Authentic Science

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No. 55

This month's featured novel :

ORDEAL by Kenneth Bulmer

Other stories by : E. C. TUBB, LEN SHAW, KATHERINE MARCUSE

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ONE SHILLING and SIXPENCE

Authentic

SCIENCE FICTION MONTHLY

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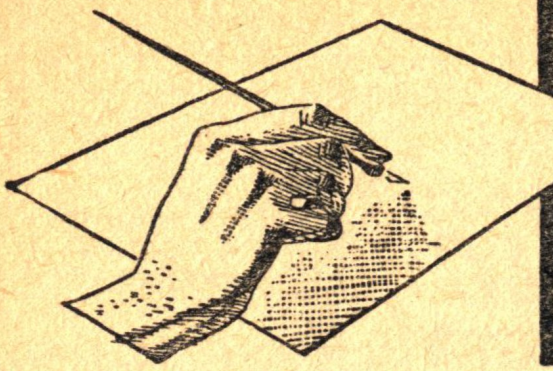


H.J.CAMPBELL Writes...

About this time of the year I do a bit of rooting for the biggest fan event in Britain—the annual convention. These conventions are run by fans for fans. They are non-profitmaking and they are not in any way interfered with by professional or business enterprises. Though, of course, serious professionals are always very interested.

For some years the annual convention was held in London. This caused a bit of bother with the boys in the North, who wanted to show what *they* could do in the way of organising a really slap-up "do." Last year they got their chance, for it was generally agreed among fandom that the Manchester group should run things. By all accounts they made as good a job of it as did the London people. But when the time came to decide who was going to organise the 1955 Convention, neither the fans in Manchester nor those in London were all that keen. A lot of work and worry is involved and the organisers are sure to be met with a bit of ridicule afterwards, whoever they are. Things hung in the balance.

Then, out of the blue, came an enthusiastic request from the fans in Kettering, Northants. *They* wanted to have their mettle tested and they pointed out that since Kettering is halfway between London and Manchester there would be no excuse for ungentlemanly bickering about the site. Hurried conferences were held in the north and south and everybody agreed that it would be a good thing. So, it's—KETTERING IN '55!

Much has already been done. A committee has been formed in Kettering, headed by Chairman Bill Panter, with Denny Cowen as Secretary and Joe Ayres as Treasurer. The Convention will take place at the George Hotel, Kettering, which has been

taken over for the exclusive use of the Convention from the morning of Good Friday (8th April) to the morning of Easter Monday (11th April). Accommodation can be arranged at 20s. 6d. per head per night—this money going to the hotel, of course.

Admission fees (which pay for the Convention) consist of a 2s. 6d. registration fee (which should be sent off at once), with this deducted from the 6s. per day (except Friday, which is free) entry fee. There is a reduction of 4s. a day for wives and juniors. Thus, for a single adult the total fee for the week-end is 9s. 6d.—and pretty cheap that is, considering the fun you will get!

If you take my advice you will send off a registration fee—or, better still, the full fee—right away, to the Treasurer, at 7, Doris Road, Kettering, Northants. When you turn up for the Convention you will not only find fellow minds, interesting talks, famous personalities, classical examples of science fiction, plays, films and parties—not only all that, but you will also find ME! What more do you want?

See you there.

H.J.C.

SCENES FROM THE FUTURE

A new cover series

Life gets faster every minute. Once upon a time it took a week to get from London to Glasgow. Now we can get to New York in a few hours; soon it will be even less. It will not be long, perhaps, before every major town has its own airport, like the one on our cover this month.

Surrounded by light, airy, spacious buildings—no more crowded dwellings—the airport will be as busy as a present-day train terminus. Every few minutes a fast jet liner will leave for distant places—Australia, Japan, Borneo, India, Mexico, Peru. And there will be no passport and immigration troubles. In the enlightened future, all countries will be free and untrammelled by the strings of petty beaurocracies; if you want to go to Lima, you just walk into the airport and buy a ticket. If you leave after breakfast, you'll be there for lunch.

Down with the pessimists! The world of the future will be a gay, enchanting place, where the spirit of the people will match the speed of the age; where hearts will be light and leisure and pleasure as fast and sure as the planes. Work will be what you want to do. Drudgery will be performed by machines. There will be colour and music and a fine rare mood of content. All hail to the future! You'll see it on our covers.

When things go wrong on Venus, the planet becomes a Hell

Ordeal

by Kenneth Bulmer

WHEN THE RADIO REfused to work they had to admit that they had no hope. Up till then they had been uneasily living with the knowledge that they were enduring an unpleasant and dangerous experience, and had accepted that as a lamentable but entirely normal concomitant of their profession. Now the fading mutter of static gibbering to itself, fading and dying, leaving only the endless frou-frou of the dust on curving walls told both men plainly that their fate, though prolonged, was certain.

Martineau struck the radio violently with his open hand. The blow smacked flat and dead.

"Curse the damned radio! And curse those fat pigs in Venus City, sitting comfortably on their backsides. It's all their damned fault! Technicians——" His trembling lips framed obscene words, pouring them out in an uncontrollable surge and childish reaction to fear.

N'Gombi waited quietly for the white man to finish. His lean stained fingers toyed with a wisp of hair and hide hung on a nylon cord around his neck. Unhappily, Martineau had not proven quite the type of man to be entrusted with the task of sitting out a year on Venus. The dust-devils had got him distressingly easily. N'Gombi sighed, the slight sound lost in the eternal whisper and rush of the dust slither over the dome.

"The radio won't work any

more." Martineau turned plaintively from the set, his thick features sagging from the weight of their own flesh. Light from the single dangling bulb hollowed his eyes, threw a squat, deformed shadow across the air purifier.

"Have you tried——" N'Gombi began, quietly.

"Tried? Of course I've tried! Everything!" Martineau slumped onto his blankets. "What the hell do you know about radio anyway, you head shrinker? The set's finished, understand? Finito." He took out a plastic container and spilled cigarettes across the floor tarpaulin, cursed, and took four tries to work his lighter.

N'Gombi said: "D'you think it's wise to smoke, Martineau?"

"Oh, go to hell!"

"I was thinking of the oxygen, that's all. We can expect a rescue ship some time. It's up to us to be alive when she arrives." N'Gombi shrugged, bouncing the knotted wisp of hide and hair on one palm.

Martineau spluttered the cigarette from his mouth and crushed it as though it were some deadly tropical snake. His wide blank eyes fixed on N'Gombi.

"You think there's a chance?"

Before the African could answer Martineau twisted his lips into an oath.

"Of course you don't. We'll rot here. Decay into another handful of this damned dust." He coughed.

"Listen, Martineau. We have to keep our heads and try to plan. Other men have lived a year on Mars, in much the same conditions as these, and come out to talk on T.V. about their experiences. We must husband our resources, scrimp and economise, last out——"

"Much the same conditions! Are you crazy? Mars is Heaven compared with Venus. Mars dust just floats around, controlled by the filters and air purifiers." Martineau pointed almost hysterically at the bulging dome. "Can't you hear it? On and on and on. Whispering and scuttling like a horde of insects biting its way in. Destroying everything."

"The radio——"

"I've told you! Finito." Martineau coughed again. "The dust gets in everywhere. Eroding, nibbling, biting, billions of tiny teeth sawing away —my God, N'Gombi, you sit there and tell me men have

lived on Mars. I'd live a lifetime on Mars rather than one week here."

N'Gombi waved his hand thoughtfully before his face. Distinctly visible in the canned atmosphere scintillant points of light danced and pirouetted. Dust gritted between his teeth, inflamed his eyes, sent a raw red patch of hell in his throat. The damned dust got *everywhere.*

Admitting that did not solve the problem of Martineau. The white man had been jovial, full of fun and frolicsome as a lion cub on the haul from Earth. He had even managed a white-toothed joke when he and N'Gombi had been assigned, with Jock M'Clare, to Observation Dome Five. Three entities were the optimum number that could be fed, housed and kept supplied with the necessities of life in an air-filled bubble, lashed by the endless dust storms of Venus. Two people would have bickered, quarrelled, fought, quite probably gone mad and wrecked the entire Observation Project. More than three was uneconomic. Three formed a harmonious unit, integrated, with set tasks and responsibilities, psychologically balanced to ensure perfect functioning under the most adverse conditions. A beautiful theory.

Only now—they were only two.

Cyril Martineau, flamboyant, cocksure, engineer, proud of his ancestry and impatient to set an arrogant foot over the frontiers of space.

N'Gombi, black, introspective, psychiatrist, proud of his ancestry and patiently persevering in his desire to penetrate the depths of the human mind.

Dust gritted against N'Gombi's face as he adjusted his face mask. He wiped his shining cheeks carefully with a tissue and settled the mask more comfortably. The oxygen bottle was heavy—although only eight and a half tenths of Earth's gravity held it—and he grunted perfunctorily as the cylinder snuggled down on his back.

"Going out?"

"Time we checked the velocimeters."

"What for?" Martineau rolled over on his rumpled blankets and stared emptily at N'Gombi. "Why go out there now? You know as well as I do that we'll rot——"

"Martineau!" N'Gombi spoke quickly, yet his voice was steady and controlled.

"There is lots of life left in us yet and the observation work must be carried out. I intend to keep a full record. If it happens that we're not alive when the ship arrives, at least our deaths will not be for nothing. There will be something to show——"

"Poppycock! When you're dead, brother, you're dead. You don't worry about rows of neat figures then."

"I wouldn't know. Nobody does." N'Gombi hooked his helmet down and prepared to lower it over his dark head. "But it's one way of passing the time. If you want to lie there and inspect Death as he comes along—well, go right ahead. Personally, I'd sooner be about my business and let the old gentleman take care of *his* without my help."

Martineau said something in reply, but it was lost on N'Gombi, who, with the clamping of his helmet was shut into a lonely, private and altogether familiar world. He had never feared the drawing in of thought and feeling that followed when you were in a suit. He could appreciate and sympathise with those who dreaded the spacesuit's utter loneliness—those who ran their radio batteries dead with small talk and idle, senseless chatter—but his sympathy was purely practical. He unzipped the inner flap and went through into the lock, closing the flap carefully behind him. Here, as it were in a bulging pod between the safety and air of the dome on one side and the hostile alienness on the other, he could feel the drumming beat of the wind on the fabric.

Always, leaving the dome like this, he had that flicker of symbolical imagery. This was like being born, being torn from the cosy, safe interior and thrust forth into the howling wilderness of the world.

Whilst he was putting his legs carefully into the twin tubes running from the lower wall of the lock he called Martineau on the radio. There must be a storm sporting somewhere near in the soupy atmosphere. Static crackled and jangled his nerves until he fined the volume down.

"Martineau. I'm entering outside suit now. Keep a time check, will you? Oh—and switch on the beacon."

"Time, 1750. Beacon on." Martineau's voice came slurring and dipping between static bursts. "I hope it doesn't go on the blink like

the radio. You'd never get back."

"I might." N'Gombi had inserted his body into the cavity above the twin tunnels for his legs. "I've no desire to wander around Venus until my oxygen runs out."

"Don't hurry back."

N'Gombi ignored that, zipping the exterior suit around his back and neck where it joined his helmet. He felt down carefully with his toes, wriggled them in the armoured fabric until he picked up and clamped down firmly on his sandshoes. The shoes, like the front part of the suit, were outside the airlock. All he had to do now to be free of the dome and out on the surface of Venus was to release the fabric from around his helmet.

To cut a sort of metallised-fabric umbilical cord.

N'Gombi freed himself with a single jerk and in the same instant felt his body lurch outwards and go sliding down in a smother of sand and dust that choked over the helmet and walled him in on the inside of a blank well. He realised at once what had happened. The wind had scoured the sand away from this side of the dome, tunnelling under the dangling suit legs and scooping a hollow. As soon as he had freed his suit and his weight had come on the sandshoes he had toppled over into a sandslide. He hoped nothing was broken.

After a quarter of an hour of intense effort and concentrated straining he had regained his feet and was leaning panting into the wind. He thrust his feeling stick before him—a sort of elongated ski-stick—and probed for a firm patch before shifting a single inch forward. The brittle crackle of the wind-driven sand was harsh on his suit and already his helmet was dimmed and scratched. He'd have to polish it up before venturing outside again.

Not for the first time he cursed the black day that Jock M'Clare died. From that event had stemmed the troubles that now, with the finish of the radio, meant only one possible outcome. Here he was actually going outside into the Venus weather to inspect a velocimeter. N'Gombi came very near to cursing Venus in that moment.

His stick hit and caught an obstruction. He smiled bitterly. That was the line from the instruments outside that should have telemetered all the information necessary into

the warm comfort of the dome. As it was, the line was useless, the equipment lying with Jock's body somewhere under thousands of tons of sand and rock. The exertion of wading through the muck was beginning to tell on N'Gombi. He had progressed some twenty yards from the dome and all around him there was only a solidly moving tower of yellow dust. Through the dust and sand occasional chips of heavier material flew and struck, each impact causing him to wince involuntarily, more from the very suddenness of the shock than from fear that his helmet might break.

"Hey, N'Gombi. You dead yet?"

Martineau's voice sucked him back into the world of the suit and the dome. There was an edge, an inflection, to the white man's voice that tantalised N'Gombi with its implications. That Martineau had proved to be the wrong type for planetary exploration and observation N'Gombi had to admit. But that he should have cracked up so fast was a disturbing factor and one that might mean finish for N'Gombi himself, if he allowed the situation to get out of hand.

When the radio had gone on the blink both men had known that their single link with civilisation had let them down, had let them so badly down that they could not signal to the relieving ship. And that meant, with conditions on Venus hopeless for radar, that the ship would not be able to find their dome. It would look just like any other sand mound or dust pile.

"Hey, N'Gombi!"

"Yes?"

"Whyinhell don't you answer? You all right?"

"Of course. Anything wrong?"

"No. Nothing wrong. Going to be much longer?"

N'Gombi smiled humorlessly. So Martineau was lonely. Well, he intended to complete the readings first and think about Martineau's fear of the dark last. The time might come when such a fact would be of use. N'Gombi filed it away and plodded on, step after probing step.

When he had finished checking the velocimeters he whistled. There had been a hundred per cent. increase in wind velocity, and according to the rules there was more to come. That was one of the things they had been dumped

down here on Venus to find out, and they were finding it out the hard way. A mighty big storm was brewing and N'Gombi knew enough about weather on Venus to know that a big storm was *big*.

"Martineau?" He called softly.

"What?"

"I'm turning round now. Beacon on?"

"Yeah. Beacon on."

N'Gombi checked his helmet mirror, which gave him a sight of his shoulder-mounted compass. The needle quivered and hung steady, providing a guiding path back to the dome. Somehow the faint fear N'Gombi had felt that Martineau might switch off the beam or jinx it in some way had vanished in the realisation that the white man was scared of the loneliness. Martineau would welcome him with open arms.

The suit was bulky and clumsy and N'Gombi was sweating freely by the time he had buffetted his way back. Under the broad sandshoes he could feel the slither and shift of the dust and sand, caught a hint of the ferocious power of the wind that could shift thousands of tons of the muck in a single instant. He did not relish the thought of being caught out in a big blow.

Martineau was grumbling again, his voice tinny and unreal. "What we ever signed on for on this crazy deal, I don't know. Must have needed our heads examined. I tell you, you damned head shrinker, I'm not crazy—and I don't want to die. But what can we do?"

N'Gombi decided that he should get back to the dome at once. Martineau might do anything if he worked himself up into a psychotic rage.

"What you can do is to get me a drink ready. I'll need it by the time I've slogged through this filth."

"More fool you for going outside."

