who did the cheating and how it was worked. No audience as diverse as Analog's agrees one hundred per cent on anything—except possibly that the Earth is quite likely rotating on its axis; they certainly wouldn't agree that the Sun will rise tomorrow.

But if someone gets a score of 376 with 280 votes, he has a "point score" of 376/280 or 1.3+ and wins first place in order. Since first place earns him a 1¢ a word bonus, said author likes having readers like his stories.

The scores for three months follow:

PLACE	STORY	AUTHOR	POINTS
	February 1962		
1.	The Great Gray Plague	*Raymond F. Jones*	1.42
2.	Hail to the Chief	*Sam and Janet Argo*	1.92
3.	Pandemic	*J. F. Bone*	3.25
4.	Master of None	*Neil Goble*	3.32
	March 1962		
1.	Epilogue	*Poul Anderson*	1.55
2.	His Master's Voice	*Randall Garrett*	3.15
3.	Uncalculated Risk	*Christopher Anvil*	3.40
	Rough Beast	*Roger Dee*	
4.	The Iron Jackass	*John Brunner*	3.50
	April 1962		
1.	Mercenary	*Mack Reynolds*	1.75
2.	A Salve is a Slave	*H. Beam Piper*	2.51
3.	The Circuit Riders	*R. C. Fitzpatrick*	2.69
4.	Toy Shop	*Harry Harrison*	3.03

The Editor.

The Rescuer

There have been lots
of paradoxes proposed in the
existence of a time machine.
But this is, simply,
a matter of the human emotional
paradox that inescapably
arises if a time machine exists!

by Arthur Porges

Illustrated by Horlens

■ It was by far the largest, most intricate machine ever built.

Its great complex of auxiliary components covered two square blocks, and extended hundreds of feet beneath the earth. There were fifty huge electronic computers at the heart of it. They had to be capable of solving up to thirty thousand simultaneous partial differential equations in as many variables in any particular millisecond. The energy which the machine required to operate successfully on a mass of M pounds was given by a familiar formula: $E=MK^n$. The K was not, as in Einstein's equation, the velocity of light; but it was large enough so that only one type of power could be used: the thermonuclear reaction called hydrogen fusion.

Designing the machine and developing the theory of its operation had taken thirty years; building it, another ten. It had cost three billion dollars, an amount to be amortized over roughly one hundred years, and supplied by fifteen countries.

Like the atomic bomb, the machine could not be tested piecemeal; only the final, complete assembly would be able to settle the question of success or failure. So far, no such trial of its capabilities had been made. When the time came, a one milligram sample of pure platinum would be used.

It was the largest, most intricate, expensive, fascinating, and dangerous machine ever built. And two men were about to destroy it. They would have to release a large amount of thermonuclear energy in order to wreck the machine. It was the only way in the circumstances.

It was a heartbreaking decision to have to make. Perhaps they should have contacted higher authorities in Washington, since the machine, although quite international in scope, was located in California; but that was too dangerous with time so short. Bureaucratic timidity might very well cause a fatal delay. So, knowing the consequences to them, the two scientists did what they believed had to be done. The machine, together with several blocks of supporting equipment, including the irreplaceable computers, was vaporized. They escaped in a fast air car.

PRELIMINARY HEARING—
A TRANSCRIPT
THE UNITED STATES
versus DR. CARNOT
THE UNITED STATES
versus DR. KENT
April 14, 2015
(Extract)

JUDGE CLARK: How did the man know the operation, when the machine had never even been tested?

DR. CARNOT: The theory had been widely discussed in many scientific papers—even popular magazines. And the man was a technician of sorts. Besides, it wasn't necessary to understand the theory; not more than forty or fifty men in this country could. He must have seen numerous pictures of the controls. The settings are simple; any engineer can use a vernier.

JUDGE CLARK: I think you'd better tell this court just what happened from the beginning. Your strange reticence has caused a great deal of speculation. You understand that if found guilty, you must be turned over to the U.N. Criminal Court for prosecution.

DR. CARNOT: Yes, Your Honor; I know that.

JUDGE CLARK: Very well. Go ahead.

DR. CARNOT: Dr. Kent and myself were the only ones in the area that night. It was a matter of chance that we decided to check some minor point about the bus bars. To our astonishment, when we arrived at the control room, the machine was in operation.

JUDGE CLARK: How did you know the machine was being used?

DR. CARNOT: In many ways; all the indicators were reacting; but primarily the mass-chamber itself, which had dislimned and assumed the appearance of a misty, rainbow-colored sphere.

JUDGE CLARK: I see. Go on.

DR. CARNOT: Dr. Kent and I were shocked beyond expression. We saw from the readings that the person, whoever he was, had entered for a really fantastic number of ergs—that is, energy. Far more than any of us would have dared to use for many months, if at all. (At this point Senator King interposed a question.)

SENATOR KING: How did the fellow get into the area? What about the Security?

DR. CARNOT: As you know, the machine is international, and sponsored by the U.N. Since there is no longer any military rivalry among the members, the work is purely scientific, and no country can be excluded. Naturally, the complex is protected against crackpots; but this man worked on the project as a Class 5 technician, and must have known how to avoid the infrared and other warning systems.

JUDGE CLARK: We had better not confuse the issue with such digressions. How the man got in is no longer important. But your sudden knowledge of his background is, Dr. Carnot. In an earlier statement you claimed to have no information about his identity. How do you explain that?

DR. CARNOT: I had to lie.

JUDGE CLARK: Had to?

DR. CARNOT: Yes, Your Honor. All of that will become clear, I hope, later in my testimony. Right now, let me clarify our dilemma. The machine was definitely in operation, and had been for about eight minutes. We couldn't be certain that it would work—I mean to the extent of completing the job as programmed by the intruder; but the theory had been carefully investigated, and all the computations, which, as you know, took many years, checked out. It is a peculiarity of the machine, related to the solution of thousands of the most complicated differential equations, that there can be neither a cessation nor a reversal of its oper-

ation without grave danger to the entire state—perhaps even a larger area. The combination of vast energies and the warping of space-time that would result, according to theory, might vaporize hundreds of square miles. For this reason, and others, our plans had not gone beyond trying masses less than one gram.

JUDGE CLARK: Let me understand your point. It was impossible merely to shut off the machine? Stop the power?

DR. CARNOT: If the theory is sound, yes. I can only suggest the analogy of breaking an electrical circuit involving millions of amperes—the current jumps the gap, forming an arc which is very difficult to stop. Well, in this case, it was not merely millions of amps, but energies comparable only to those emitted by a large mass of the sun itself. In short, the only way to prevent completion of this particular operation was to bleed off enough of that energy to destroy most of the complex. That, at least, would save the populated areas. Remember, we had only about twelve minutes in which to choose a course of action.

JUDGE CLARK: But you weren't even sure the machine would work; that is, that the man would really survive. Yet you deliberately wiped out a three billion dollar project.

DR. CARNOT: We simply couldn't risk it, Your Honor. If the man did survive, and succeeded in his mission, the dangers were almost inconceivable. Even philosophically they are more than the human mind can grasp.

JUDGE CLARK: But neither of you has been willing so far to explain that point. This court is still completely in the dark. Who was the man, and what did he attempt to do?