N'Gombi did not bother to answer that. He conserved his energies, bending every cell of his body and will into forcing his way back to the dome. If only he knew something more about radio—but that was foolish thinking. If Martineau said the radio was dead, then dead it was. They had not yet been brought face to face with the inescapable fact of death. They had air and food and drink. They could live comfortably for at least another six months. After that would come the

time when utter finality stared grimly at them.

You just couldn't take seriously the fact that in six months or so you'd begin to die. Men's brains just aren't constructed that way. And, N'Gombi knew, that was the cause of Martineau's jumpy nerves—first full of braggadocio and next cravenly whining. Although he was logically aware that they would die, he could not bring that into emotional focus. Not yet. It showed in little things, and it would grow and swell like a vile putrescence on a corpse until it had taken possession of both their minds and spirits. N'Gombi shuddered at the prospect. He thrust with unnecessary force against the dome and clamped the crazily flapping fabric around his helmet.

Like that, still a part of the outside surface insanity, yet with his helmet locked partially into the dome, he heard Martineau's shrill panic scream and caught the horrid ripping squeal as metallised fabric parted.

The dome was collapsing. Incredible though it might be, the toughened triple-vacuum walls were curling back like a burning newspaper as exterior and interior pressures equalised. N'Gombi, standing like a condemned man with his head in the noose, had a black moment of utter terror. He did not know what to do. Through the turmoil that boiled around him and found a terrifying echo in his mind came the realisation that the dome had not burst.

There was still a chance.

He listened for a moment for sound of Martineau, but could hear nothing. The thrumming pelt of sand against his suit was growing in intensity, vibrating over his whole body, but in the other world of his helmet there was no sound. That meant that the radio had become choked with sand, breaking down like the big planetary set, isolating him. Martineau might have made it to a suit. He might have been lucky and quick enough and be panting with relief, unable to switch on his personal set. Or, of course, he might have been slow.

Whatever had happened to Martineau, N'Gombi, for the moment, was strictly on his own.

He began to free himself from the clinging fabric, peering round through the pervading yellow murk as soon as his helmet was clear. The dome was a rippling, writhing

mass before him, its edges still anchored and holding the whole thing to the surface. In this wind it would have blown half way across the planet by now without those deep-seated anchors.

The yellow swirling fog was bending, was moving in leisurely circles within the immediate ferocity of the wind, was towering away in long streamers of dust and darkness. The storm was nearing, and from the occasional down draughts that pummelled at him, he imagined that the storm centre was approaching. Sand and dust gyrated in sucking upward rushes, showered over him with a patter of millions of tiny grains.

First of all he had to ensure that Martineau was adequately cared for. If his companion was still alive N'Gombi must seek to succour him. He pushed through the deep sand, thrusting his stick forward impatiently and following with suicidal speed. Edging his way round the flapping, undulating mass of the partially collapsed dome, he found the gap. The tough fabric had sheared along a seam, the reinforcement plainly visible as a ragged-edged strip lashing the walls. He avoided the flogging end and carefully forced his suit into the aperture.

Dust and sand covered everything in the squashed interior. He switched on his head lamp. A suit lay spread-eagled at his feet. Martineau had evidently had time between the first warning sound and the resultant splitting to scramble his head into a space helmet. The helmet, with sand trailing in a mound to leeward, was jammed under the radio table and Martineau's body, completely buried in sand, was invisible.

The effect was gruesome.

N'Gombi bent as swiftly as his suit would allow and opened the oxygen taps wide. He scraped away dust carefully with his mittens and peered with inflamed eyes into the shadowed depths of the helmet. Martineau was breathing. Letting out a grunt of relief, N'Gombi set straightaway to the task of cleaning house. The first job was to seal the breach and re-inflate the dome.

Repair kits were somewhere under the bizarre mounds and hummocks of sand lying around, and he began to explore the strangely unfamiliar environment around him. He had been living here

for six months, and yet with everything smothered in sand the place looked completely alien. After a fruitless search in the wrong half of the dome he found the repair kits under the first aid box at the opposite end. Until then he hadn't known that he was working with his orientation one hundred and eighty degrees out. The conception made him smile.

Thick rubbery paste smeared over the edges and liberally plastered into the gaps brought the outside fabric skin into a homogeneous whole. He'd have to go outside later and seal the reinforcement strip into position. He rapidly stitched up the inner skins, pulling the cord tight for strength, and smeared the rubber paste over the joins and stitches. The inner atmospheric pressure was little different from outside, and the dome had no great strains to withstand, which was a thankful thought —if the inner pressure had been high the dome would have split right open in one burst.

The oxygen and atmosphere regeneration plant were brought into operation and N'Gombi lavishly stepped up the oxygen intake. Bring the air into a good breathable state right away and then he could work more rapidly. As it was, the regeneration plant was not a hundred per cent. closed cycle—that was not possible with their limited equipment—and the oxygen would have to be husbanded to last their six month remaining period. Then he remembered.

When six months had gone and the relieving ship nosed her way down into the Venusian murk, they would have no radio link and would be unable to home on the dome. N'Gombi stripped off his suit. Well, that problem would have to wait. By that time they might have thought up some other system of guiding the ship. Otherwise, they'd never be rescued. He put the suit down and bent over Martineau.

With the obscuring helmet removed N'Gombi saw that Martineau's face was flushed and the man's stertorous breathing rasped in pale imitation of the omnipresent howling sand storm outside. Martineau's head lolled to one side and his tongue rasped dry lips. He tried to say something and N'Gombi felt a curious wonder at the shut eyes. Was it a deep

psychological drive within Martineau, causing him to keep his eyes closed against the sand? Whatever it was, N'Gombi could sympathise and feel for it. At times he could have shut his own eyes and covered his ears to blot out all sight and sound of this desolate, eerie and nerve-fibrillating Venus.

Digging out Martineau was not a long job. N'Gombi laid the white man on his blankets and cleaned up the burnt flesh, smeared soothing ointments over the broken and charred skin. The sand on Venus' surface was hot—nearly boiling point—and made a good job of dry-roasting a man. The coveralls afforded good protection and N'Gombi knew that he had gone about his process of rescue in the correct order. After Martineau was comfortable, sleeping with a shot in his arm, N'Gombi stood up, put one hand to his back and surveyed the wreckage in the dome. He sighed. Life was certainly complicated.

Life presented serious complications also to Commander Stassen, seated before the glittering control board of the Terran Exploration ship *Livingstone*. He pulled a clip-board towards him and wondered just why some men should have jobs like being actors on the T.V. or professional rocket-skid men. He riffled the yellow papers and began to read the latest operational order.

Lieutenant Nancy Kinglake, sitting beside him, smiled. "We'll get to Venus on time, skipper," she said in that throaty, maddening voice that Stassen dare not fight against ignoring. "And no doubt they'll be very glad to see us, six months before we're expected. As glad as you're miserable, I should imagine."

Stassen eyed her sourly. Then he grinned. "I'm not miserable, Lieutenant. Just annoyed that the Survey and Observation Project should decide that I have to break off an Earth visit to reorganise the Venus set-up." He scowled again. "Good Lord, they could have asked Commander Tsing Hue, at least. He knows more about Venus than I do."

"Maybe. But he doesn't have your record. You have to tell the Venus boys what to do under the new system. You invented that system—ergo—you go and tell 'em."

"Pah." Stasson flung the clip-board back and took out

a Martian cheroot. "Anything on the radio yet?"

"Not a thing." Nancy's brown eyebrows drew down, shading the fire in her tawny eyes. One slim hand made delicate adjustments to the radio controls. "I've had nothing from Venus since we came within range of their set. They could be sleeping, I suppose, but . . ." Her voice was doubtful.

"Sleeping nothing." Stassen fired up his cheroot. "There's three of them at Post Five." He stopped suddenly, flame wavering slightly in the fan's draught. "Wait a minute, though. Wasn't there the report of an accident to a crewman on one of the Venus Observation Posts?"

"Yes." Nancy slid the records out and turned up "Accidents." "Yes. Here. Post Five. One of the crew, Observer M'Clare, killed in a sand slide. They lost a lot of equipment, too. Observer N'Gombi reports that they can last the year period on a reduced ration scale. Mostly radio and telemetering equipment lost."

"Well, that explains why we're not getting a signal from them. They can't keep up a round the clock watch on the radio with only two crew. We'll have to wait until they call out."

"I suppose they will?"

"Sure to. Regulations."

Nancy pushed the records back and bent to straighten her coverall trousers. She stood up and walked towards the cabin door. Stassen tried not to look after her and failed.

"Think I'll see what we're having for lunch." Nancy smiled casually over her shoulder and went out the door. Before Stassen had time to say the swear-words that bubbled up—the woman was a menace to red-blooded morale aboard his ship—Lieutenant Kulsky came in, face grinning like a Hallowe-en mask.

"Say, skipper. I've just found out from the boys that Observer N'Gombi's a chess wizard."

"That's right, Kulsky. He's reckoned to be good."

"This promises to be an interesting trip, after all."

"I don't think you'll be in his class—at least, not after the practice you have against the ship's opposition."

"Which is just why I want to meet him."

"You'll have to wait for that pleasure. They lost a

crewman and we've heard nothing from them."

Kulsky's broad face sobered. "Hope their radio hasn't gone on the blink. I doubt if we'd pick them up."

"Be cheerful, Kulsky. I didn't say anything about their radio being inoperative. They're probably both asleep or working on the records."

Nancy came back, her tawny eyes making Stassen think very un-commanderlike thoughts. "Roast chicken and French fried." She sat casually in her radio chair, hitching up her coveralls. "I'm starving."

To Stassen, the miracle was that Kulsky said as little as he did say.

"I fail to see how you keep that figure with what you eat," Kulsky said, and went through the doorway fast, followed by Nancy's thrown shoe.

As she retrieved it, Stassen grinned: "Discipline aboard my ship's rotten, Lieutenant Kinglake. You missed."

And, with a sort of rosy feeling of comfort that did much to offset his annoyance at this mission, Stassen knew that *Livingstone* was a very happy ship—a very happy ship indeed. Whatever trouble they might run into on Venus, he didn't want any other ship or crew to deal with it.

Nancy opened up the radio again and began calling Venus Observation Post Five. Calling in vain.

By the time N'Gombi had sorted out the food supplies he realised that two very nasty things had happened. One, caused through his own mistake, he could remedy at once. He sorted out a pair of goggles, then bathed his eyes and donned the goggles. His eyes still smarted, and in a scrap of mirror he could see they were inflamed and angry.

He had been working with such intense preoccupation that their stinging warning of dust damage had penetrated to him only when a fair amount of damage had been done. He felt like cursing. He should have realised that the concentration of dust in the dome, especially with the movement caused by his working, would be greater than normal. The trouble was, of course, that he had become so used to working in dusty atmosphere that he accepted it as normal.

The other fact was out of his control, and was even more dangerous. The food supply had been adjacent to

the gap in the dome, and, caught by the violent wind, a great deal of food had been swept away. There was left, at a rough estimate, enough food for the two of them for a week. So serious was this that N'Gombi flopped down on his blankets and wondered whether it was worth his while fighting on against the savagery of Venus.

Martineau was still unconscious in the grip of the drug. When he came round and realised the situation, N'Gombi had the nasty conviction that the white man would break up. Now, their fate had leaped towards them in seven-league boots, spanning the days. Only a week—and then it wouldn't matter that the radio had broken down.

Clearing up the dome and piling accumulated sand near the airlock for later disposal gave N'Gombi an occupation. His mind kept buzzing with the implications of the week's death sentence imposed on him. How would a man like Martineau react to the knowledge that he had only seven days to live?

The pain and irritation in his eyes made thinking difficult. The interior of the dome blurred with the smart in his eyes and he kept bumping into half-seen objects. Deciding that it was time he had a breather, N'Gombi realised with a humorous grunt of disgust that he still hadn't had the drink he'd asked Martineau to prepare. He sat disconsolately on his blankets and measured out a meagre portion of water. He took a long time drinking it.

Between drinking the water and thinking of Martineau and trying to ignore the growing irritation and soreness of his eyes, he was still sitting hunched up when Martineau groaned and rolled over and sat up with a terrifying lurch and convulsion.

"The dome!" Martineau croaked. "It's going—the sand—the sand——"

N'Gombi was by the stricken man's side before the spasm had passed, was whispering swift words of assurance. He pressed the water beaker to the dry lips, watched carefully as the precious water was gulped down.

"Steady, now. That's enough."

The gurgling ceased. Martineau opened one eye, stared around watchfully, then opened the other. His face

was strained and streaked with perspiration soaked sand.

He gulped and said: "What's happened?"

"You're all right. A little burnt—but otherwise you're unharmed. Take it easy and don't move around too fast. Give yourself time to heal."

"I remember—I remember, the dome—God! It was awful."

"Yes—it was." N'Gombi pressed the other back gently, wondering how he could break the news about the food shortage. Well, that problem would come up in its own time.

When it did come up, after they had eaten a frugal meal prepared by N'Gombi over the battery-powered electric stove, it was sparked off by Martineau's surly question about the amount of food served to him.

"What's up, N'Gombi? On starvation rations?"

Evading the issue any longer was pointless. N'Gombi had to face the fact that he had grown a coward's attitude to the Martineau problem since the time of the accident. He took a deep breath and coughed as the dust bit into his throat.

"When the dome split," he began, "the food was adjacent to the gap. A lot was blown away. We'll have to go carefully from now on."

"How carefully?"

"What you've just eaten could be called a representative meal for the future."

"What? Hell, man, that's starvation level!"

"Not quite." N'Gombi's face had a thin, drawn look, the shadowed eyes haunted. He was playing again with that scrap of hair and hide hung on nylon cord around his neck. He took a deep breath. "Look, Martineau, let's face it. There is enough food for both of us for about a week. After that—well . . ." He didn't bother to finish.

What Martineau's reactions would be, he hadn't the faintest idea. Oh, sure, he was a top line psychiatrist with all the fancy-scrolled diplomas to prove it. But, because of that very fact, he was too wise a hand to attempt a prophecy on the possible behaviour of a man under the impact of a death sentence in conditions such as these. After all, this Venus Observation Project was quite new, and for all the experience gained on Mars, the Venus Observers were working quite in the

dark. N'Gombi smiled bleakly. In the dark, figuratively and literally.

Martineau looked blank for a while. His thick features, puffy and bloated under the swaying gleams from the lamp, jerked in a revolting muscle twitch that brought all N'Gombi's half-forgotten ancestral repugnancies to the front of his mind. Casually, he stood up and stretched.

"A week?" Martineau's voice came thickly. He coughed and cleared his throat. "I don't believe it!" His eyes glittered; then, as he dropped his gaze, that glitter went out like a ship at brennschluss. His throat worked in a gargle of sound, clearly audible through the ever-present slither of the sand on the dome walls. N'Gombi stood, relaxed and yet alert, every portion of his attention centred on the break-up of this man slumped before him.

"You're lying, N'Gombi! You're just torturing me with your damned superiority. A big-headed psychiatrist and I'm just a lousy engineer. Oh, sure, don't think I miss your damn condescension." He looked up cunningly. "You can't fool me—we're going to last out our six months and fix a system to signal the ship when she comes. We are, aren't we?" he finished, suddenly pathetic.

"I'm afraid we haven't the food, Martineau."

"You're lying!" In a blaze of action Martineau came to his feet and gripped N'Gombi's tattered coveralls. He shook the black man, as though he could shake out the words he wanted to hear. "You're lying, damn you! We have plenty of food." His face sagged. N'Gombi had made no attempt to free himself from the despairing clutch fastened on his coveralls; now he took Martineau's hands away without any exertion and watched as the betraying twitch shook the heavy face. Martineau was taking this hard.

"Brace up to it, Martineau. The radio is your pigeon——"

Whatever stamina N'Gombi had hoped to instil by reference to Martineau's department was still-born.

"Radio! Forget the radio. I told you, it's finished."