DR. CARNOT: Up to now, we weren't ready to speak. But if you will clear the court except for yourself, the President, and a few high, responsible officials, I'll try to satisfy this tribunal. The fact is, as you will see, that a large part of the public, in this country, at least, might approve of what that man tried to do. It may not be possible to convince laymen—people not used to the abstractions of philosophy or science—of the great risk involved. I can only hope that this court will appreciate the implications. I should add that Dr. Kent and myself have seriously considered refusing any further information, but merely pleading guilty to willful destruction of the machine. As it is, if you decide to release us to the U.N. for criminal proceedings, we still might have to do just that—which means your records would have to be suppressed. Our only reason for testifying is not to save our own lives, but the hope that we can contribute to the design of a new machine. And to better understanding of the problems involved in the operation. Among the public, that is.

JUDGE CLARK: I must take your

attitude seriously; that is very plain. Do you persist in maintaining that this room should be cleared, and all broadcasting suspended? Press, distinguished scientists, senator—all these are not qualified to hear the testimony?

DR. CARNOT: I only mean that the fewer who hear me, the fewer mouths to be guarded. And I'm sure this court will feel the same way when all my evidence is in.

JUDGE CLARK: Very well, then. The bailiffs will clear the room, except for the President, the National Security Council, and the Chairman of the Research Committee of the Congress. All electronic equipment will be disconnected; a complete spy curtain will be put on this room. Court will adjourn for two hours, reconvening at 1500.

PRELIMINARY HEARING
(Continued)

JUDGE CLARK: We are ready to hear your testimony now, Dr. Carnot.

DR. CARNOT: Do I have Your Honor's absolute assurance that nobody outside this room can hear us?

JUDGE CLARK: You do. The spy curtain, which your own colleagues in science claim bars all wave lengths, is on at full strength.

DR. CARNOT: If I seem too cautious, there is a reason, as you will see.

JUDGE CLARK: I certainly hope so. Now, will you please give the real point of this testimony? What was the man—and incidentally, has any identification come in on him yet? No? Well, what was he doing that seems to have scared you so?

DR. CARNOT: His name doesn't matter; it was on the note he left.

JUDGE CLARK: What note? Nothing was said about a note. Here this court has been trying to identify the man, and all the time—

DR. CARNOT: I'm sorry, Your Honor; that is part of the testimony we thought had better be withheld until now. The man did leave a note, explaining just what he meant to do with the time machine.

JUDGE CLARK: And what was that?

DR. CARNOT: He had set the dial for a two thousand year trip into the past. That accounted for the vast amount of energy required. You see, it varies not only with the mass transported, but the time as well.

JUDGE CLARK: Two thousand years!

DR. CARNOT: That's right, Your Honor. In itself, that's bad enough. It is one thing to send a small mass or a sterile insect back in time; even then, there are dangers we can hardly predict. The present is intricately involved with the past —stems from it, in fact. It's like altering the origin of a river; a little change at the source can make a tremendous difference at the mouth. Even move it fifty miles away. Now a modern man in the world of two thousand years ago—

frankly, Your Honor, we just don't know what that might do. It seems fantastic to believe that he could change the here-and-now, and yet the theory implies that this whole universe might change completely, or even vanish. Don't ask me where or how.

(At this point, Professor Pirenian, of the National Security Council broke in with a question.)

PIRENIAN: Why didn't you and Dr. Kent merely send another man to intercept this one? Yours, by the machine, could obviously set the dials to get there first, thus snatching the first one back before he could do any harm.

DR. CARNOT: We thought of that, even in the few minutes we had. But suppose before we could cut in ahead of him that this world vanished? Believe me, the paradoxes are maddening; no amount of mathematical wrangling can settle them; only experiment. We couldn't chance it; that's all.

PIRENIAN: You're right, of course. Maybe we should be glad, gentlemen, that Dr. Carnot—and Dr. Kent—were there instead of the rest of us!

DR. CARNOT: You still don't know the real danger. What I've said so far applies to an impulsive, random trip to the distant past, where the man had no specific intentions. But Michael Nauss did have a particular plan—a wild, crazy, and yet, in a way, magnificent conception. One that the public, or much of it, might foolishly support without realizing the consequences. I speak of this country, and people in Europe; not in Asia, for the most part. And he had set the vernier with perfect precision, which made his plan even more feasible.

JUDGE CLARK: What was he going to do?

DR. CARNOT: According to his note, this man had taken with him a repeating rifle and five thousand rounds of exploding ammunition. His intention was nothing less than to arrive at Golgotha in time to rescue Jesus Christ from the Roman soldiers. In short, to prevent the crucifixion. And with a modern rifle, who can say he wouldn't succeed? And then what? Then what? The implications are staggering. Disregarding the Christian dogma, which asserts Jesus *had* to die for our sins, what of the effect on the future, the entire stream of history, secular as well as religious. Maybe Jesus Himself would have prevented this madman from saving Him—but who can be sure? Yet, if you ask the man in the street, now, in this year 2015: Shall we save Jesus Christ from the cross?—what would he answer? Whose side would he take? Ours, or Michael Nauss'. That is why Dr. Kent and I destroyed the machine; and why we face this court now. We believe the proceedings should not be released. The decision is yours. We made ours that night. ■

the Reference Library

P. Schuyler Miller

THAT DOUBLE STANDARD

It will certainly not have escaped the notice of veteran science fiction readers that we are in the midst of another cycle of novels with SF themes, written by "outside" authors and in most cases advertised by the publisher as general fiction of a "remarkable," or "challenging," or merely "extraordinary" kind. Sometimes the results are good: a talented writer can do well by almost any theme. All too often, however, these books show that publishers have a double standard in such things—and that the standard for "serious" writers is lower than for the unabashed specialist in science fiction or fantasy.

Two books are cases in point. "Central Passage" by Lawrence Schoonover—William Sloane Associates; New York; 1962; 246 pp; $3.95—is another of the atomic war books, this time by an experienced but not especially high-powered writer of historical fiction. By my faint damns, I mean that Lawrence Schoonover is identified with fast-moving adventure romances with a historical setting, like the ones that used to be part of the *Argosy All-Story* formula. In venturing into a new medium—perhaps quite unconscious that it *is* a medium with its own disciplines—he has kept his smoothness but based part of his story on a very basic scientific mistake, which would never be tolerated here or in the least of the currently published science fiction magazines. It can't be a question of a publisher who doesn't know what good science fiction is since William Sloane has written two of the best SF novels we have—"To Walk the Night" and "The Edge of Running Water"—and has edited some good anthologies. It's just that Mr. Schoonover, as an established novelist, doesn't have to meet the same standards as writers with names from Asimov and Anderson to Williamson and Wyndham.

As a matter of fact, the gimmick

in "Central Passage" is a good one and relatively new in non-SF circles. The "20-Minute War" of "Central Passage"—which is touched off by a prestige-seeker in a Red satellite—destroys seven hundred miles of the Isthmus of Panama. The Gulf Stream begins to pour into the Pacific, instead of circling back to warm the coasts of North America and Europe, the clouds of dust and steam from the holocaust shut off the sun's radiation, and the world is in for another Ice Age.