Martineau dropped to all fours, began to scurry about the dome, turning over boxes, ripping open packages, seeking like a sinner for his immortal soul.

"Martineau! Snap out of it, man!"

"The food! Where is the

food? You've hidden it somewhere, blast you, N'Gombi." Martineau leaped to his feet and rushed at N'Gombi, sent him reeling backwards so that both men crashed into the wall, a struggling confusion of arms and legs. The fabric bulged and groaned. N'Gombi tried to extricate himself, ducking down and twisting his tired body so that he could escape the frenzied man's clumsy attempts to throttle him. He saw at last that there was only one thing he could do.

Phlegmatically he bunched a fist and scientifically dropped Martineau in his tracks, laid the engineer unconscious in the dust coating the floor.

He rubbed his neck and twisted his head around experimentally. Martineau's fingers had bruised his neck and N'Gombi knew he was in for a king-sized headache. His fingers closed again on his juju, felt the familiar softness of the hair. He supposed that generations ago his ancestors dancing in the jungles of Africa would have relied on the juju's efficacy to find a solution to this problem. His lips curved in a bitter smile. Things were not so easy now. The simple faith that might have found a cure in the fancied virtues of juju could hope to find no solution to an atomic age problem, could never bring a spaceship in on a lost dome smeared with the eternal sands of an alien planet.

He took a sparing drink of water and became aware of the smarting prick of his eyes. Bathing them, he was acutely aware of the futility of his own behaviour. Wasn't Martineau right? Was there any point in trying to go on, to last out the few days of agony on what food they had? Why not settle the whole thing, here and now?

Pushing those thoughts aside, he found the log-book and began to enter up the chaotic events that had led to their present grim situation. Weight restrictions had precluded the use of a recorder. It was simpler to write in miniscule on rice-paper and keep the weight for other things. Such as food. The paper felt gritty under his pen and the small lines of precise writing marched more and more erratically across the page. He felt a compulsion to write down what had occurred, to commit to the written word their experiences. Perhaps it might serve to warn later Observers. After a

while his eyes ached so abominably that he was thankful for the groan from Martineau heralding the return to consciousness of the engineer.

"What now?" N'Gombi said aloud as he wrote the words. "What other fate can we look forward to but the ultimate one? The only consolation that Martineau and I have is the knowledge that death must come to all at some time, and to us it has chosen to come in a sand-swept dome lost on Venus. It is only a matter of geography, an accident of event, that we go into the unknown from an alien planet instead of from our own green world. And where we are going, does it make any difference where we have come from?"

N'Gombi laid down the pen and peered towards Martineau. Strange how slowly his eyes refocused, how long they took to accept the picture in the dome and transfer it to his brain. He saw Martineau gather himself and rise unsteadily from the dusty floor. The picture appeared to him blurred, the edges ragged and formless. He raised a hand automatically to rub his eyes and his fingers brushed against the goggles. He shook his head.

The slurring rush of sand pattering and slithering across the dome fluctuated in intensity. For a moment N'Gombi thought that his ears were playing him tricks as well as his inflamed eyes. He cocked his head. Martineau had paused, his head hanging down and his body supported by rigidly thrusting arms and legs. He looked like a beast stupidly unaware of the slaughterhouse.

Martineau spoke unexpectedly, throatily. "The storm's stopping."

"Yes," N'Gombi agreed, thankful for the diversion, although failing to see any way in which it might affect the issue. 'Yes. The weather must have blown itself out after that centre passed."

"Now would be a good opportunity to get rid of that sand," Martineau said.

And then N'Gombi had it. He smiled wearily. "A good idea. Let's do it right away before the storm blows up again."

He reached out a shovel and tossed it across to Martineau. Both men donned their suits, checking the bottles and lines and making sure that the suits were at one hundred per cent. efficiency.

N'Gombi opened up the airlock and looked at Martineau. A cunning smile chased across the engineer's face.

"You go through, N'Gombi," he said, harshly. "I'll shovel the stuff out to you."

"As you wish." N'Gombi ducked through the airlock and slithered around in the bulge, seeking his sandshoes. They weren't there. Then he remembered. He'd left them at the gap when he'd come back into the dome. He lifted his feet out of the twin tubes and swung across, dropped into Martineau's outside suit. Zippering himself up, he tried to weigh the chances that Martineau would try to kill him on his re-entry into the dome.

It posed a small problem. Small only in that he felt confident of handling Martineau. That the half-crazed engineer would attempt a murder seemed beyond question. N'Gombi licked his lips and freed himself, dropped on Martineau's sandshoes out onto the hostile surface of Venus.

With the clearing of the immediate storm, and the odd sucking uplift of pressing masses of dust, he could see for perhaps a greater distance than he had ever been able to see before. It gave him a strange sensation of space, of outward flowing, a frightening reminder that life on Venus' concentrated images stultified his imagination.

Some way off to his left and clearly visible, twisted columns reached decaying arms of weathered stone towards the lowering dust masses swirling past above, dust grains that had sculpted the living rock into outré forms and grotesque parallels of sentient life. He had no feeling, as he had once thought he might, of being in a cathedral. The vasty openness subdued him; he thought he could see for at least a mile and the distance appalled him. Yellow and ochre dust raised gossamer trails against the sombre violet and umber rock carvings, raced in lacy veils through openings pitilessly pierced in the stony towers. The dust-filled sky lay oppressively upon him. He was forcibly reminded of a pot of gold, simmering and bubbling with golden steam tracing a deadly mist to shroud harsh realities. The golden dust shifted under his shoes and the spell was broken.

He began to call into his radio until he remembered

that the set back in the dome was dead. This short operation would have to be carried out by men deaf and dumb, with their vision microscopically restricted by an alien and artificial environment. The outer flap bulged suddenly and he knew that the lock was full of sand. Working methodically and unthinkingly, he cleared the lock, sealed the flap again and waited for the next consignment. It took them a long while.

Going back into the dome, N'Gombi played it carefully. He zipped open the inner flap and then sprayed the handful of dust he had carried in a calculated sweep, a spattering that filled Martineau's eyes and sent him coughing back, the metal bar falling soggily to the floor.

N'Gombi didn't say anything. He didn't have to.

When Martineau recovered, gasping and spitting, the ferocious glare that transformed his face told N'Gombi that from now on it was war.

As if to underline the new tension between them, the storm crashed in fresh fury against the dome.

"Venus!" Commander Stassen was annoyed. His thin, handsome face acid with disgust showed in sharp human fallibility contrasting the glittering inhuman efficiency of his ship. "Of all the filthy planets to pick—I should have had more sense."

"But the problems don't exist on the other worlds," Nancy Kinglake said, maddeningly.

"I know! I know!" Stassen cut a cheroot moodily. "So the problems existed and I, clever little brain boy, decided I could devise a better system for Observation Posts. I should have left it alone." He set flame to the cheroot and dragged on the smoke. It tasted foul. "It's absolutely certain now that something's wrong down on Post Five. And if they can't contact us we can't help them. Dammit all to hell!"

"Nothing on the radar," Kulsky said briefly. Then, as if to unburden himself of a pent-up grudge: "Why they can't rig a decent radar reflector down there I don't know. A mast, something to show a distinct blip against all these maddening ups and downs of dunes——"

"No mast could live in those storms," Stassen said, curtly.

"Well—a sheet of metal—a pylon——"

"Down there a hundred tons of sand would be dumped yards thick over any flat sheet. A pylon, like our domes, would show on a radar screen as one of countless other dunes—don't forget, Kulsky, the storms are electromagentic; they twist even a high power radio reception into a cat's chorus."

"I know what you mean," Nancy said, feelingly.

"The thing is, what are we doing about finding those men?"

"Assuming that their radio is on the blink, as I think we must," Stassen said, measuredly, "we know that their suit radios cannot pierce the electronic barrier set up by the storm centres. We have their co-ordinates, which would have put us near enough to them for them to guide us in. Now, the co-ordinates are useless figures. We certainly can't put out a scout vessel just on chance. Darn it, this is a mess."

They fell silent, and Stassen grew aware of the multitude of tiny clickings and chirrupings that denoted his ship was alive and eager for space. And he had to dive down into a dusty hell-hole like Venus. If only there were some way for those lost men on the surface to signal out. Post Six had reported their last contact with Post Five so long ago that the time factor had no bearing now.

Six had warned of a fresh series of storm disturbances sweeping up over the hump of desert and dust that girdled Venus, a massive vortex of storms swinging in a wild arc that cut clear across the landing path of shipping heading into Venus City. The trouble was, of course, he brooded, that on Venus you were so damned restricted, you couldn't step outside your control post and *see* the enemy. All you could do was set up an interlocking system of chains of Observation Posts and from their reports construct an overall picture of weather around the freakish globe. And as for venturing outside in a tractor—that had been tried just once. Now, if you wanted to travel anywhere in the dust belt of Venus you stepped aboard a rocket and shot up above the filth and curved over and came down spot on your target. Typhoons, hurricanes, tornadoes, monsoons, all would have been swallowed up in one of Venus' smaller

storms. Stassen had no scrap of envy for the Observers; he felt profoundly sorry for them.

"Nancy," he said with abrupt decision. "Call Post Six and find out if they've heard anything."

"Roger." Her tawny eyes flashed with some inner amusement as she bent to her set. "Terran Survey Ship *Livingstone* calling Venus Observation Post Six. Come in, please." She was brisk and efficient.

Post Six, with three able-bodied Observers on watch, answered immediately.

"Post Six, *Livingstone*. Hearing you loud and clear. Go ahead."

Stassen leaned across to his own mike and said: "Post Six. Any report on Post Five yet?"

"Nothing since last contact. What in blazes has happened to those guys? We've a king-size storm approaching from Post Seven—they were almighty pleased to be rid of it—and Lord knows how it will swing when it leaves us. Venus City have been sitting on our necks the last few hours."

"I know. Anything from Post Four?"

A new voice cut in over the mush of static. "Post Four here, *Livingstone*. Nothing to add. Our last contact with Five was before last contact with Six."

Stassen sat and felt a slow anger rise in him. An anger composed of frustration and tiredness directed against the blind, inchoate, remorseless lather scudding over Venus. Why did mankind have to try to settle such a place? Dust and sand and heat and wind. No fit place for an imp from Hell. And groups of men, three to a dome, sat down there for a year—an earth year—at a time. Stassen shook his head. He gestured wearily to Nancy and she tied up the transmission.

She paused in her work, deft fingers playing the controls and bringing in a fresh contact through the growing mush. She listened and then gave a brief acknowledgement.

"What was all that about?" Stassen growled.

"Venus City. Want to know what we propose doing about Post Five."

"*They* want to know what *we're* doing!" Stassen took his cigar from his mouth, looked at it, put it back and said: "Tell them we are trying to regain communication and will they please notify us as

soon as they speak to Post Five." He grinned darkly. "That's put the baby right back with them."

Livingstone was a happy ship. Stassen savoured the thought, holding onto it, clinging to it in the knowledge of what could happen to a ship—a happy ship—under the stress of spatial adversity. He had a clear cut objective before him. He had to get down to Post Five and find out what was wrong. And he had to ensure the smooth continuity of harmonious effort that he had built up so patiently in *Livingstone*.

The storm blowing up out of the wastes of Venus bothered him. If the storm centre, which was really a whole boiling of centres, veered from the plotted path traced on the weather map there would be no Observation Post ready to record and measure, to transmit that information to Venus City, where it would be integrated with all the other pieces of information on the big weather chart. Stassen rolled his cigar round his mouth and thought dark and bitter thoughts.

"Look, skipper," Kulsky said unexpectedly, his broad face creased in a perplexed frown. "What are we getting so excited about? So their radio's on the blink. But the men are okay. We can think up some system of getting down there when this big blow's over, and then——"

"Talk sense!" Stassen was brusquer than he intended. "For one thing, we've come to Venus to re-organise the Observer set-up and Post Five is out of action. That means we cannot start work until they've been integrated back into the system. And who knows what two men cooped up under those hellish conditions down there will do when they know their only link with civilisation has failed? It's not so much what we know might happen as what we can only conjecture. They could do anything."

Nancy said, softly: "Like going mad?"

"That would be an easy way out for them, I imagine."

"Well, until their tour of duty's up," Kulsky said, stubbornly, "I fail to see why they should panic. They must know we'll be trying everything to reach them."

Stassen stood up tiredly and tried to think clearly, to evaluate what Kulsky was saying, to find if there might just be a grain of truth in it. He wanted to believe like

that. By God he did! It would shred away this load of responsibility that bowed him now with the terrifying concept of what might be happening in the dome. He said: "You've never been down on Venus, have you, Kulsky?"

"No, skipper." Kulsky was short in his answer, truculent with the knowledge that he had been theorising on insufficient experience.

"Venus is a hell planet. It frays at your nerves. Wears you down. Builds up a repressed load of irritation that grows and grows—and when your mental controls snap—bingo . . ."

Nancy shivered. "We just have to believe that those two men can last out. Can keep their spirits——"

"Yes," Stassen said, thickly. "We have to believe."

But privately, inside him, where he kept things that he did not wish the world to see, he knew that there was very little hope. Men were built for Earth, not Venus. It was as basic as that.

Inside the dome N'Gombi sat awkwardly with his back shoved against the air regeneration plant. It was strange how little things assumed an importance when all the big things had been settled—an importance that didn't matter at all and yet which you just couldn't ignore. Now that he knew he was going blind he had an insatiable ache gnawing at him for the places and things of Earth that he had never seen.

Like Paris in the Spring. The Taj Mahal. An acetylene-lit stall in the East End of London and eating fish and chips out of a newspaper. Things that he had read about and felt an affinity for, things that he had always meant to do but somehow, in the daily round of study and preparation for a career, had never done. The Bay of Naples with the sun drowning in a sea of burning gold. Oddly, the places that he had seen and which he had thought might come back with a pungent nostalgia didn't move him in quite the same way. The crashing roar of the Victoria Falls; the close mutter of everlasting jungle; the bleak beautiful etching of the moon. They were there, locked in his mind, but to take them out now and examine them stirred him not at all.

His right leg cramped him and he shifted it jerkily. Martineau sprang into a quivering awareness, his hands

outflung, face drawn, white and corpse-like.

"All right, Martineau. We're still here."

"What am I supposed to do—cheer?"

"Listen to me, Martineau, and don't interrupt." N'Gombi picked his words carefully. "I know you say the radio is dead. I have heard of radios being repaired with all kinds of odd bits of bent wire and metal, even nail varnish—although we've no women operators. Can't you cannibalise the suit sets? Surely, man, there must be *some* way of repairing the thing?"

Martineau laughed.

He cackled. Tears ran down from his eyes and cut little rivers in the dust caking his face. His body bent over and he had difficulty in breathing.

N'Gombi watched, feeling pity, feeling the same sort of pity he might have experienced when looking at a small wild creature held fast in some steel-toothed trap. Only, he was held in that trap, too. He waited.

Presently Martineau looked up and his eyes gleamed in the lamplight like two crazy headlights of a car racing to destruction. His mouth opened. Words came out, words which N'Gombi could not understand. He knew they were technical words. Words which were labels for the insides of a radio set. They meant nothing to him. But when Martineau was finished he understood that the words meant that the radio could not be repaired. And that was all that mattered.

And then Martineau said a strange thing.

"If we had more food," he said quite distinctly. "If we had enough food we could walk over to Post Four. They'd let us use their radio, I'm sure."

N'Gombi's mind wanted to crawl in its pit of bone, curl up and shudder away from the other mind that sat in Martineau's brain over there on the other side of the dome. Post Four was a hundred miles, more or less, from Five. A hundred miles through the dust and sand, the wind and heat, the sheer hell of Venus. N'Gombi doubted that a man could walk for an hour out there and survive.

He said, quite reasonably: "What about oxygen? You're forgetting about the oxygen."

"Oh no I'm not!" Martineau chuckled with his own cleverness. "I'd carry an extra

bottle. And I'd walk fast. Oh, yes, I'd walk very fast."

In the swirling sand motes that clustered ever thicker in the dome, forcing their insidious way past the emergency sealing N'Gombi had plastered on the split, the bloated figure of the white man appeared to jump and quiver, to writhe with an evil life that came not from itself but from the lamp's erratic rays. N'Gombi shut his eyes, feeling the swift sealing that flowed over the lids and the irritation that quietened restlessly as light was shut off.

He forced his eyelids apart, unsticking the gummy edges, knowing that he dare not allow them to remain closed for long, otherwise they would never open again. He could not go to sleep. Martineau had something—a knife, a metal bar, a rock—something under his right leg, and every now and again he would put a stealthy hand down and feel it, make sure it was still there.

The interior of the dome was close and oppressive. N'Gombi let his glance stray over the familiar things of the dome. Things that had been a home until the radio broke down. The air regeneration plant against which he leant. The squat grey boxes of the accumulators, ranked all against one side. A few shelves with leaning books. Behind Martineau's rumpled blankets the radio. The damned, stinking, hellish radio! N'Gombi shivered at the violence of his thoughts and stirred restlessly on his blankets.

Midway between the two men the electric cooking stove jutted up from all the food that had been salvaged. The food was neatly arranged in groups of basic needs, a group for a day. There were five groups left. Five.

N'Gombi put his hand around his juju, pulled gently on the nylon cord, feeling it bite into his neck. Something real. Something of his old life. Something that he could hold onto in face of what was surely going to happen when the last of those pitiful heaps of food was eaten.

More for something to take his mind off that particular thought—although he knew well enough that he couldn't think of anything else with all his mind—he pulled out the thin-leaved log-book and began to write in his precise microscopic miniscule. He wondered whether he had the courage to go outside again and check the veloci-

meters. There was no point in that now. There was a storm coming. A big one. By the time anybody at Venus City got around to marking it up on their charts it would have veered around and left the area of this dome. Posts Four and Six would be handling that from now on.

There'd be a nasty gap in the charts back at Venus City. The thought made him smile. Some prickling little come-back at those sitting comfortably back there.

He dropped his pencil suddenly and jerked around as the thought struck him.

"Martineau," he croaked, and felt surprise at the hoarseness of his voice. "Venus City! They'll want our report!"

"So what?" Martineau rolled over on his blankets and then scurried that mysterious object back under his leg again. "So they'll be unlucky. Serve the pigs right."

"Don't you see, man? They'll wonder what's happened to us! They ought to investigate——"

"How?"

"Well—send a ship, something we didn't think of before."

"You tell me how a ship can reach us. Go on. Tell me. You're a fool, N'Gombi. No ship can find us in this muck." His face puckered suddenly into that cunning, knowing leer. "My way's best. Walk across to Post Four—they're nearer than Six, you know—and use their radio. They'd let us, mark you, they know me. I've got pull there."

N'Gombi felt sick.

He bent again to his writing, looking up suddenly and unexpectedly, not really caring if he did see Martineau in the act of beating his brains out. At least—that way would be quick. Then he stiffened. At least—he *wouldn't* go out that way! He'd be beholden to no man to slip him down death's dark corridors.

"Three observers are essential," he wrote, carefully. "And I feel strongly that a replacement should have been flown out to us. In the case of Martineau, although I fear that there may be some blame attached to me, I consider that the circumstances are such that there would be no use in my attempting treatment, as we are both going to die in any case. His wild talk of walking to Post Four may be judged by clearer minds than mine; all I can say is that I doubt that he would make it." N'Gombi re-read

that and the shock of it brought him part way back to the realities of the situation. The idea that he needed to comment on Martineau's fantastic proposal meant that he was slipping badly. He didn't feel like altering the entry. He hadn't the energy. Everything was growing darker and there was a crepe band of blackness around the outside edges of his vision. Red tadpoles swam in maddening swarms before him. He'd be blind very soon now.

The agony of that etched into his soul. Why should he be picked out to be the one to die here on Venus? Martineau and N'Gombi. Two names that would be erased from the records. Just two men who had paid the supreme penalty for venturing out into space. A scrawled entry in a ledger, the closing of a page, of an account. And fresh men would come out and never know there had been two flesh and blood men called Martineau and N'Gombi. Or a man called Jock M'Clare.

Quite deliberately he conjured up a chess situation and began to plot moves in his head, finding a deep peace and sedative in the sheer beauty of move and counter-move. His head nodded and panic sent him upright like a blown-up toy balloon doll.

Martineau filled all his vision. A Martineau, whose face, shadowed into a formless splodge by the lamp behind him, could tell N'Gombi nothing. He needed to know nothing of Martineau's intentions. They were obvious. They were made plain by the upraised arm, foreshortened, and the evil bar that sprouted as an addition to that arm.

Martineau struck.

At the last moment of despair, N'Gombi threw himself sideways. His feet caught in the blankets. Stars and nebulæ flamed in his pitiful blank eyes and he felt quite distinctly the soggy squash of the back of his head against the dome wall. The world lurched.

Through a red haze of pain-filled roaring he saw Martineau scooping all the food into his blankets, knotting them around the food, slinging them to his suit. For one awful instant he thought that Martineau was so crazed that he was attempting to walk to Post Four without donning his outside suit. The relief that came as Martineau shambled into the airlock shook him with its

irrationality. He could not, psychiatrist though he might be, have explained why that final idiocy would have been so horrifying.

He was scrambling for his own helmet then, picking up the dimmed plastic and fumbling it over his head. The wall of the dome behind the shiny bulk of the radio bulged inwards. Bulged—and through the slur of wind and sand he could hear the squeal as the stubborn fabric resisted.

His helmet 'phones squawked and then spoke, and the shock of that sledged a stroke of horror through him. He had forgotten that the suit radios were working and only the sets in the dome inoperative. And now Martineau's high-pitched voice sliced into his ears.

"Radio! Damn you, radio! You caused the trouble! It was you who killed poor old Jock. He was carrying spares for you, and he died. And you killed us all!" The voice keened on a rising note of hysteria; and N'Gombi climbed as quickly as he could into his suit where it lay limp by the break in the dome he had repaired.

He tried to interrupt Martineau. For some reason his tongue was furred up, clung to his palate. He couldn't speak.

"You damn radio! I'll get you! And then I'm off across to Post Four. They'll be pleased to see me——"

With a squeal of tortured fabric the dome wall split; and N'Gombi could see the sliver of steel that ripped and slashed, cut a hole through which the unwieldy figure of Martineau blundered. He rose to his feet, hands out-thrust, helpless in the grip of a paralysis that would not let him move a muscle. Martineau took the shiny radio and shook it. He tipped it over and dragged it through the gap he had cut. His voice babbled and shrieked and N'Gombi stood there, unable to do a thing.

Martineau kicked the radio. He dented the metal, scratched the surface, battered in the vital parts. Valves spilled out. Coils of wire and small round things that were the intestines and lungs of the radio. Martineau pounded them into rubbish. He screamed with laughter. He sobbed like a broken man. And then he walked away, across the spuming dust of Venus, and left the collapsed dome and the smashed radio and a black man, who felt he had

witnessed a manifestation of the devil.

Slowly, N'Gombi fought his way up against the rushing tide of madness. Insanity like that was contagious. He felt unclean. As though he had brushed against the slime festering in the case books of the psychiatrists back on Earth.

Still in his earphones he could hear Martineau cackling and rumbling, clear and without distortion, as though the engineer were still with him in the dome. N'Gombi pushed at the fabric billowing around him. He stumbled awkwardly to his knees and clawed his way out of the dome—the dome that was now only a flat rippling circle of fabric under the dust of Venus.

It was only when he was putting his feet into his sandshoes outside where he had left them that the wonder of that occurred to him. He looked about. He could see a long way. Even with the pain and blurriness of his eyes he could see much farther than he could previously.

The oddly shaped black dot that jerked and capered away there must be Martineau. The man was walking towards Post Four. Post Four—a hundred miles away across a planet that had not allowed a single germ of life to ferment in its dusty girdle of raging sand. And Martineau was setting out to walk there, with five days' food and two bottles of oxygen.

N'Gombi knew, even as he scuffed around for his walking stick, that he was a fool to do this. But there was no point in not doing it. He had to go after Martineau. The man might be mad, might be going to die anyway; but for some reason connected with vows of loyalty to the human race N'Gombi had to go after him. It was all crazy, all stupid and insane and pointless. But he just had to go.

The storm had cleared off. At least, it looked as though it had. It was probably only a temporary lull coming between centres that revolved in the big storm centre; but that had no bearing on what he had to do. That Venus at the moment was clearer than it had ever been before, to N'Gombi's knowledge, only meant that he could see Martineau to follow him. He picked up the feeling stick and probed before him; but the ground was plain in front. He could see that

Martineau hadn't bothered with a feeling stick.

He went off after the crazy engineer, and as he went he brushed past the radio set, lying naked and ugly and smashed against the black circle of the fallen dome.

Martineau was growing smaller, a black animated dot against the fretted spires of flamboyant rock beyond, and N'Gombi hurried his pace as best he could. The wind had dropped, the dust lay thick and sleazy, disturbed only where his sandshoes brushed it up, to fall and lie without a trace of his passing. He went after the other human.

He did not look back.

"It's just like an upturned bee-hive." The voice came from Venus City and Nancy Kinglake grimaced at Stassen. "The Controller just went through in his pyjamas. I wouldn't be in his way for all the tobacco on Mars. Oh, oh, here's a call for you, *Livingstone*. From the Controller in person. Putting you through."

Stassen frowned and bent towards the microphone. He fully savoured the hilarious methods that maintained contact between isolated groups of men on hostile planets; just at the moment, though, he was feeling far from happy.

"Commander Stassen, *Livingstone*," he growled into the microphone, and was aware of Nancy's quick glance and the tiny vertical line that appeared between her eyebrows. What the blazes—she didn't think he was made of lead, did she?

"Venus City Controller here, Commander. What's all this about Post Five?"

"I'm sorry to call you personally, sir." Stassen was not at all sorry. "But I'd like you to send a rocket to Post Five. I need to get down there, and there has been no signal from them——"

"All right, Commander. I'll authorise a rocket at once." There was some background mush that garbled the next words. Then: "But if you think a rocket can land without guidance, you're crazy."

"Maybe," Stassen said stiffly. "However, that appears to be all the more reason for trying."

The connection was cut and Stassen slumped back in his seat. He smiled wearily at Nancy.

"So that's how they run Venus. No wonder I was

sent out to check on things and supervise the new system." He swore softly to himself. "I wonder what caused the radio at Post Five to break down?"

"You're suggesting that slackness——"

"Well, what else? What else could cause a vital piece of equipment to break down? Even allowing for the fact that spares were lost?"

Kulsky came through the doorway with a chart. He laid it on the control desk and pointed. Stassen's eyes picked out the red lines, the whorls of the storm centres, isobars, all the labyrinthine shorthand of the meteorologist. He chewed thoughtfully at a thumbnail until a reproving click from Nancy brought his hand away from his mouth with a guilty start.

"If that means what I think it does," he said, slowly, "then there's a good chance that this area of clear—relatively clear, that is—space will continue on over Post Five."

"We can hope." Kulsky was now fully converted to the seriousness of the position down on Venus. He had none of his former cockiness.

Nancy disappeared and presently returned with three trays of preheated food. They ate in silence. Cutting a cheroot, Stassen moodily went over the sequence of events, and again found no other solution than the one he had instigated. The damnable thing was that Venus City *should have* investigated as soon as Post Five reported trouble. A replacement should have been sent for the observer killed. And radio spares. He lit his cheroot and his eyes were lit in the glare with two tiny spots of flame.

The radio crackled.

"Calling *Livingstone*. Survery R cket Nine. Come in please."

Nancy answered. The rocket pilot's voice went on: "Am dropping down on co-ordinates of Post Five. There's quite an area clear of dust clouds. Strange to see the surface bare, without that filth." Nancy remarked on the clarity of reception, and Stassen agreed that it was due to the absence of the interference that hung so liberally in the air.

"Say. This looks interesting." The rocket pilot's voice came in spasms, as though he were craning his neck over the side at the same time as riding his craft. "I can

see a blackish ring, and a thing that's shining in my searchlight. It is! By Jupiter, it is! It's the dome. Collapsed."

Nancy groaned and Stassen bit into the cigar savagely.

"I'm landing now. Hold on."

There was an agonising wait.

"If only we could be there." Stassen took his cheroot from his mouth and stubbed it out. "Keep the ship on course for Post Five," he said, abruptly. "We'll maintain contact for as long as we can."

The waiting fretted their nerves. Kulsky swallowed two or three times and then took a long drink from the dispenser. Nancy was holding onto the mike with white clenching fingers. Stassen took out another cheroot.

After a long while the radio crackled. They all looked at it as though it held the lost secrets of the ages.

"*Livingstone*, Rocket Nine here. Well, it's all over for those guys. I don't know what happened to them. The dome's collapsed and there's smashed up junk and stuff scattered around."

"Where are the men?" Stassen forced the words out.

"Nowhere around. No sign of them. I've salvaged the logbook. This place is like a ghost town; they couldn't have lived here. Dust over everything—and it's blowing up. I'd better get off quick before that storm hits."

"All right." Stassen felt drained of energy. "All right. Good work getting down. You'd better head back for Venus City."

Nancy was performing with her dials again and fresh surges of static washed across the background. Stassen stood up and tried to decide on his next course of action. Get to Venus City and clean up there. Root out the sloppiness that had allowed this tragedy. Make very sure that nothing like this could ever occur again. Still, for the time being he'd vector in on their present course and then turn for Venus City just above the blanketing dust sheath. He had a morbid desire to see the scene of the drama, although he knew that nothing so far invented by man could show him the surface when the dust devils were sporting.

"Rocket Nine," he said, wearily. "Read me over that log you found. Oh—and call in Venus City, too, Nancy. I'd like them to hear. It might be good for their souls."

"Where did they go?" Nancy's voice trembled. It held a stunned wonder that made Stassen want to take her in his arms and comfort her.

Stassen smiled bitterly and said: "Go? Where could they go? They went mad, I imagine. Which was a simple get-out for them."

"If they could only have held on." Kulsky joined in. "I'd never have believed it possible. In such a short time. And with that break in the dust—a million to one chance—that enabled the rocket to spot them."

"Ironic, isn't it?" Stassen asked of no one in particular.

N'Gombi had just come alongside the fallen figure of Martineau when he heard it. Incredulously he tilted his head back, straining against the helmet, peering with his pitifully inflamed eyes giving him a jumpy, erratic picture of the high-lying levels of dust. A single clean flame was scoring straight towards the dome, supporting the lovely, wonderful, altogether beautiful body of a survey rocket.

"A rocket!" N'Gombi felt the words come out past his lips without any conscious volition on his part. Then he was shaking the fallen man. "Wake up, Martineau! They've come for us! They've thought about us. *They're here!*"

Martineau's floppy figure pushed up against the dust, swivelled awkwardly on the sandshoes and N'Gombi saw the man's eyes, hollowed and shaded terribly, stare gauntly back towards the dome. A brightness grew in those terrible eyes.

"A rocket." Martineau croaked. Choking sounds came over the radio. "Rocket. Radio. They've come—they've come for us?" Before N'Gombi was aware of what was happening, the engineer scrabbled to his feet, sending a smother of sand outwards like a dog shaking itself free of water, and began to stumble crazily towards the landing rocket. N'Gombi could hear through his outside mike pickups the throaty grumble as the rockets cut, then he, too, was charging through the dust after Martineau.