In the early part of the book the author follows the fortunes of two families: the Youngs—American Navy, stationed in Panama but fortunately in Jamaica at the time of the touch-off, and the Bolducs—Gaspesian fishermen with a tradition that may go back before Columbus. The fortunes of Narcisse Bolduc, his wife, and their ten children as they make their way from the Gaspe down the ruined coastline of the United States to the stub-end of Guatemala, where an international task-force is trying to replace the isthmus, are especially interesting, if unsurprising to Old Holocaust Hands like the readers of Analog.

Meanwhile the author has been dutifully, if not very subtly—to us OHH—planting clues to the Big Shock that is the theme of the last third of his novel, "The Intruders." Little Bill Young Jr., born at the very moment of the Panama burst, is incredibly precocious. So, it appears, is Angelique Bolduc, born as the radiation from the bombed cities of Canada began to bathe the Gaspe. They have brown eyes, they see the ultraviolet spectrum—another of the author's points that is precisely the reverse of what he intends—they are telepathic and extraordinarily intelligent, they mature at a terrific rate. They are "Homo Supersapiens"—and in the final chapters their parents see them hunted down aned murdered in cold blood.

Now, all this is familiar, legitimate, and reasonably well down if not the great idea to science fiction readers that its author evidently believes it to be, and that the average reader may find it. The trouble is that the scientific rationalization is complete nonsense.

I've mentioned the ultraviolet vision. This is supposed to be attested by young Bill's being able to see the sun through a heavy overcast. But ultraviolet is *stopped* by clouds—so this big clue is pure nonsense.

Worse yet, the rationale of the superchildren, all born at the moment of the explosions and ganging up to take over the world, is hung on biological nonsense. Mutations from radiation—as all good Analog readers know by heart—occur because of damage to genes in the sperm or ovum whose union creates a new individual. Radiation at birth might kill a baby, but it would not give him the superpowers of a standard SF mutant, as the author of "Central Passage" obviously believes. By that time a child is nine months old, and his heredity is well fixed.

There are other scientific flaws in

the book. As a matter of fact, the restoration of the Isthmus of Panama by setting off another battery of super-bombs, of the same kind that removed it in the beginning, is given no more logical backing than some wild muttering by the superchildren about "fighting fire with fire." But I doubt that any of this will have the least effect on the sale of Mr. Schoonover's book, which will be automatically picked up by the libraries and others who like his way with a sword and a bosom. I am sure that "Central Passage" will sell many times more copies than the best *good* science fiction novel published in 1962. And the uninitiated public will receive with delight and wonder the information that even if we do have a nuclear war, the children born during the holocaust will be geniuses, and we can undo any incidental damage by setting off another round of bombs.

Another book, "The Moon Man" by Andrew J. Steiger—published by Philosophical Library; 318 pp; $5.00!—carries the double standard to the nadir. The author is described on the jacket as "a widely traveled correspondent and news editor . . . contributor to American Oxford Encyclopedia." I have no reason to doubt that he is a distinguished and thoughtful gentleman, who feels very strongly about the flaws and foibles of human society. I am inclined to believe that he may have believed so strongly in the importance and message of his book that he has been willing to help pay for its publication, but this is only a guess.

Unfortunately, "The Moon Man" is one of the very few books that I find totally unreadable.

Here we have another aspect of the double standard—the writer who sells his book on the strength of his reputation in other fields, and who gets automatic sales and critical acclaim because of that reputation, in spite of the fact that he can't write as well as the poorest newcomer in the poorest SF magazine in its worst year.

"The Moon Man" is supposed to be a "deep" and thoughtful analysis of what's wrong with us, presented in fictional form and elaborately entangled in allegorical double-talk, symbolism, philosophy—after all, the book is published by Philosophical Library and costs $5.00—and nonsense. This "work of space-age fiction"—quoting the philosophical publisher again—deals with four immortals who seem to be four of the ancient Greek gods and goddesses, presently resident on the Moon and seeking help in the conquest of their brother Ares, god of war, who is operating from a base on—of course—Mars. Coyly incognito as the Prophet, the Poet, the Dreamer, and the Skeptic—and later as Omega, Legion, Aphrodite and Alphabet—they spend the first third of the book in philosophical colloquy on the Moon, discussing the qualifications of one Mr. H., "the moon man," who will become Hermes and carry out their mission against Ares, saving human-

ity for eternal Peace or something. In the remaining two thirds they talk on and on with Hermes—whose personality has sundered, so that he is also, at times, Mr. A.N.Y. Man—about such things as human identity, the economy of abundance, wealth and poverty, sex and obsessions, and of course religion.

As I said, I have been completely unable to read this book. I have tried starting at the beginning, looking at the end, and gritting my teeth and plunging into the middle at random places. The immediate sensation is that of being thirty feet underwater with no air and no idea of which way is up. All right, I'm exaggerating—I've never been more than fifteen feet deep—but I have wedged myself into a tight spot, a couple of hundred feet underground and with a strong conviction that I was plugging up the only route by which air could get into a dead-end cave. The sensation is much the same.

This time, I'm afraid, the double standard is going to assure Mr. Steiger's immortality in the libraries. Just *because* his book is totally unreadable, it is not likely to wear out, so that SF readers of a generation hence will find it on the shelves in beautiful condition, and take it for a sample of our era. The real science fiction of our time will be long since worn out, just as in my own neophyte days all I could find in the library were the less digestible of H. G. Wells' utopian novels and the perpetually reprinted Vernes: "Around the World in Eighty Days" and "Twenty Thousand Leagues Under the Seas." Burroughs was worn out; Wells' real science fiction was worn out; Verne's really imaginative yarns were gone; the contemporary classics that Hugo Gernsback shortly began to reprint in *Amazing Stories* were worn out.

The dull books, the respectable books, the "daring" books by big-name authors were there, though. They got more critical attention than they do today, because fiction itself seems to have been more respectable in 1922 than it is in 1962. But the double standard was working strongly and well on their behalf, and it still is.

» » »

LITTLE FUZZY, by H. Beam Piper. Avon Books No. F-118. 1962. 160 pp. 40¢

I don't often agree with a publisher's jacket blurb for a new book—in fact, it is frequently obvious that the blurbwriter hasn't read the book—but this time I am completely behind the Powers at Avon who say: "Our candidate for the most delightful science-fiction book of the year!" Little Fuzzy and his people set a mark for the most lovable, charming, appealing critters since the Hokas.

Zarathustra is a Class III uninhabited planet, sufficiently Earthlike to be open for colonization, sufficiently rich in visible and potential resources to be rewarding to the Zarathustra Company which completely controls the planet. Then old Jack Holloway, a sunstone prospector, meets Little

Fuzzy—first of the friendly, golden-furred, intelligent little creatures whose very existence is shortly to blow things wide open. Because, if Fuzzy's people are an intelligent native race, Zarathustra becomes a Class IV *inhabited* world, Federation agents will step in to protect them from exploitation, and the Company will be out.