He began to shout insanely. Perhaps the pilot could hear over his ship radio? No—the distance was far too great. Sweat poured down N'Gombi's face and he could feel the moisture rilling over his chest, soaking the juju.

He tried to increase his pace, tried in vain to overtake the gesticulating form of Martineau. The man could run! N'Gombi plunged after, panting, excited, full of a tremendous elation, an exuberance of spirit that he had thought himself incapable of. He forgot the pain of his eyes. He concentrated on putting one leg in front of the other with as much speed as he could. That wonderful rocket!

Tendrils of dust snaked over his shoulders. He dared not spare the time to glance back; but a hasty glimpse into his mirror gave him a distorted vision of dust banks rolling up, sweeping low over the sand and raising the familiar yellow furore that was Venus' habitual clothing.

Martineau had walked a long way from the dome, and it was taking longer to return than N'Gombi expected. If the man hadn't collapsed when he had, they might have gone so far that they would have missed the rocket. That would have been tragedy. N'Gombi could think about that, chuckle that, now the danger was over, there had been any danger at all. Venus City was not so indifferent to men's lives as he had thought. However notorious the slackness there, at least, when trouble threatened, they did something to redeem their former carelessness.

Martineau had stopped running.

"Go on, man! Go on!" N'Gombi shouted.

Then he stopped running.

He stood, mouth open and great sobs tearing at his chest, stood staring unbelievingly. This could not be. This was some figment of his fevered eyes, some distorted trick of his tilted mind. He glared like a man watching hell fire.

Noise blurted in from his outside pick-ups. Noise that shrieked upwards and dwindled and died.

Mixed with that fading roar was the surge of his heart, washing in tides of blood through his body and hammering in his ears. Oddly, he noticed how the dust rushed upwards in a leaping spiral after the rocket, leaped, and fell and dropped back to the surface in a drifting umbrella.

He shook his sandshoes free of dust. Methodically, he began to walk towards Martineau. There was nothing at all in his head. Only a

vague ache, a helpless, wondering question. Nothing at all that made any sense. He walked.

Martineau began to talk, to shout, to shriek.

N'Gombi said: "Shut-up, you spineless lump of jelly."

Maybe that wasn't the right thing to say. Maybe there was every justification for Martineau's behaviour. But right now N'Gombi was sick of it all. Sick of Venus, of the dust, of the heat, of sweating and prickly irritation, of the slashing smart that tore at his eyes. Sick of life.

The bright visions of Earth that had infected him a moment before dimmed and dulled, tarnished and withered. The Taj-Mahal. Paris in the Spring. God! They'd gone, gone without a word, and left him here to die.

By the time he reached Martineau the engineer was stone cold sane, sane and tottering on the edge of unconsciousness. There was time for Martineau to say: "This is our lot, N'Gombi." Then he pitched forward and held supported grotesquely in the air on his sandshoes. N'Gombi gave the still figure a slight push and watched as it toppled over to lie comfortably on the sand.

That was one way to solve problems. Quite probably Martineau would experience a mental catharsis and dispose of all the unpleasant facts that had driven him partially insane, so that he could look forward with an unwarped mind. The only trouble was—he could look forward only to death, which meant that he'd probably go insane again. There was rather a pretty pattern to it, if you looked. N'Gombi looked. He spent some time debating the question, tidying up pockets of facts that didn't fit, building an impressive theory. A theory he felt sure would win approval from his professors back on Earth. They'd be quite intrigued by the ingeniousness of it all.

He'd better get back to the dome, though. Enter up all this delightful speculation in the log-book. Make sure that it was left for posterity. For some reason not quite clear to him there was no possibility that he would tell the professors himself. Why that should be he didn't know. Still, enter it all up, mark the important new concepts, and leave the rest to the future. He wandered back to

the collapsed dome, lost in intricate and tenuous threads of logic. The storm built up slowly as a fresh centre veered round over Post Five.

He couldn't find the log-book.

At first he turned over the sand dusted rubbish casually. Then, as panic mounted, more and more rapidly. In the finish he was flinging stores and boxes haphazardly around, scuffling in the dust, peering through inflamed eyes for the thin book. It wasn't there.

N'Gombi sat down. Tears rolled from his eyes, washing over the yellow stuff that clogged them, prickling and jabbing at tender flesh. It just wasn't fair. Just when he had formulated a new theory that would transform the world of psychology and was about to commit it to paper, the means of doing so were denied him.

He began to croon a simple melody. A single thread of sound that was too terrible to hear. N'Gombi sat in the yellow dust of Venus and waited.

Into the everlasting hellish slither and mutter of the sand that crawled through his outside pick-ups he heard the storm building up again. He could barely see. He knew that the clear patch was still around him, like a great tunnel blasted into the murk, but he could not see his sandshoes, or his legs, or his hands.

God! His hands. He held them before his face, touched the gritty surface of his helmet. Nothing. Only the dark.

He was blind.

His keening song faltered, straggled, then swelled again. He rocked backward and forward. He didn't care what that did to his suit. He sat there, a dusty heap of blackness. Singing.

Sand roar grew, mounted in intensity, blew in a fierce shouting loud across the face of Venus. Let it blow. Let it storm. For him, there was nothing, and he didn't give a damn. He stood up unsteadily, unseeing, unknowing, balanced on his sandshoes and feeling the gritty dust trail off him. He stared sightlessly before him, tottered and fell.

He did not get up again.

Milestones in Science—4

THE CLOCK

It must have taken many centuries of slow development after man came down from the trees for the concept of time to become established. Yet this concept is with us throughout the whole of recorded human history. We do not know of a period when man as a whole lacked the idea of time. True, one or two small, isolated races even today are most hazy about time relations; and it takes several years of individual development before even the vaguest notion of the meaning of time shows itself in the human child. But humanity as a whole is very well aware of time—and, some say, civilisation's chains are forged with links of seconds!

Whether or not time controls society, it is certainly essential in science—and what is the use of knowing about time if we have no means of measuring it? So it is that clocks—*i.e.*, time-measuring devices—have played a vital role in science's progress.

Some of the earliest clocks of which we have record were crude in the extreme by modern standards. The hour-candle, for example, was not too bad for measuring intervals of sixty minutes, but it was hopelessly inaccurate for less periods; and the sand glass was even worse. Nevertheless, these primitive devices served their purpose and have an honoured place in the history that leads to the more precise instruments we have today. After all, what point would there have been in going to the expense and trouble of making an instrument so precise that it measured time intervals so short that they interested no one? In those early days the tenor of life and the fields of discourse were such that time measured to within an hour or so was good enough. The affairs of men were leisurely and the affairs of science were non-existent; the early thinkers had not yet got around to the idea of actually testing

their theories, and so were more philosophers than scientists.

Not so today! Life is hurried and science is experimental.

As society increased in complexity, so the measurement of time was required to be more and more precise. The most important factor was the development of maritime transport. Here time was very much of the essence if the mariners were to know their position well enough to get to their destination and back again. Governments sponsored time study and such institutions as the world-famous Greenwich Observatory came into being, primarily concerned with the measurement of time, not astronomy.

The importance of measuring time with precision was recognised by one far-sighted dextrous nation and turned to such good account that the nation's skill is, so to speak, a watchword in time-keeping circles! The best timepieces still come from Switzerland, where a science has been made an art.

Though clocks are so familiar that they tend to be taken for granted, yet few scientists would hesitate in agreeing that without them science would be rather at a standstill. Certainly some of the most fundamental experiments in physics, on which are based that science's basic laws, could not have been carried out without clocks.

Galileo would not have been able to state the precise quantitative law of falling bodies if he could not have timed their rates of fall. Newton could not have developed his laws of motion if he had not been able to time movement from one spot to another. Einstein would not have been able to elaborate his theories of relativity without a background of experiments in which events were precisely timed.

These are some of the pillars that hold up the whole of science. But there are hundreds of other, less general, laws and theories that would never have come into being in the absence of good clocks. They occur in every science: re-

action rate laws in chemistry; orbital laws in astronomy; developmental laws in botany; ecological laws in zoology; reflex laws in physiology; seismographic laws in geology—the list goes on and on. Without those laws the sciences would totter. Without clocks the sciences would stagnate.

Just as clocks keep the pure sciences going, so they also are essential to the applied sciences—the technologies. In the field of applied atomic physics especially, the measurement of time—down to hundred-millionths of a second—is so integral a part of the work that highly skilled and highly paid specialists give their whole life to its study. It is from atomic work that the most accurate clocks have emerged, measuring intervals of time so small that they appear to the untrained mind to be abstractions rather than parts of the real world. Can *you* imagine 1/100,000,000 of a second?

In all the different branches of engineering the exact measurement of time is vitally necessary in the development and maintenance of our systems of heating, lighting, communications, drainage, sanitation, transport and food supply. The poet, Oliver St. John Gogarty, once grew tired of being pushed around by clocks and wrote a poem called *Time, Gentlemen, Time!* about what a wonderful world it would be if we could banish the clocks. We may all feel a bit like this now and then, but we should have to disagree with Gogarty. He thought the clockless world would be a paradise. It would be a jungle.

From the humble alarm clock, through the not-so-humble stop-watch to the haughty radioactivity clock, time-measuring devices are weaving the pattern of our lives today and in the future. The regular, unhurried ticktocking all around us is doing more than ticking our lives away. It is deciding whether we shall live at all—and for how long.

Time travel can produce some peculiar results. It can make a man kill himself without knowing he's doing it . . .

The Silver Box

by LEN SHAW

NANNY NODDED OVER the small silver trinket box. "Pete . . !" she quavered. She brushed maudlin tears away. "Pete must have it. He's the one!"

She examined the box reverently, her time-washed eyes intent. On the lid the miniature of lovely Eva Grimble, dead this many a year, was instant-fresh. The tiny hinges squeaked as she opened the box. As the result of an ancient fall, the lid did not fit properly. One day, perhaps, she would have it mended.

"Pete . . !" she whispered. She looked round guiltily. "Yes, yes . . !" Her hand went to her wizened-apple cheek. She rocked her thick-set body, comforting herself. "Certain . . ! Sure . . !"

Uncertainty switched on inside her, stripping her of courage. Her features decomposed as fright ravaged her corroded old heart. She whimpered.

"For pity's sake . . !"

She dabbed at penitential tears. So many, many years! Such unrightable wrong! Time muddling her mind, fraying the threads of memory —and small wonder. For half a lifetime there had been no rest, no peace of mind. Remorse had lived with her like a worm in wood, ravening and destroying; and there was no prospect of deliverance —ever.

Inexplicably her mind cleared. Perception sharpened. Indignation flared. "No —ah, no!" She shook her head and tut-tutted. "Not

Pete, stupid! Not him . . !" She nodded self-reassurance. "Dear me, it's Aylwyn, of course! He's the one who must have it. Yes. Aylwyn's definitely the one!"

She slipped the box into her pocket and rose from her fireside chair. Before she could change her mind again, she shuffled from the room.

She paused on the half-landing to look through the open window. The unkempt garden was beautified by moonlight; but she saw only the reality of borders tangled with weed, hummocks of grass on the untended lawn, paths whose foot-beaten centres only were free from encroaching green. The red brick stables opposite, unpainted, loose-tiled, neglected, were a small-scale reflection of the semi-derelict old house they served.

"Ah me!" she sighed. Her ghosts were more real than moonlight. "If poor Mr. Grimble could see it now, it would break his heart."

She turned away, immeasurably distressed. Her sin burden, nowise mitigated by underlying altruism, was hard to bear. There was no easement for good intent. So the dead lived on in her mind, and time-past intertwined with time-present, muddling her hopelessly.

Hearing voices, she went to the bannister and looked down into the hall. The suave male tones that floated up from the lounge lilted with mockery.

"The trouble is," Pete Grimble was saying, "you won't face realities, Aylwyn. Poor show for a scientific genius, old boy! This happens every day. Sarn thought she loved you. But she loves me. Tough on you—but who's to blame? Sarn? You? Me?"

Brittle silence.

Nanny rocked in distress. She pictured the scene clearly, having witnessed the like so often before.

Spruce, blond Pete, medium-sized and aggressive, the one with the infuriating grin, baiting his dark lanky

cousin Aylwyn, whose sombre speechlessness afforded him no protection. Clenching and unclenching the fists she had forbidden him to use, restraining the urge to smash his tormentor, Aylwyn's pale face would be chalky, his deep-set eyes brilliant with hatred. But now, instead of toys and childish treasures, the cause of contention was Sarn.

Nanny waited anxiously. At last Aylwyn's voice grated on her ears. One raucous syllable—a prayer, an act of adoration, a condemned man's last plea.

"Sarn——"

And a clear young voice responded: "I'm terribly sorry, Aylwyn."

Nanny's grip on the bannisters tightened as pain spilled into her heart. Poor Aylwyn! The girl could have rescued him from himself—from morbid introspection and the unrewarding quest for knowledge; could have weaned him from test-tubes and retorts; coaxed him from unhallowed smells and weird lights. But, instead . . .

Pete broke out impatiently: "Oh, come on, Sarn!"

"Pete, darling!" Sarn's voice held the pity of the loved for the unloved. "Can't we——?"

"No!" rasped Pete. "We can't!" Harshness modulated into derision. "You've got your old time machine, Aylwyn. Have a bash at it. Take a time-trip. Help yourself to Cleopatra. Or Helen of Troy. Or pop into the future and——"

"Pete!" Sarn was indignant. "How could you!"

"I was joking," came smoothly. Then, with urgency: "Let's go, Sarn, before there's trouble. Come on. Quick!"

Pete crossed the hall, followed by a slim girl with green eyes and raggedly-cropped black hair, whose boyish charm had roused passion in antagonistic cousinly hearts. She hesitated, looking back with sorrow, with pity, but not with love.

"Oh, hurry up, Sarn!"

Pete reached back for her hand, bundled her out into the night and slammed the door.

Before the reverberations had died away, a triumphant shout rang out. "Got it!" invisible Aylwyn croaked malevolently. "I'll take a trip, Pete, old boy; and then—watch out!"

Nanny hurried into the lounge a second too late. The door to the built-on laboratory slammed. The key turned. Her knocking and tearful entreaties at last evoked a growl.

"Go away, Nanny."

"Aylwyn, let me in!"

"Leave me alone."

"Open the door!"

"Oh, do buzz off, Nanny!"

She went away, shaking her head. She sat on a chair in the big unlighted kitchen, tapping her hand worriedly on the table top, staring out at the moon-silvered stable roof.

She was afraid, but without knowing why. Aylwyn was moody, unpredictable and, when he was thwarted, prone to senseless violence. He was in a dr adful state at the moment. That wild threat he had flung after Pete—ah, that was it! That was why she was afraid. There was black mischief afoot. Something—evil. And she was powerless to prevent it.

She rose, trembling. At least she could try . . .

She prepared a light meal on a tray and took it along to the laboratory. She tapped on the door, but there was no reply. She knocked again . . . And again, harder . . . The fourth time she knocked, the door swung open and she hurried inside. She took three paces forward, then stopped. Aylwyn was not there.

In a corner, a queer contraption of glass and metal hummed. Light flickered intermittently about it. Her heart suddenly chilled as she caught sight of a transparent outline among gleaming rods

and fitful lights. It was Aylwyn. There! In the machine!

She stepped forward, mute with horror. But the humming stopped. The lights dimmed and died. There was a click. A stillness. And Aylwyn was no longer there.

"Aylwyn!" she whimpered. "Where are you?"

The machine remained inert.

Nanny stood there, a stupid, muddled old woman, holding a tray. Doubts mushroomed violently into convictions smothering common sense, fabricating impossible possibilities. Fragmentary fourth-dimensional glimpses turned her mind into a lunatic quagmire.

"Aylwyn!" she commanded shrilly, her face pearled with panic. "Come back this minute. Do you hear me, you bad boy!"