You can imagine the hell that pops over that situation. It is more than just a story of lively action, skulduggery, and mystery, for the author meets head on the same question that was the theme of Vercors' novel of a few years ago, "You Shall Know Them." How do you know when a being is sapient? But Piper is after a far more fundamental analysis than Vercors, whose near-men were close enough to human so that they could interbreed with us. The Fuzzies are peeping fuzz-balls that make tools, enjoy TV, and become more enchanting company the more you see of them—never for a moment to be considered human—but are they *people?*

Holloway's gradual discovery of the Fuzzies' potentialities—the bureaucratic furor which results—the issues of scientific ethics vs. a paycheck next Thursday—and the final legal battle when one of the Fuzzies is killed and a Company administrator charged with murder—make as enjoyable a book as I have seen in a long time. The author makes even the villains believable and understandable—even while they are plotting to solve the problem by exterminating the Fuzzies and making the matter moot.

Enroll me among the Friends of Little Fuzzy. It's the best book H. Beam Piper has ever done, and for my money the best out in the first third of 1962.

» » »

THE DEFIANT AGENTS, by Andre Norton. World Publishing Co., Cleveland & New York. 1962. 224 pp. $3.50

There is a kind of science fiction that will never go out of style, and Andre Norton writes it.

Jules Verne's novels were dated even in his own lifetime. Edgar Rice Burroughs Barsoom—and the Red Planet of many another writer—became fantasy as soon as the astronomers began to measure Mars as well as look at it. Arthur C. Clarke's space stations are about to be bypassed in the political race to the Moon, and our fictional stereotypes about that world, though better grounded than most, will soon be up for reappraisal. But twenty years from now, or two hundred—even if science realizes science fiction's faster-than-light drive—there will still be excitement and fascination in stories about strange, distant worlds that men have never seen. And nobody writes better stories about such places than Andre Norton.

This book is the third of the time agent stories. In "Time Traders," you will recall, the West discovered that Russia had developed time travel and was harvesting the scientific se-

crets of a galactic empire from a star-ship wrecked on Earth thousands of years ago. In "Galactic Derelict," a young Apache archeologist, Travis Fox, was investigating another such ship when it automatically took him on a tour of a series of worlds where ruins. and relics of the star people served only to deepen the mystery about the star-treaders.

In the new book, the West has sent a pioneering team of young Apaches, including Fox, to colonize Topaz—a world of golden grasslands and wooded mountains much like the American West where their ancestors had lived before the *pinda-lick-o-yi*—the White Man—came to the new world. But, without their knowledge, they have been subjected to the Redax, a field which warps their minds back into those of their ancestors. Presumably this will better fit them to colonize a virgin planet.

But the Russians are there first, with a company of Tartar horse-herds like those who had dominated the steppes of High Asia while the Apaches are winning the American Plains. The Western ship is shot down, and Fox and his group are on their own. The book is the story of their efforts to make a place for themselves, to reach a working alliance with the Tartars—or those of them who have escaped from the dominance of a Red mental-control machine—and to keep the Reds from discovering a strange city of the star people.

Again, as in others of Andre Norton's recent books, we have the concept of a telepathic rapport between men and mutant animals—in this case, a pair of coyotes who are as real as any of the human characters. Again we get more glimpses of the star empire, opening new mysteries as old puzzles are clarified. The native animals and birds of Topaz are less fully realized than usual—to a degree, the plot gets in the way of the world—but if we return to Topaz in another book, that will certainly be rectified. The similar but contrasted traditions of the two horse people, Asian and American, are nicely used to produce legitimate conflict, and the erratic operation of Redax, which has left the Apaches mentally strewn through time from stone age days to the nineteenth century, contributes more worries for Travis Fox.

All of which I would have said with just as much enthusiasm even if Miss Norton had not honored me with a share in the dedication. "Defiant Agents" isn't her best book—in fact, I don't much like the title, which may be the publisher's—but it is one of a group of such books which have set a level all their own, well above most present day science fiction.

» » »

WHEN THEY COME FROM SPACE by Mark Clifton. Doubleday & Co., Garden City, N.Y. 1962. 192 pp. $2.95

The previous adventures of Ralph Kennedy, personnel director and general trouble-shooter for Computer Research, have been chronicled here

and elsewhere over the years. Some of you may recall his problems with telepaths and poltergeists, back in "What Thin Partitions" in 1953, or "Sense From Thought Divide" in 1955. These earlier stories have had due recognition in anthologies, but this is the first time Kennedy has had a book to himself. It's an expansion of the two-part serial, "Pawn of the Black Fleet," which has just finished running in *Amazing Stories.*

"When They Come From Space" is a joyous comedy of bureaucracy, supported by the vigorous application of Parkinson's Laws and needled by a properly cosmic crisis. Space Navy, through a compounding of error, has tagged Kennedy as an Extraterrestrial Psychologist and has no intention of admitting any error. Meanwhile, back in the Galaxy, the powers-that-be have tagged Earth for some spectacular attention. A Black Fleet will threaten Earth; a fleet of Good Guys will appear and drive them off at great cost. Then the dickering will start. But because of the aforesaid snafu, our hard-headed and efficient Kennedy is the ET specialist with whom the visitors have to deal . . .

The Kennedy view of Washington suggests a certain familiarity on the part of the author or friends with what goes on in those status-sifted precincts. There are deft portraits of bureaucrats of the kind whose entanglement in red tape helps keep the government from taking over too much, and others of the kind who see to it that something gets done after all, if for the wrong reasons. There is broad, practically slapstick humor and needle-sharp satire. There is, in short, a lot of fun.

What more do you want?

» » »

PLANET OF THE DAMNED, by Harry Harrison. Bantam Books No. J2316. 1962. 135 pp. 40¢

This rough, tough and puzzling story was called "Sense of Obligation" when it ran here as a three-part serial, beginning in last September' issue. If you remember, Brion Brandd is enlisted by the Cultural Relationships Foundation to solve the insoluble situation brewing on the hellish world of Dis, whose belligerent yet seemingly backward people have promised nuclear destruction of their peacable neighbors on Nyjord. Nyjord intends to shoot first, unless Brandd and his colleagues can either persuade the Disians to withdraw their threat or find and disarm their stock of bombs.

Violence piles on violence in as bloody and gutsy a yarn as we've had in a long time, and at the same time the picture of the extraordinary symbiotic relationships which the Disians have developed with the native life forms is rounded out. The author has done a masterful job of weaving the two threads of development together, and hanging the solution of the plot on a scientific puzzle: who and what are the *magter?*

Top stuff, as you know if you read the original. The pb expands, rounds out, and makes the book even better.

THE UNSLEEP, by Diana and Meir Gillon. Ballantine Books No. F-471. 1962. 207 pp. 50¢

Give Ballantine credit for discovering this puzzling blend of science fiction and straight novel, by a pair of English writers of whom we are told nothing.