The silence remained, and somehow intensified. Reason dissolved, and——

Clatter—crash!

The tray hit the floor and, suddenly, Nanny turned and fled.

She panted upstairs beset by twin terrors. Night crouched like a malignant beast, ready to spring the moment she slumbered. Ready to rend and tear.

Sleeping, nightmare would engulf her, wrenching her soul back to the phantasmal past, to Pete's first birthday party, the multiple tragedy that ensued the following day, and her own still-living sin.

Even if she defied sleep, she would brood over vanished Aylwyn, fearing the unguessable evil that night might spawn. His cry of dark triumph had filled her with foreboding. Though she knew not where he had gone, nor how, formless fears shuttled about her brain. Aylwyn was bent on mischief and, if mischief could be done, it would be done.

Ascending the stairs she tired rapidly, her breathing became laboured. One foot

followed another, each time heavier, each time slower; and the right foot, treading, signalled "Sleep," while the left foot countered "Don't"; and she would have given ten years of her life to do neither.

Until at last, in muddled anguish and hopeless helplessness, she cried out aloud: "If only one of the parcels had been mine!"

Aylwyn stepped from the machine at approximately 11 p.m. on the 12th October, 1928. As the space indicator had not moved, he knew that the lawn on which he now stood would later vanish under the bricks and mortar of his own laboratory.

He smiled oddly, thinking of Uncle George Grimble. As his eyes became accustomed to the darkness, he perceived the faint mass of house and stable. There was crisp gravel under his feet, and he knew that the borders would be a riot with autumn colours, the lawns as smooth as baize, the paths edged and weedless. Uncle George had been a stickler for tidiness.

Standing there, tall as a grenadier, alert and tense, Aylwyn passed his plan under final review.

Uncle George Grimble, Pete's father, was an artist in oils. Having struggled unrewarded for years, he had reached that point of frustration beyond which he would not labour unrewarded.

His latest "masterpiece" stood on its easel, ready for dispatch to the Royal Academy. If it won recognition, all well and good; but if not, he had sworn to sell up, migrate to South Africa and, renouncing art, take up fruit farming. Pete, about to be born, would perforce go with him and, living and loving thousands of miles away, would never set eyes on Sarn . . .

The academy hanging had touched off one of the most startling success stories of modern times, causing a sensation, bringing Uncle George

wealth and renown. He had re-dedicated his life to art, renouncing for ever his dream of South Africa's golden fruit, thus welding the link binding Aylwyn's destiny to that of cousin Pete.

Aylwyn smiled as the night breeze stirred, bringing coolness to his brow. He had chosen his time well. His plan was diabolically simple.

With one swift act of vandalism, he could alter the course of events, precipitate Uncle George and family into a new field of endeavour, secure himself from the machinations of Pete. He had only to slash the painting. He chuckled. The plan was fool-proof. And the time for action was at hand.

As he let himself in at the front door, Aylwyn's torch revealed the gleam of new paint. He smiled sourly. Legend had it that Uncle George had always kept the place in first-class condition. Regular old fuss-pot, Uncle George!

He drifted upstairs to the studio—or his own bedroom, according to the time factor involved—and lit the lamp. The neat stacks of canvas and general air of tidiness reflected Uncle George's mania for law and order, but Aylwyn's only concern was the masterpiece perched on the easel under the north light.

He wasted no time. Snatching a Malayan kris from the wall, he went to the easel and hacked the canvas to shreds.

He stepped back, satisfied, his purpose achieved. He had jolted Uncle George's life from its destined course, eliminated Pete's rivalry, won Sarn irrevocably for himself.

Suddenly obsessed by the incongruities of the situation —by the studio which was currently his own bedroom; by the tattered canvas which, he knew for a fact, hung intact in New York—he lingered, peering round uneasily. The strain of simultaneous cognisance of dual time took toll of his nerves. Unreality seemed real. Reality a receding dream.

He turned away abruptly, desiring only escape from temporal ambiguity—and froze in his tracks as a short rubicund man in a silk dressing gown appeared in the doorway.

Seated before her bedroom fire, determined to stay awake, Nanny took the silver box from her pocket and stared at the miniature of Eva Grimble.

She nodded gently, jerked upright, then nodded again. Her head jerked a second time; then nodded and nodded, lower and lower, and lower. So, imperceptibly, she slipped into the haunts of nightmare.

Paying no attention to the weight in her lap, she watched the two women conversing before the lounge fire.

"Don't worry," said Eva Grimble. "You'll see, Lois. George is a bit eccentric, but he's generous to a fault. I'm sure he'll help Joe."

Lois Grimble, Eva's sister-in-law, looked fondly down at the face of baby Aylwyn, asleep in her arms. "I only hope you're right, Eva," she said. "Joe's absolutely broke. And now there's this offer of the business. It's a little gold mine. If only——"

"You're not to worry!" said Eva.

Nanny brushed the weight off her lap—and saw, too late, that it was the four oblong parcels. She snatched at them, but they eluded her and swooped about the room in Indian file.

She gave chase. The parcels —birthday presents for Pete— had to be recaptured and destroyed. They were extraordinarily elusive, but at last she had two of them under her arm, while the other two hovered over the women by the fire.

Nanny grabbed successfully at the one above Eva Grimble's head, tucked it under her arm—then saw the fourth one sailing through the door. She was after it like a flash.

She followed it across the hall, up the stairs and into

the nursery. It hovered over the cot of the sleeping Pete.

"No, no, no!" she screamed silently. "It mustn't! It mustn't!"

She sprang on the cot, captured the parcel, and floated down to the floor. "I'll put you in the fire!" she said, squeezing the thing into shapelessness.

A movement caught her eye. She stared—and saw the other three parcels slip round the door knob and out of the room. She threw up her hands in consternation—and the fourth parcel slipped from her fingers, resumed its original shape and followed the others.

She gave chase. Floating downstairs she entered the study where two men stood before the fire, talking earnestly.

George Grimble said: "Sorry, Joe. I'd like to help, but I'm hard up myself and I've got the family to think of. If I don't sell this picture," he shrugged widely, "I'm off to South Africa for keeps. So you see——"

"Okay," said his brother uncomfortably. "I only asked. I—er—well, anyway, it doesn't really matter. I'll manage somehow."

Nanny caught two of the parcels as they tried to float out through the door, then she collected the remaining two, which were hovering over the men. She turned away, intending to burn the parcels in the kitchen fire, but they slipped from under her arm and shot out into the hall.

She plunged after them, screaming silently.

In fuming helplessness, Nanny sat on the back seat of the car with Aylwyn in her arms. Eva Grimble, nursing Pete, was on her right, Lois on her left, while in front George Grimble was at the wheel and Joe sat beside him. The four parcels were dipping and diving infuriatingly above the heads of the passengers.

At last she could stand it

no longer. The parcels had to be destroyed, and she would have to do it herself. Nobody else saw them. She had half-risen, intending to lay Aylwyn on the seat, when a tyre burst and the car embarked upon a series of lethargic somersaults . . .

Later, pacing up and down the deserted moorland road with the terrified child in her arms, she crooned soothingly: "There, there, my pet! Did the nasty car turn over then! Now, now! No more tears, my darling."

To and fro she went, endlessly. She looked up and down the empty road; her gaze searched the empty stone-walled fields on the right, and, steadfastly, she avoided looking into the ditch on the left.

But at length she had to look. When she did, she saw something move in the wrecked car. "Gracious heavens—the parcels!" she choked, and scrambled down into the ditch, taking Aylwyn with her.

The car's five occupants were grotesquely still. Three of the parcels hovered above Eva, Lois and George, while the fourth swung between Joe and the infant, Pete.

Nanny tried to catch it, reaching desperately inside the broken window; but, even as she did so, all four parcels burst open, shedding their wrappings, revealing their contents as miniature black coffins . . .

Nanny's mind went blank, but she knew there was terror there. And treachery . . .

The man in the white coat touched her shoulder. She stood aside and saw the bodies removed—Eva, Lois, Joe, then Pete. "This child's alive!" barked the man. "Get a move on there!" Then, again: "So's the driver! Jump to it!" They were put in the ambulance, and the fourth coffin swung in after them.

Screaming, Nanny fought to get at it. Then came the prick of a hypodermic. The man's voice said: "She'll be

all right now, nurse. It's the shock——"

Nanny stirred, half waking. This was the end of her nightmare. Always, at this point, she wakened with the ancient tragedy freshly minted in her mind, her burden of guilt renewed. But tonight she was unable to escape to consciousness.

"No!" she moaned. "Ah, no!"

Protesting unavailingly, she was dragged down into the black pit of the subconscious. The nightmare continued, violating time-sequence, switching back to the night before Pete was born.

She was on duty, attending Eva Grimble's first confinement. Worn out after a trying day, for the baby was late arriving and the patient fractious, she cat-napped in a chair beside the bed.

Suddenly she was awake, rigid with terror. The small flame of the night light on the bedside table revealed a tall, sinister figure bending over the sleeping mother-to-be . . .

Her scalp crawled.

She opened her mouth screaming—wide——

Aylwyn retreated as the fat man advanced, snorting, into the studio.

"Who the devil are you?"

Aylwyn shook his head. Remembering certain family portraits, he recognised the intruder as Uncle George Grimble.

He licked his lips. He must not be caught. Not by Uncle George. Or anyone else. Explanations were quite impossible.

"What the blazes!" shouted Uncle George; then he saw the tattered canvas. He threw up his hands, and his jowls turned plum-blue. "My landscape!" he moaned, making futile protective gestures.

He turned on Aylwyn, erupting with rage. "Vandal!" he shrieked. "Swine! Murderer!" Berserk, he seized a chair, lofted it, flung himself forward.

Aylwyn stood his ground.

Smiling disdainfully, he took a firmer grip on the kris.

He wiped the blade thoughtfully on a paint-soaked rag. Uncle George's sudden demise had radically affected his plans. Aunt Eva and unborn Pete would not go to South Africa. Family ties would, if anything, be strengthened. The future-to-be would not differ materially from the future-passed.

His grip on the curved blade tightened. One stark, menacing fact stood out. About-to-be-born Pete was still a potential danger. The elimination of his rivalry, if it had to receive attention, had better be attended to now.

He tiptoed to the door. So far, his journey in time had been a wasted effort. Pete's rivalry would, if anything, be more deadly in the future-to-be. And there could only be one possible end to that. Self-restraint would eventually snap and he would kill Pete. How much better, then, to do it now and bury the dead in the deep oblivion of a quarter-century of time!

Wraith-like, he entered his aunt's bedroom, where the dim light was sufficient for his purpose. Ignoring Nanny's sleeping form, he bent low over the bed to identify the sleeper's glistening face, although the bulge under the bedclothes was surely identification enough.

He shrugged as a shred of remorse crossed his mind. Aunt Eva was a lovely lady. Pity she should pay with her life for the future malfeasances of her unborn son!

She stirred, and Aylwyn drew back into the shadows. Her brow contracted with pain, her lips shaped a soundless cry; then she was still again.

As Aylwyn moved back, a glint on the bedside table caught his eye. He reached out, picking up a small silver trinket box.

He examined it, marvelling at the exquisite miniature on the lid—Uncle George's work, no doubt. He was about to

replace it when the sleeper caught her breath, grimaced with pain, and opened her eyes wide—and they were dark wells of horror as they focused on the knife's wickedly curved blade.

Simultaneously, Nanny, waking with a start, took one look at the intruder and opened her mouth screaming-wide.

Thin-lipped, Aylwyn struck down with all his might.

Nanny wakened, refreshed, from her nap. She felt bright and cheerful, almost gay. "Dear me!" she clucked, good-naturedly, noticing the silver box lying on the floor. "I hope it's not bent the lid again!"

She picked up the box and, finding it undamaged, slipped it into her pocket. Then she put her head on one side, listening expectantly. She heard a key turn in the door below, and a warm joyfulness invaded her placid old heart.

"Here they come!" she thought.

Footsteps hurried upstairs. There was a tap at the door, and in burst spruce, blond Aylwyn and radiant Sarn. They quarrelled happily for the right to break the news, but with the prescience of age Nanny forestalled them.

"You've got engaged, my dears!"

Sarn pouted delightfully. "How did you know?"

"A little bird told me." Nanny took the silver box from her pocket and gave it to Aylwyn. "It's for you, dear. A wedding present. I've treasured it for many, many years."

"That's very nice of you, Nanny."

Aylwyn paid with a kiss, examined the box perfunctorily, then handed it to Sarn, who whooped delight.

"Steady on there!" Aylwyn chuckled. "If you want it for keeps, you'll have to marry me!"

Boyishly impulsive, Sarn held out a hand. "It's a deal!" She shook on it. Then she examined the miniature in-

tently. "But how beautiful, Nanny! Who's the lovely lady?"

Nanny sighed. "The lady is Mrs. Eva Grimble, Aylwyn's aunt. She and her husband—Aylwyn's Uncle George—both died tragically while Aylwyn was a baby. They were murdered the night before her own first child was expected."

"Good heavens! What a dreadful thing, Nanny! Did they find the murderer?"

Nanny hesitated as a phantasmal jumble coruscated through her mind.

She saw never-born infant Pete killed—as she thought—together with his parents and his uncle and aunt, Joe and Lois Grimble, in a motor car accident which, surely, could never have happened . . .

She saw herself, frantic with concern for penniless living Aylwyn, take furtive action before help arrived, robbing rich supposedly-dead Pete by exchanging the infants' clothes, identities and, thus, inheritances . . .

She tasted the gall-bitterness of her own craven silence on learning that Pete still lived; a silence maintained while Pete and his father fought for survival; a silence extended, after George Grimble had succumbed and Pete had rallied, through a guilt-warped quarter-century during which malignant rivalry between Pete-Aylwyn and Aylwyn-Pete had completed the dispiteous wastage of her hag-ridden existence.

She saw, too, at the end of this satanic succession of events, the most ghoulish hallucination of all; for she witnessed the lethal flash of driven steel as Aylwyn-Pete, in a supreme effort to eliminate his rival, struck convulsively, slaying his own mother—and his own unborn self!

And she heard, a second later, after the murderer's blown-out-flame disappearance, the tinkly sound of the silver box striking the floor, damaging its lid . . .

She blinked, vaguely remembering the kaleidoscopic mental pictures. Then memory blurred and, suddenly, was gone. Her mind was blank.

Sarn insisted: "Did they find the murderer?"

Nanny passed her hand across her brow, but no memory-trace was there. She shook her head. "No, dear," she said. She sighed without loss of composure, for it had all happened so very long ago. "He just—vanished. There were no fingerprints on the knife. Nor on the silver box which he'd dropped. There was—nothing."

The crunch of wheels sounded in the drive, and Aylwyn sprang towards the door. "That's mother and dad," he announced, flinging out a hand to Sarn. "Come on, darling. Let's break the good news."

Alone again, Nanny switched off the light and looked out of the window.

The stables, painted and pointed, with every argent tile in place, reared up out of shrubbery shadows like a haunted grange, and the garden was bejewelled with eerie moon-magic. The smooth lawn, stencil-edged with neat gravel paths, patterned by well-stocked borders, was a joy to behold—for Joe Grimble was as tidy-minded as his brother had been before him.

Nanny stifled a yawn. The scene was a symbolic replica of her own life—calm, purposeful, replete. She felt pleasantly tired and, presently, would bestir herself to go to bed. She realised that she was an old woman now, long past her prime, in the twilight of a placid existence.

A sigh escaped her. Life had been very kind. Comfortably provided for, surrounded by her loved ones, finding joy in the happiness of Aylwyn and his Sarn, her outlook was confident and serene. Profoundly convinced of man's humanity to man, she was at peace with the world.

Here's a peep behind the seventh veil

THE HOLIDAY

by KATHERINE MARCUSE

THE DAY CAME. THE FIRST day of the special, the wonderful holiday. They sat together in the spaceship taking them to the place called Star Island, the place where only those chosen for special honour were allowed to go. They sat, hands touching.

"Why won't they let us stay up there together?"

His hand squeezed hers. "They know we've always worked together. They know that. I wouldn't have got anywhere without you."

"Or I without you. So why won't they let us holiday together? I'll be lost!"

"And I. But they were firm."

"Quite firm. I asked them——"

"I did, too." For a moment he looked at her curiously. "Was it before the Session, or after, that you asked?"

"Before. After. I forget. Does it matter?"

"Perhaps. Try to think——"

"I can't. It's all hazy. I remember going in the white room, and the man sitting at the desk and I lay down when he told me . . . the pill the nurse had given me was making me so sleepy . . ."

"You don't remember starting to talk?"

"No. Do you?"

"I remember the same as you. And yet in that time they were able to learn our deepest wishes . . . the setting needed for their fulfilment . . . so that now they've got it all ready!" For a moment he gripped her shoulders, hard. "How does it feel, knowing all *that's* going to happen?"

"I don't know. Crazy. Queer. I'd settle for a good old-fashioned holiday. Just you and I——"

"But when did we ever take one? We couldn't; we were always working, we had to be——"

"Until now."

He smiled down at her. "And even now, if they hadn't made us, we'd probably have started a new set of experiments, the kind you can't leave . . . this way, we'll start off again fresh, all tensions relieved . . . so they say . . ." He broke off. "We're decelerating. Look—we're going to land!"

They said good-bye in a waiting room with high bright windows. "Strange, the light here. Do you know, I think it makes you look younger—a whole lot younger——"

"It does you, too."

"Well——" he hesitated. "Have a good time. Goodbye . . ."

"Goodbye." They kissed. Then each went out through a different door.

And instantly the air was different, the air, the light, the ground under her feet—the blood in her veins. She was tingling, quivering—what is it? Where am I? There was a wooden platform, and steel rails. An old black suitcase stood on the platform, with a tag on it, and there on the tag was her name. She bent towards it, looking, and at that instant became aware of vibration, the faraway clack-clack, and then the long-forgotten, lonesome, *whoo-whooowhoo*. She stood still, feeling the pounding begin in her veins, and then the train was in sight. It was stopping; a porter was stepping down and helping her aboard . . .

The world flew by—was it the world, here, and did it matter? Outside the window were rolling hills of reddish sand with little bushes clumped together like spots on a leopard's skin. There were yucca plants—she tasted the word unbidden on her tongue—and cactus and stunted palms. A child nudged her with sticky fingers, "See my rocket?" and she wound it for him, seeing it arc over the head of an old lady, sound asleep, brush past the ear of a fat man. Then the child was pointing: "Oh,

look! He's got it! An' he's a space pilot!"

The man had just come through the door at the end of the car as the rocket zipped toward him; he nipped it out of the air, and came forward, smiling.

He stood, smiling down at the boy, holding out the rocket. "It's a good ship," and the child took it, suddenly shy. But the man did not go on. He stood, balancing easily as they rounded a curve, while she looked at the dark red hair, the fair skin, the lashes and eyebrows so light they looked bleached white. He fumbled in a pocket of the black uniform. "Gum?" Then as the child chewed with delight he turned to her, tentative: "It's Venusian, you may not like it . . ."

"But I do," she said, gravely, and it was true, but even if it had not been good she would have delighted in the strangeness, the knowledge that it flew through fabled space.

He sat down, then, stretching his legs, talking lightly, and she thought, feeling the slow rising of delight: *It's beginning, what I am here for, this encounter.* And then the awareness of the two worlds left her, the absurdity of a train no longer absurd. She was back in the time of new beginnings, when anything was possible . . . on the way to join her husband, yes, since he had gone ahead to set up the new laboratory, but in the meantime, free, herself. And filled with the enchanting euphoria of train travel, suspended from work, and so capable of the bravest dreams about it.

Suddenly her childhood resentment of being female—no women, yet, in perilous spaceships—flared up. "How I wish I could do what you do!"

"It's all right." He grinned down at her. "I don't need to tell you about the bad parts . . . you can get really fed——"

"No, I know about that. But the good parts?"

"Well—there are times——" And then he was telling her about them, the moments, fabulous, but real . . . while the world flashed by. They

sat, still talking, in the dining car, and coming back, stopped on the sliding platform between the cars. The top half of the door was open and they stood, taking the rush of wind in their faces. She thought, fleetingly, the only way I can be part of those far places is being with a man who knows them, and at that moment he bent suddenly and kissed her.

She had known he would, but not so soon. Someone opened the door—the conductor passing through—and they moved apart, but as soon as they were alone he seized her again. At last she drew away, looking up and seeing, as she knew she would, the bright blue eyes, the half-smile, enquiring, hoping: "You wanted that as much as I——" There was no need to hide the answer.

The train raced faster; the world outside darkened and grew magical; all her body was transformed into a fiery longing. They stood between cars while the porter made up the beds. "Let me sit in your berth and talk to you for a while——"

"No——"

He argued, but after a while, he went back to his own car.

She lay on her back in the dark, thinking of strange towns, whistle stops, boys, waking in the night and hearing the train go by. Thinking of him. So different from her husband. August would be surprised, expecting her to like only people with the same intellectual markings as herself. This one was no intellectual at all. Talk made up of slang she'd never heard before. Physically direct—unsubtle. Earthy—she smiled—although given over to space. He was not a pilot at all—pilots were older—only the equivalent of a coxswain in the navy. But beautiful, she thought, sleepily, beautiful . . .

In the morning he looked just as good, coming down the aisle, jaunty in the well-brushed uniform, and in the dining car, eating pancakes and sausages. And the day passed like a dream, a day suspended in space, between Here and There, filled with low-voiced conversations,

quick touchings, the delight of discovering each other. Only at night danger seemed to threaten. "You will stay on the train . . . and I——"

He said finally, roughly: "Look—I have to report at the base. But then I'll be free." He held her, shook her almost. "You've got to get off with me."

And she said, suddenly, almost surprised at her own voice: "I'm earlier than I'm expected. Maybe I could——"

He seized her, his voice exultant in her ears. "Maybe? You've got to!"

The hotel was small. It had the usual ferns, leather chairs, old men, in the lobby. The room had a metal desk, painted to look like wood, and a bedstead, also brown. She sat in the chintz covered chair, waiting. Why did I think he was so familiar, so looked-for? Should I go, now, while I can? Then there was a tap on the door. She went in stocking feet to open it. "You're here. Oh, baby, I thought I'd never get here . . ."

Five days of loving.

The last night she woke; moonlight lay on the bed, lighting a moment of stark clarity. She looked at him, knowing the ending was near, and saw that his eyes were open, too.

"*How do they do it? Hypnotism?*"

"No." His hand was soothing, stroking her arm. "It's real, all of it, in a strange way. Don't be afraid of that. They provide the props—they have a machine for doing it economically. And they try to find suitable people. But there's no guarantee of how we'll react——" He smiled. "If you hadn't liked me, what a lousy train trip this would have been."

She was staring down. "But I thought—I was afraid——"

"That I was a prop planned just for you?" He grinned. "No. I'd been awarded a Holiday, too."

"And I fitted into it . . ."

He was awake now, awake and strong. "God, you *are* it——"

Day came, and it was as if that conversation had never been.

He carried her bag to the station. "Do you think we'll ever meet again?"

"I don't know. I can't believe I'm leaving you. I feel so alive. I've never felt so fully alive before."

"You've never been so fully loved before."

The alive feeling stayed, in spite of the pain. She stretched—smiling a little, feeling bruises on muscles below the nape of her neck—then relaxed, untaut as a cat. The new experiments came to mind; the prospect of work seemed good. She thought, only fleetingly: "I wonder how August spent the time . . ."

They met in the waiting room again, under the high bright windows. "I missed you."

"I missed you, too."

"It'll be good to be back at work together again——"

His tone was heartfelt. "It certainly will!"

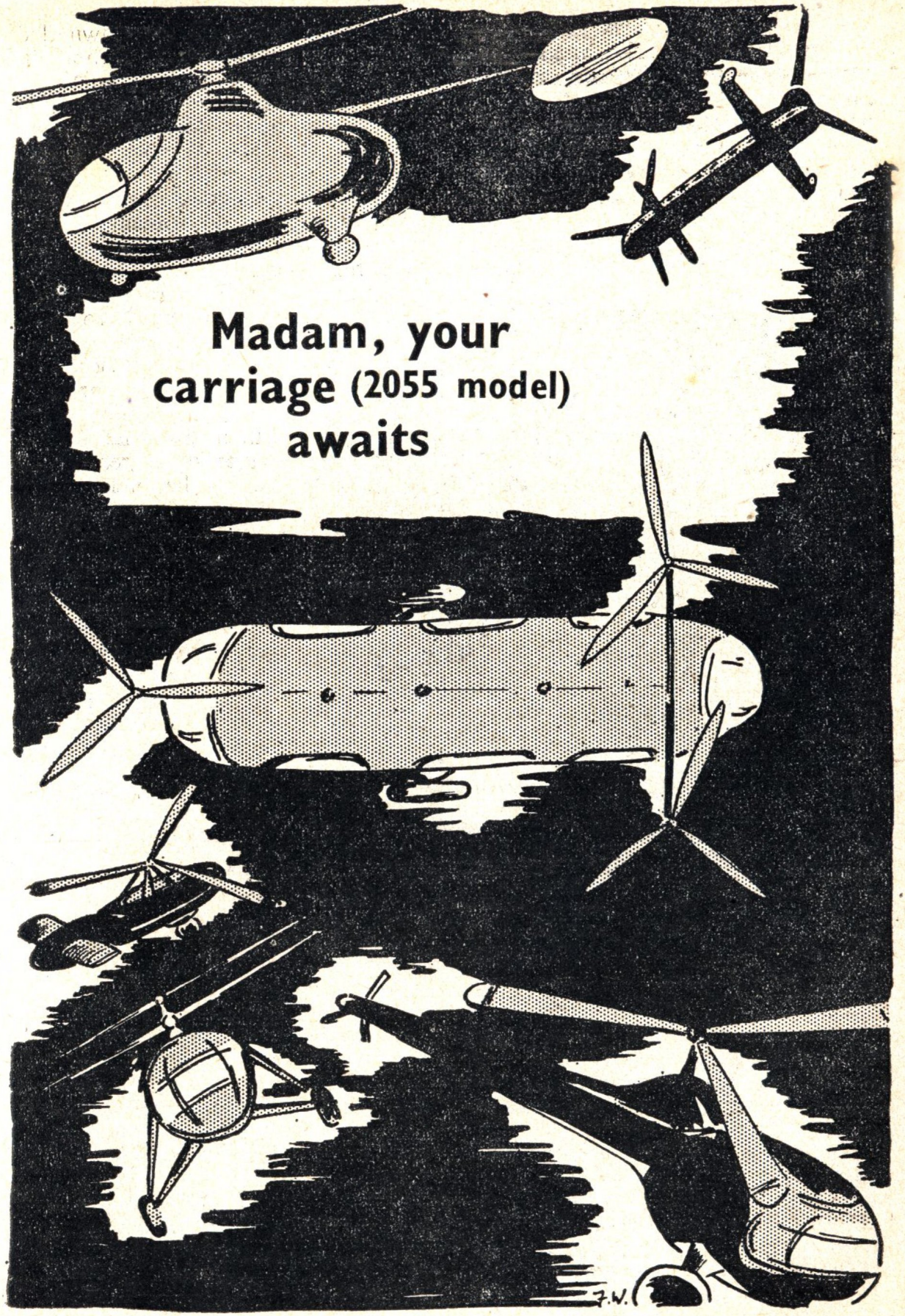
The controller of the star looked after them, rubbing his nose. Two nice, honest people, lying in their teeth. Well, the woman's interlude was easy enough to understand—but how would she have felt about the man's?

Suppose she *had* been able to look in on him—in a lab the duplicate of the one he used on Earth—working hard. Desperately. Discouraged, often. But alone. Without her. As once, perhaps, he had wanted, and not dared, to lock the door of the basement workshop against his mother.

Without her when the stuff in the crucible at last was right. Without her when the great men of science came, reporters, cameras. Receiving recognition, honour. Alone.

The controller shook his head.

In the spaceship the two were nearly back to Earth. They sat, quietly, holding hands.


Madam, your
carriage (2055 model)
awaits

ONCE UPON A TIME WHEN A flunkey told the mistress of the house that her carriage awaited without, he meant a very ornate affair drawn by two or maybe even four horses and driven by a moustachioed gentleman of impressive and colourful appearance. Today, the same kind of message usually refers to a sleek, shiny, smooth-running automobile—a Rolls-Royce, perhaps.

But it will not be very many years before there is another change and Madam will step from her penthouse into a compact, speedy helicopter to take her to the opera—if ladies will still indulge in those fashion-parade occasions!

The helicopter, in the news very much today because of its use by airline companies, was a sort of offspring from the gyroplane. The latter were much in use before and during World War II by sports commentators, by traffic police and by artillery observers. But they soon dwindled into near-insignificance once the helicopter appeared. The first helicopter seen in England—the first that really did its job, that is—came over from America in 1944. So short a time ago!

Since then a great many hours have been spent at drawing boards and several types of helicopter have been manufactured. Several hundreds of these are in constant service, apart from the recent airline services. They are a boon to aerial survey work, especially where fairly small areas have to be mapped in great detail as in the planning of new towns. And they are God's gift to the plant pathologist—of all people!—who uses them to effect a very complete treatment of crop plants with insecticides and fungicides. In this case, it is not only the manœuvrability of the craft which is useful, but also the powerful vertical downblast that comes from the rotors; this knocks the leaves about and ensures that the pesticide reaches the undersides—where the harmful agent so often hides. You may be pretty sure that a lot of the fruit and vegetables you eat were once close beneath the buzzing body of a helicopter.

Somewhat similar is the use of helicopters by seaside corporations in ridding their beaches of unpleasant flies. The aircraft moves up and down, drenching the beach with fly-killer and so making the place more amiable for you on your summer holidays.

And, of course, everybody knows of the yeoman service that helicopters perform in rescue work at sea.

Probably as many lives have been saved by helicopters as there are helicopters—which is something that definitely cannot be said about the more conventional type of aircraft—quite the reverse!

But let us see if we know just what a helicopter is. Many people think they are the same as gyroplanes—autogyros with a more fanciful name. That is not so. A helicopter, as defined by one authority, is "a type of aircraft in which lift and thrust is provided by a power-driven, horizontal rotor located above the fuselage." How does that differ from the gyroplane? The operative phrase is "power-driven." The rotors of a gyroplane (or autogyro, which is really a trade name for the same thing) are not powered; they are turned by the stream of air that comes from a perfectly conventional propeller, and it is this propeller that drives the gyroplane.