For completely unresolved reasons, the British government has decreed that all Britons will be dosed with Sta-Wake, a drug that makes sleep unnecessary. Like dutiful citizens, the English people have complied—then found time pretty heavy on their hands for that extra eight hours a day. Meanwhile a few holdouts like the hero, Peter Gregory, and his wife, Francesca, are trying to keep going in a world of constant din and clamor. Peter is a civil servant, Francesca a librarian, and the tension between them and between them and their friends builds up until Francesca breaks and gets her injection, leaving Peter to struggle on alone. Then he discovers a new outlet for the energies of the sleepless, and recreates fiction. From a dangerously subversive nobody, Peter becomes a person of importance. And then—

This is good science fiction in the way the social consequences of Sta-Wake are worked out; it is also a serious novel in the way it explores the personal relations of its chief characters, and the consequences to them of what is happening. It is also extremely English: if the same book were written about an American-based society, it would be entirely different. We may not be in for a twenty-four hour day, but a twenty-hour work week will create some of the same problems.

» » »

WORLDS OF THE IMPERIUM, by Keith Laumer.
SEVEN FROM THE STARS, by Marion Zimmer Bradley. Ace Double Novels No. F-127. 1962. 133 + 120 pp. 40¢

Well-done action, adventure and cloak-and-dagger stuff are the ingredients that have gone into both halves of this Ace double. "Imperium" was in *Fantastic* last year; "Seven from the Stars" must be pre-1961, and I can't pin it down without digging into storage.

"Worlds of the Imperium" is a parallel-time-tracks story with mild van Vogtian wheels-within-wheels ramifications. Brion Bayard, of our own continuum, is snatched into one in which there never was a United States, in which northern Europe, Britain, the Western Hemisphere, and Australia form one huge empire, in which Hermann Goering is a useful ally. He learns that there is still a third continuum where nuclear war has nearly shattered civilization, leaving a North African dictatorship headed by—himself. The scheme: replace the bad Brion Bayard with the good one and stop the guerrilla raids on the Imperium.

Naturally Brion falls in with this plan, and naturally things are not quite as simple as they seem. He presently finds himself helping himself—but the only way to find your

way through the complications is to follow him.

"Seven From the Stars" is more evidence that mild-looking feminine writers can come up with lively action. Seven survivors of a wrecked starship find themselves on a Closed Planet—Earth—sealed off from the civilized galaxy because of the presence there of Man's interdimensional foes, the Rhu'inn. The oddly assorted lot begin to adapt to the society in which they find themselves, as potential colonists should, but there is soon evidence that unknown forces are working against them. Perhaps hidden Rhu'inn, disguised in human form. Perhaps a Watcher of their own people, who can set them on their way again.

The two parts of Ace F-127 add up to a bargain in action-entertainment.

» » »

THE PLANET STRAPPERS, by Raymond Z. Gallun. Pyramid Books, N.Y. No. G-658. 1961. 157 pp. 35¢

The author of this interesting story was one of the consistently good writers of science fiction's early days, from whom very little has been heard for a long time. This is a good, but puzzling come-back. Good, in the way it uses the fortunes of a gang of space-mad young people to paint an impressionistic mural of the solar system in many facets of life and action. Puzzling in that the economic structure that enables a group of youngsters to get into space for relatively small change is never convincing, and seems to be contradicted by the price structure of the space society.

We follow the exploits of the Bunch from Jarviston, Minnesota, primarily by looking over the shoulder of Frank Nelsen, one of its more level-headed members. They can work together, yet they retain their individuality. Gimp, the cripple, who turns into a respected interplanetary handyman. The hulking Kuzak twins who become shopkeepers for the asteroid miners. Little Eileen Sands who uses a woman's weapons to reach the Moon before any of them, and becomes an interplanetary madame. Ramos, the adventurous. Dave Lester, the weak. Tiflin, the switch-blade type. Two-and-two, the loyal follower.

The unrest of the Bunch is derived from the unrest and ferment of the space era in which they grow up, and this the author conveys very nicely. It is a parallel to the opening of the American west in the early 19th century, and breeds the same kind of people. But we never quite identify with any of them, even Frank—just as the early West has remained strange to stay-at-homes.

» » »

THE CYBERNETIC BRAINS, by Raymond F. Jones. Avalon Books, New York. 1962. 224 pp. $2.95

This story originates in *Startling Stories* of September 1950, and has presumably been up-dated a little in places. It was a competent enough

yarn for its place and time, but doesn't contribute much to the corporate image of science fiction now.

Long before the story opens, human brains have been wired into the control circuits of super-computers, the whole making possible a total Welfare State in which nobody needs to work. Then a scientist discovers that the brains, in their platinum boxes, are alive, in a kind of perpetual slavery. He is killed to keep the secret quiet and his brain duly added to the work squad. The people who are running the Welfare State have no intention of relinquishing their control, and the people who are basking in its benefits see no reason to let Santa Claus go on a sit-down strike.

The details of how the Brains attempt their revolt are interesting, but the effort itself is doomed from the start. At least, a happy ending hasn't been produced, but the ending that is used is pure soap opera. Hollywood should buy it.

CREATURES OF THE ABYSS, by Murray Leinster. Berkeley Books, New York. No. G-549. 1961. 148 pp. 35¢

Here is the Old Master again, competent as ever but not quite as exciting as he often is, with an original "menace" yarn about the Things at the bottom of the Luzon Deep and their bid to take over the world. Giant meteors—bolides—converge on the area of mystery. Seething seas engulf whole ships in an instant—yet other ships reap a rich harvest of fish in the same waters. A young American electronics bug, whose partner has become involved with the law of the Philippines, is offered a mysterious job by a strange yachtsman with a beautiful daughter and powerful connections. The secret of the native fishing paddles is translated into a force that can trap and kill. Giant squids—guided monsters—come up to prey on the men who dare to oppose the invisible creatures in the dark deeps.

Sound familiar? Yes, but Murray Leinster is the man who can catch you up in it and drag you along by sheer skill in story-telling, by the weight of plausible detail and incident, by mystery intricately interwoven with menace and action. It's more fun to read than much in the magazines.

THE RECENT REPRINTS

THE LONG TOMORROW, by Leigh Brackett. Ace Books No. F-135. 1962. 223 pp. 40¢

One of the SF classics of recent years, which should have been reprinted long ago. Its thesis: that people who have lived on a subsistence basis, like the Pennsylvania Amish and Mennonites, will be best fitted to survive an atomic holocaust—so that it will be their values that shape society after the War.

THREE MARTIAN NOVELS, by Edgar Rice Burroughs. Dover Publications, N.Y. No. 139. 499 pp. $1.75.

For some reason—perhaps copyrights—Dover has plunged into the middle of the famous Martian series for this omnibus volume. You get "Thuvia, Maid of Mars," "The Chessmen of Mars," and "The Master Mind

of Mars," with offset reproductions of sixteen of the St. John illustrations. Perhaps the first three adventures of John Carter will be put into a similar volume, but why not begin at the beginning?

THE INCOMPLETE ENCHANTER, by L. Sprague de Camp & Fletcher Pratt.

THE CASTLE OF IRON by L. Sprague de Camp & Fletcher Pratt. Pyramid Books, Nos. F-723 & F-722. 192 & 159 pp. 40¢ each

If you've never read these classic adventures of Harold Shea, who found a mathematical basis for magic, here they are in companion paperbacks.

THE MENACE FROM EARTH, by Robert A. Heinlein. Signet Books No. D-2105. 1962. 189 pp. 50¢

Eight short stories, including the classic "By His Bootstraps" and "Year of the Jackpot". Reprint of the recent Gnome Press book.

FAR OUT, by Damon Knight. Berkley Books No. F-616. 1962. 192 pp. 50¢

Reprint of the recent—1961—Simon & Schuster collection of thirteen short stories.

BURN WITCH BURN, by Fritz Leiber. Berkley Books No. F-621. 1962. 176 pp. 50¢

For some reason, the title of A. Merritt's novel has been tagged on Fritz Leiber's classic "Conjure Wife," which introduces witchcraft to a modern university campus. This is prelude to a new screen version which may be good, since it was scripted by experienced SF writers Richard Matheson and Charles Beaumont.

PREFERRED RISK, by Edson McCann. Dell Books No. R-114. 1962. 190 pp. 40¢

This was winner of a *Galaxy*/Simon & Schuster contest back in 1955: a superior underground yarn about life under the Company.

GRAY LENSMAN, by Edward E. Smith, Ph. D. Gnome Press, Hicksville, N.Y. 306 pp. $3.50

First in a series of Gnome reprints of Doc Smith's famous "Lensman" stories, which in their day helped make this magazine. This is the best of them, though the fourth in the reconstituted series as published by Fantasy Press. You pay full price through a book store, but get a bargain through Gnome's "Pick-a-Book" plan, advertised here from time to time.

THE SPACE EGG, by Russ Winterbotham. Monarch Books, Derby, Conn. No. 252. 140 pp. 35¢

A competent thriller about the thing from the stars that possessed a flier and made him invulnerable.

★ ★ ★ ★ ★

« *Continued from page 5* »
Authorities of the Officially Authorized Experts, is blameless . . . provided the Officially Authorized Authorities are held to be absolutely, certainly, and indubitably Right.

The real-world facts are that men can never be certain of anything—and yet people want to feel they can depend on the infallibility of always-certainly-right authorities. The most successful scientists, under such exceedingly unfortunate cultural conditions, will be those who have the greatest ability to project a feeling of Infallible Certainty. And that is always easiest for a man who feels himself that he is infallibly certain!

All those factors add up to produce a very powerful tendency to suppress the doubt-generators, the unwelcome-question-raisers, the people who say, "Hm-m-m . . . but couldn't that also be explained this way—" and, by showing an alternative, make the Indubitable Certainty less certain.

Yet it is just that questioning of certainties that makes for real progress in Science. Truth has never been determined by democratic vote, nor by agreement among Learned Authorities; in Galileo's time, both democratic vote and Learned Authorities agreed that the Sun moved around the Earth.

Research has many difficult and painful problems—and one of the greatest can best be expressed in terms of an analogy. If an airplane has gone down somewhere in the mountains, and a search is started, what does it take to establish that the downed plane is *not* down in Area A?

The simplest, cheapest, and quickest answer to that is, "Prove it *is* down in Area X."

The hard way, of course, is to search Area A so thoroughly, persistently, and diligently that you have examined the entire area, and can say, "It is not here, because we have searched and not found it."

Not only is that harder, slower, and far more expensive—it's never completely satisfactory. The plane might have gone down, knocked down a tree, started a small slide, and been completely buried by the slide. I.e., the plane may be in Area A despite your search.

In an actual search for a lost plane, the search starts at Area A—A being the area which available clues indicate is the most-probable-locus. Last radio report, perhaps, or last reported sighting—something like that.

So Area A is searched first—but as the first searches of A don't find the plane, the search is spread to Area B, then to C, D . . . in order of decreasing probability.

Now the unfortunate fact of things is that there's a Finagle Effect involved. It is clearly obvious that, actually, the area of maximum probability for search is the area where the plane actually is. That is, it finally turns out that the plane wasn't down in the mountains at all, but had simply had a radio transmitter failure there, and had proceeded toward its destination another five hundred miles, before an electrical short-circuit

and fire brought it down in an abandoned stone quarry only fifteen miles from the destination airport. Now obviously the maximum probability of finding the plane is to search in the area it is—the old quarry. Not in the mountains five hundred miles away.

Sure that's obvious after the plane's been found. Any durn fool can see that. And unfortunately, all the durn fools do see it, and the durn fools tend to vastly outnumber the wiser men who appreciate that it didn't *appear* probable.

Any fool can see that Galileo was right . . . now. But it didn't *appear probable then.*

Suppose a great research effort has invested $100 millions in investigating the Frahmstahl Effect as a means of druping stebolks. They've been at it for twenty years, with a research budget of $5 million a year, and haven't gotten the thing to work yet, but have achieved some highly interesting and almost workable results.

Then along comes Chuck Whippersnapper, Jr., with a two-dollar gadget that does a pretty good job of druping stebolks, and doesn't use the Frahmstahl Effect, or anything else that anybody ever heard of before. For some reason, young Whippersnapper has a terrible time getting the scientists of Project Frahmstahl to listen to him or examine his gadget.

Naturally! Young Whippersnapper has just demonstrated that they were wasting their time searching in the mountains five hundred miles from the lost plane, when all they had to do was walk out to the old quarry where it was, and they'd have found it right away. They've spent twenty years, and a hundred millions, and it's all down the drain, and they were responsible for it, and it was government money, so they're guilty if young Whippersnapper is right.

O.K.—so the basic problem is that a government can't hold public approval if it keeps betting on the horse races. Even if it won, on the average! There'd be a howling outcry about waste of public funds every time it bet on the wrong horse.

And a government can't bet on dark-horse candidates for major discoveries, either. It has to bet on the high-probability ones . . . *and even that isn't satisfactory.* It must *pretend* it isn't betting at all, that it's not gambling on research projects at all, but is investing only in sure things. And the government scientists who will best succeed in getting government projects are those who will make it easy for the government administrators to believe they aren't gambling.

Such a situation makes it inordinately difficult for scientists-in-authority to acknowledge a Chuck Whippersnapper, Jr., when he does show up.

In the days when the United States was a free-enterprise economy, individual capitalists could bet on horses, dogs, inventors, yachts, scientists, or any fool thing they wanted to. If they lost—so they lost, and it was their money they lost.

Today, government administrators of our nationalized Science can't bet on horses, dogs, inventors, or unofficial scientists. *And must not acknowledge the outside inventor when he does succeed.*

Because of course, to acknowledge the success of an outside inventor is to acknowledge that they *had* bet on the wrong inventor—the official government scientist!

A government agency is not allowed to make a long-odds hunch-play.

Private investors were.

Government-backed scientists can achieve backing by convincing the highly skittish government administrators that they have the One and Only Official Authorized True Theory. And the best way for any man to sell a proposition is for him to first convince himself until he truly believes it.

This makes the tendency toward Orthodoxy in Science extremely acute in government agencies, and in all major industrial corporations and universities, which are dependent on government contracts for support.

Adding to the ever more complete control of government over research are the patent policies followed by major government research agencies, such as the AEC and NASA. If a company takes on a research contract for AEC, any patentable ideas stemming from the research belong to the government, of course. The only trouble is that government agencies have a powerful tendency to claim *any* idea originated in *any* division of the contracting company during the period of the contract. Even material developed in an entirely different area of study, by men having nothing to do with the government contract, and working in labs in a different part of the country have led to rugged hassles for patent rights.

The overall result is a situation of political and emotional tensions that leads to the development of a powerful Orthodoxy effect.

That, not real Science, is the target of my attacks. The tendency of official groups, committees and staffs of scientists to support each other against the attack of the Chuck Whippersnappers—who find the answer in some area that is obvious *after* the discovery, but makes it *appear* that the official scientists were fools, scoundrels, and money-wasters.

There are two general types of challenge to the official scientists. One is the walk-on character, we might call him—the amateur who simply stumbles on the answer by sheer chance. (That downed plane in the quarry is more apt to be found by a high school kid than by an official searcher; there are high school kids hiking around in the countryside all over the nation, without regard to the probability of the lost plane's location.)

The other type of challenger is the thoughtful researcher who is *not* on the project, and hence can view it more objectively. Such a man might say, "Hm-m-m . . . they've been trying to drup those stebolks by the

Frahmstahl Effect for twenty years. They've had top men working at it, with plenty of equipment, and they haven't done it. It certainly did look as though that was the most probable area for research—but if all that searching hasn't found it, it must be somewhere else."

The probability score on the problem has been shifted *by the fact of the fruitless research itself.*

We will shortly, I hope, have an article on a discovery that falls in this class—a quite genuine breakthrough in communications theory.

For many years the major communications and computer labs have been seeking to find means for encoding human speech in a manner that a computer can recognize. There are two basic motivations: 1. Human speech is known to have high redundancy—i.e., it's more complex than necessary to carry the required information, and therefore takes more information-carrying channel than the actual message should. The minimum channel for satisfactory human speech is about 2,250 cycles. Properly encoded at the transmitter, and decoded at the receiver, it should be possible to send the information far more compactly. And 2. If human speech can be encoded in a computer-recognizable form, we can have voice-operated machines.

The Bell Telephone Laboratories have, obviously, been interested in that problem since the dial telephones first started going in; a voice-operated dialing system would be a wonderful relief for the telephone companies. To date, the only workable voice-operated dialing system has a human being doing the dialing.

IBM and other computer companies want voice-operated computers for fairly obvious reasons—having to do, basically, with the fact that people *like* to have their voice be sufficient to make things happen. ("And God *said* 'Let there be light,' and there was light." It's godlike to speak and have things happen.)

An enormous amount of time, money, effort and material have gone into this research—and still no voice-operated devices. Some highly interesting things have been developed—the Artificial Larynx, hi-fi sound-system equipment, the Vocoder, Visible Speech—a lot of interesting and highly useful results have been achieved.

But still it's "Nice try . . . but no cigar."

Now all this research has been conducted on the basis of the sine-wave theory of sound—i.e., that sound consists of complex patterns of sine and cosine waves of different frequencies, amplitudes and phase relationships.

A major research program in chemistry, before Lavoissier, would certainly have been based on the phlogiston theory of combustion. And an effort to isolate and bottle phlogiston because of its great lifting power (it was supposed to have negative weight, you know) would *not* set about developing evidence that phlogiston didn't exist, thus terminating the project.

A tremendous amount of effort went into those efforts to analyze speech in terms of sine waves, frequency spectra, phase-shifts, et cetera. The modern concept of stereo derives from the work done—that the human ear *is* sensitive to phase relationship between sine waves, and uses that sensitivity to determine left-right direction of sound sources.

Certainly there was plenty of evidence that fitted into the theory very nicely. Of course, there was plenty of evidence that fitted into the phlogiston theory nicely—and evidence that fitted the Ptolemaic theory of astronomy, too. Still, both theories were fundamentally wrong.

And be it remembered: at any level of science, of human knowledge, we will always be just as ignorant concerning what we're trying to find out as Ugh, the caveman was, concerning what *he* was trying to find out. Obviously—because if we weren't ignorant about it, we wouldn't be "trying to find out." Concerning human speech, we have been just as ignorant, just as wrong, as the chemists were concerning phlogiston, and the astrologers were concerning Ptolemaic theories. It only seems that we're wiser—because we're wiser concerning old things that we have already found out. But not concerning the new—

The sine-wave theory of speech and hearing seems to be one of those false postulates like phlogiston. It's mathematically handy, because math can handle sines and cosines so readily—but that doesn't make it valid. Plane geometry is much easier than spherical, but that doesn't mean you can navigate around on the Earth using plane geometry.

Dr. Wayne Batteau, of United Research Corporation, has developed a new approach; he has a gadget that encodes human speech into a pure binary pulse code—pure on-off—that a computer can accept directly. He can transmit his coded pulses with a two-hundred cycle channel, and decode it to clearly intelligible speech. His encoding gadget costs, I should guesstimate, about $5 to make, and the decoder perhaps $50. It discards completely the theory of sine-wave frequency distributions, amplitudes, et cetera, and approaches the problem from a quite different aspect—a pure time-analysis concept.

Dr. Batteau has, also, developed a system of *three*-dimensional sound recording that makes any stereo effort seem exceedingly clumsy—also based on a time-analysis theory of sound. (Stereo is designed to allow you to determine the left-right direction of sound; Batteau's system allows you to determine that a source is up-to-the-left or down-in-the center. It's *three* dimensional, not two. With it, you can hear a girl shaking the maracas over, under, and around behind your head—which is a quite ghostly effect indeed!)

Batteau's encoder eliminates frequency, amplitude and phase, as such. There have been plenty of clues around that these are unimportant—the four-year-old treble and the basso

profundo use neither the same frequency, frequency spectrum, nor amplitude. Whispering and shouting both say the same—and don't show similar frequency or amplitude distributions. The Artificial Larynx, originally developed by Bell Labs during their sound research, allows a man to talk, yet he can control neither frequency nor amplitude. It has even been shown that a man in a very noisy environment can "talk" understandably without making a sound himself! Merly moving his lips, jaws, and tongue produces a shaping of the ambient sound which can be heard as speech.

One item that Batteau did add—a crucial one—was his discovery of the true function of the pinnae—the external ears. The Biophysics Communication Group, at MIT, when I asked them some questions concerning the external ears, were quite sure that they had no real significance in hearing research—that experiments with microphones in silicone rubber moldings made from human ears were quite pointless, and rather silly.

According to the Official Orthodox Theory of how we hear, the external ears are quite unimportant—more decorative attachments, like a mustache, than useful or necessary functional parts of the hearing mechanism. So the Biophysics Communication people necessarily held that research into that aspect of hearing wasn't a worth-while project.

They happen to be wrong.

Most animals have mobile, dirigible trumpet ears—the horse, for instance. The primates are unusual in having the peculiar convoluted, immobile ears they do . . . and the primates are also unusual in having an immensely developed and convoluted brain attached to those ears.

Another class of animal having complexly convoluted, and rather immobile ears, are the bats, however. And bats just happen to be the world's top sound-system experts.

There's a simple experiment you can make that's quite astonishing. There are two steps: 1. Have A sit down, eyes closed, facing B, who's equipped with some keys to jingle. B jingles the keys, high-left, low-center, high-right, et cetera, while A locates the source of the sound, points, and then opens his eyes to check. The usual score, with normal hearing, will run ninety per cent accurate both in altitude and azimuth. Step Two changes one factor. 2. A holds the upper part of his ears downward with his fingers, locates the sound, points and open his eyes. Normal hearing gives about a ninety per cent score on azimuth—but the altitude angle is wildly Inaccurate.

Conclusion: One minute spent experimenting indicates most strongly that the external ear is no mere decoration! It is, somehow, an astonishingly effective device for determining the vertical angle of a sound-source. (Not important to a plains animal of large size, like a horse—but *quite* important to an arboreal monkey!)

Incidentally, you'll find that you can do almost as well with a single clink of the keys, as with continued

clinking. The sound-locating system works perfectly on a single transient. It had to; predators don't ordinarily make continued crackling noises in the underbrush.

I suggest that it was time for the Official Authorized Theory of sine waves and so forth to be considered not the most-probable-location of the answer about twenty years ago. That the Biophysics Communication group is showing marked Orthodoxy tendencies in their attitude toward Batteau-type experiments with external ears—and that that Orthodoxy tendency in Science is a major danger to American progress.

Batteau found, with his molded ears, and tiny microphones where the eardrum would be, that the external ear constitutes a dual acoustic delay line network—a highly asymmetrical delay-line that imposes about a two-microsecond delay on sound waves arriving from different vertical angles, and a different form of delay on sound waves arriving from the rear.

The Official Authorized physicists today love to talk about "highly sophisticated techniques"; one of these days those highly sophisticated physicists are going to catch up with the highly sophisticated technique of sound-locating that that grandly-ignored "mere decoration" of the external ear actually is.

But only at the expense of sacrificing his Orthodox Theory; since it is known that human ears can't hear above about 15,000 cycles per second, it's obviously impossible for them to distinguish a two-microsecond phenomenon.

So there they sit, with their ears hanging out, and not listening to what they're hearing.

Because they *know* they can't possibly be hearing that; their theory tells them so.

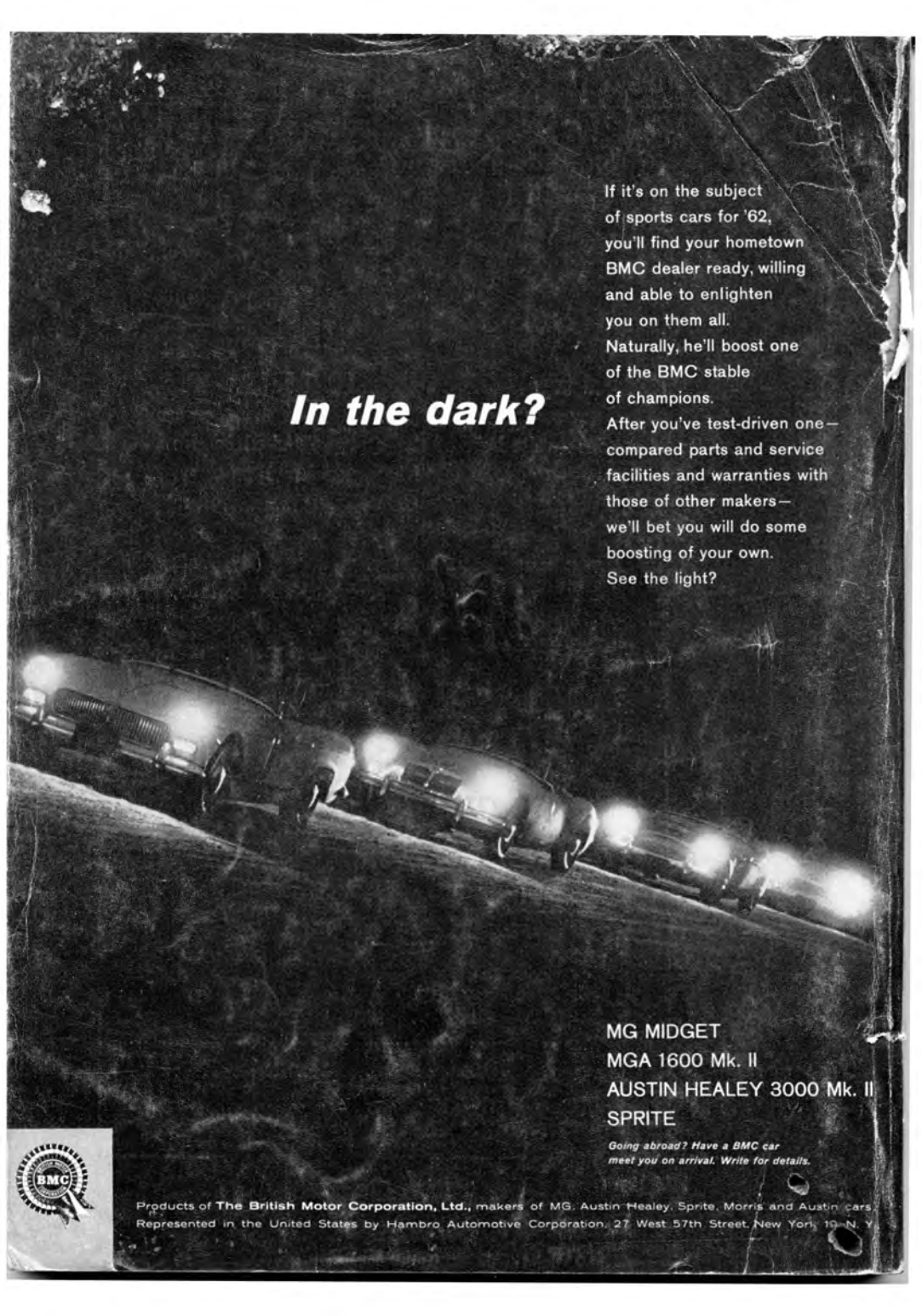
Anybody want a good science-fair project on human hearing? It may be theoretically impossible, but it's very readily demonstrable that the external ears give us vertical sound location—and it isn't, as yet, very widely known.

The Editor.

Last Moment Addendum

A seventeen-year-old Houston, Texas, radio amateur has been experimenting with a sort of radio-frequency-hearing-aid. It's obviously impossible for human ears to hear radio waves directly . . . but there is something peculiar happening, because his tests show that people can hear RF directly applied to the temples. Even the totally deaf, who can not be helped by any form of electronic-acoustic hearing-aid, can hear by this means.

Nobody knows why . . . it just happens.


In the dark?
If it's on the subject of sports cars for '62, you'll find your hometown BMC dealer ready, willing and able to enlighten you on them all.
Naturally, he'll boost one of the BMC stable of champions.
After you've test-driven one—compared parts and service facilities and warranties with those of other makers—we'll bet you will do some boosting of your own.
See the light?
MG MIDGET
MGA 1600 Mk. II
AUSTIN HEALEY 3000 Mk. II
SPRITE
Going abroad? Have a BMC car meet you on arrival. Write for details.
BMC
Products of The British Motor Corporation, Ltd., makers of MG, Austin Healey, Sprite, Morris and Austin cars.
Represented in the United States by Hambro Automotive Corporation, 27 West 57th Street, New York 19, N. Y.