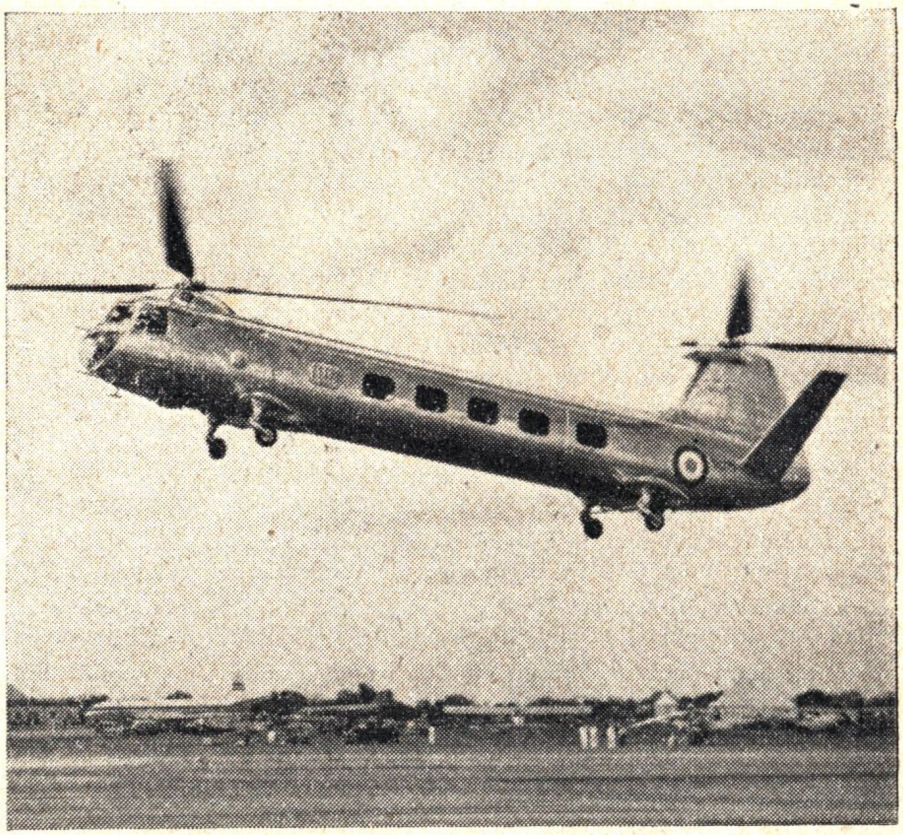


Photo: Bristol Aircraft Company.

That is, perhaps, the main difference. There are others. The gyroplane cannot hover or move backwards and sideways; the helicopter can do all three. The gyroplane cannot take off or land vertically; the helicopter can do both. The gyroplane usually has wings of some sort; the helicopter usually hasn't—though these are appearing on some types, such as the Bristol Type 173 Helicopter.

It can be seen that the helicopter, which, by the way, has no propellor—unless you apply that term to the little rotor at the back—is a far more versatile aircraft than the gyroplane and is eminently suitable for getting about in crowded cities. Any aircraft that does not need a runway for taking off and landing is in a very favourable position for short distance urban travel.

Yet it took a considerable time before a practical design was developed. Perhaps this was because its military uses were limited. The first helicopter that actually flew was designed by the Marquis de Pescara, who took it up at Issy-les-Moulineaux on 18th April, 1924. He made a world record by flying half a mile in a straight line. Two years later the Isacco model was flown in France—but really, to use the word flown is being very charitable; it hardly got off the ground. It had a thirty-three

horse power engine at the tip of each of its four rotor blades. A similar type, tried out in England in 1930, had four wings with a small engine on each and a 100 horse power engine for traction. It was no good. In 1933 the helicopter designed by Nicholas Florine, which had a 200 horse power engine, broke the record by staying in the air for 9 minutes 58 seconds. In 1934 the record height was fifty-seven feet and the record distance 1,184 yards. In 1935 an aeronautical text stated that: "Only two helicopters have had any appreciable success, but neither can be considered a practical aircraft." Now, just twenty years later, we are witnessing the rise of the helicopter to its true position—not as a cranky kind of aeronautical novelty, but as a hard-working and greatly needed machine.

One of the nicest things about the helicopter is that it is so easy to fly. You don't need months of training on the ground, manipulating all kinds of complicated instruments, before you can take the thing up. You can go up for the first time with an instructor and do a bit of flying straight away. After very few hours of instruction you will be able to handle the aircraft like a veteran.

There are only three main controls, as shown in our sketch—the joystick, the pitch lever and the throttle. These, as you would expect, effect the three main changes that are necessary to fly the craft wherever you want to go. The throttle controls the engine that drives the rotors, and, therefore, controls the speed of the rotors. The pitch lever—or, more properly, the collective pitch lever—controls the twisting of the rotor blades on their own axes. The joystick controls the tilting of the rotor head on the axis of rotation. That may sound a little complicated, but it isn't, really.

You see, just making the rotors run fast will not help in lifting the craft. You could run them so fast that they shattered themselves and the machine wouldn't budge an inch from the ground. To get the craft up you have to fiddle with the collective pitch lever so that all three blades are slightly twisted on their own axes; that way they really can push against the air, and the equal and opposite reaction will force the machine upwards. So, if you keep the pitch set at that level the aircraft will, within limits, continue to rise. When you have gone as high as you want, you decrease the pitch; the machine tends to fall; what you must do is judge the right amount of pitch that will give a lifting force equal to the falling force. Then you hover.

When you want to move horizontally you move the joystick and this tilts the rotor head as a whole, still spinning, in whichever direction you want to go. While all the blades are, in general effect, horizontal, the aircraft will stay where it is. If the rotor head is tilted forward, the craft will move forward, and so on. Thus, by a combination of joystick and pitch lever movements—vertical and horizontal travel—you can make your machine move in any conceivable direction. This would undoubtedly be useful in future traffic jams!

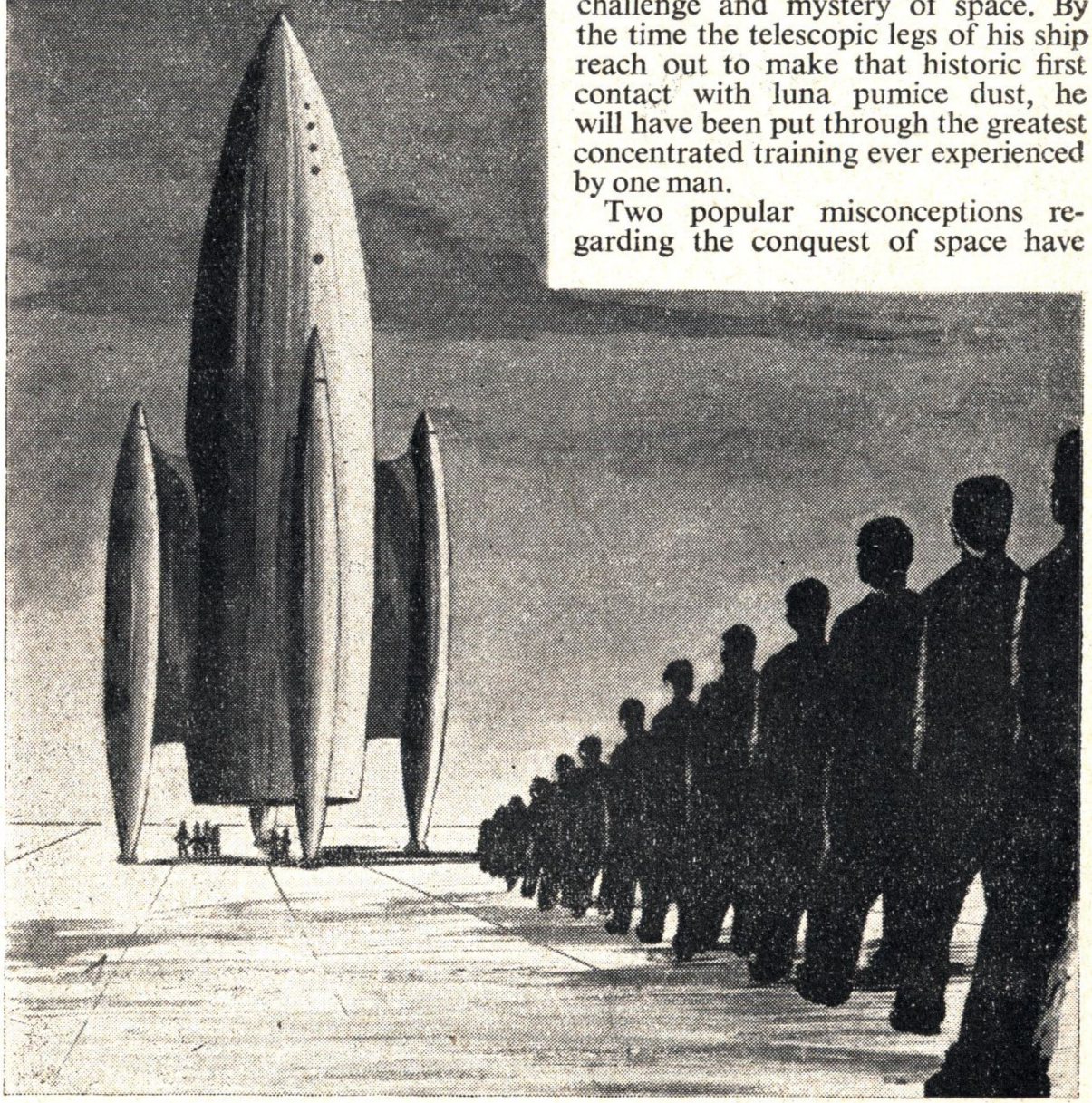
The combination of simplicity of operation, versatility of movement and cheapness of production, ensure for the helicopter an increasing part in the affairs of man—and of Madam.

WANTED
Men for Space

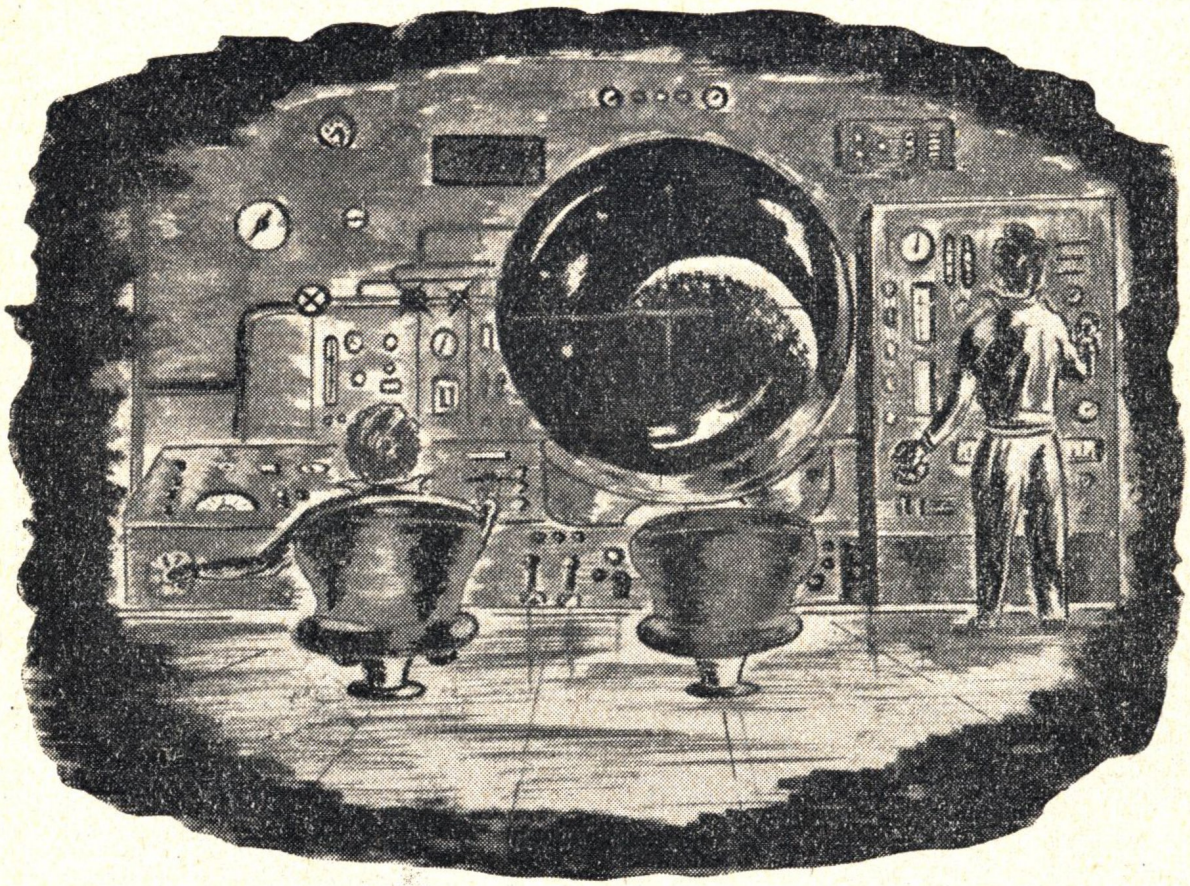
Illustrated by J. Ratigan

IT MAY WELL BE THAT THE FIRST MAN to land on the Moon is at this moment a schoolboy, just awakening to the challenge and mystery of space. By the time the telescopic legs of his ship reach out to make that historic first contact with luna pumice dust, he will have been put through the greatest concentrated training ever experienced by one man.

Two popular misconceptions regarding the conquest of space have



in recent years been exploded. One, that a professor will construct a private spaceship in his back garden and fly off to the Moon with casual ease has been made ridiculous by the tremendous costly interplanetary research programmes currently undertaken by the Governments of various countries. The more the journey to our satellite is investigated the greater appear the difficulties.



The other idea, that the spacemen of the future will be big, craggy hemen, bulging with muscle, is equally false. The special qualifications required by men to fit them for space are being studied with minute care. The more scientists probe into the problem, the more they realise that it will be far simpler to train a *scientist* to pilot a spaceship than to try to train a jet pilot for the job.

From the many thousands of eager young men who will volunteer for the task of taking the first manned ship to the Moon only a half-dozen will reach the final stages. And of these remaining half-dozen perhaps three will at last stand with a quick anticipation beneath their ship and climb the ladder into the control cabin. They will not be three men chosen at random. They will have trained for this day with a monotonous grinding persistence that has eliminated everyone else—and very nearly made them give up!

What qualifications will these young men need?

First, and perhaps most important of all, they will be imbued with the deep realisation of the star-destiny of mankind. Of course, they won't phrase it like that. They will be acutely embarrassed if anyone should suggest that they are capable of such grandiose ideas. "Just curiosity, old boy," they will say with the flippant casualness of youth in the face of danger and emotional ideas.

And curiosity, after all, has brought

us a long way from the first fire and wheel, and lever.

There will be no need to discuss the question of courage to be possessed by these first space voyagers. They will simply know that there is a job to be done and will do it to the best of their ability. Like the young men who flew over Britain and Germany during the war and were far too busy to allow their fear to interfere with the job they were doing.

Physical requirements of spacemen will be at variance with pre-conceived ideas. Our chemical reaction motors are at best inefficient and demand huge amounts of fuel to lift even their own weight against the pull of gravity. Payload must, therefore, be made up as economically as possible. Why send as crew men who are large and heavy? Small men possess the same brains, the same number of eyes and fingers—and are likely to have quicker reaction times.

This question of reaction time is of vital importance. To be able to operate a spaceship's controls and to be ready to face the unknown dangers that lurk outside the comforting blanket of our atmosphere, a man must be in perfect physical condition. For a man to attain this desired physical condition, he must also be mentally balanced. The dark secrets of the human mind, its flaws and weaknesses, may well prove to be the greatest stumbling block to our stellar progress, far outweighing in importance such things as reaction-mass, thrust and power co-efficients.

Space will be bleak and inhospitable. The soul devouring emptiness, the monotonous endurance of cramped, uncomfortable and nerve-wracking conditions demand of a man a stoic philosophy, a capacity to hold onto his sanity and a spirit of vital recognition that what he is doing is so great that it transcends anything ever before attempted.

The spaceman lacking imagination will probably feature in the progress of stellar conquest and exploration: but it will be reserved for the spaceman *with* imagination to perform the greatest feats, to obtain the highest honours—perhaps to die in the deepest oblivion. But he alone will have been able to appreciate just what his actions meant to Earth and to the millions of ordinary people strangling on our planet.

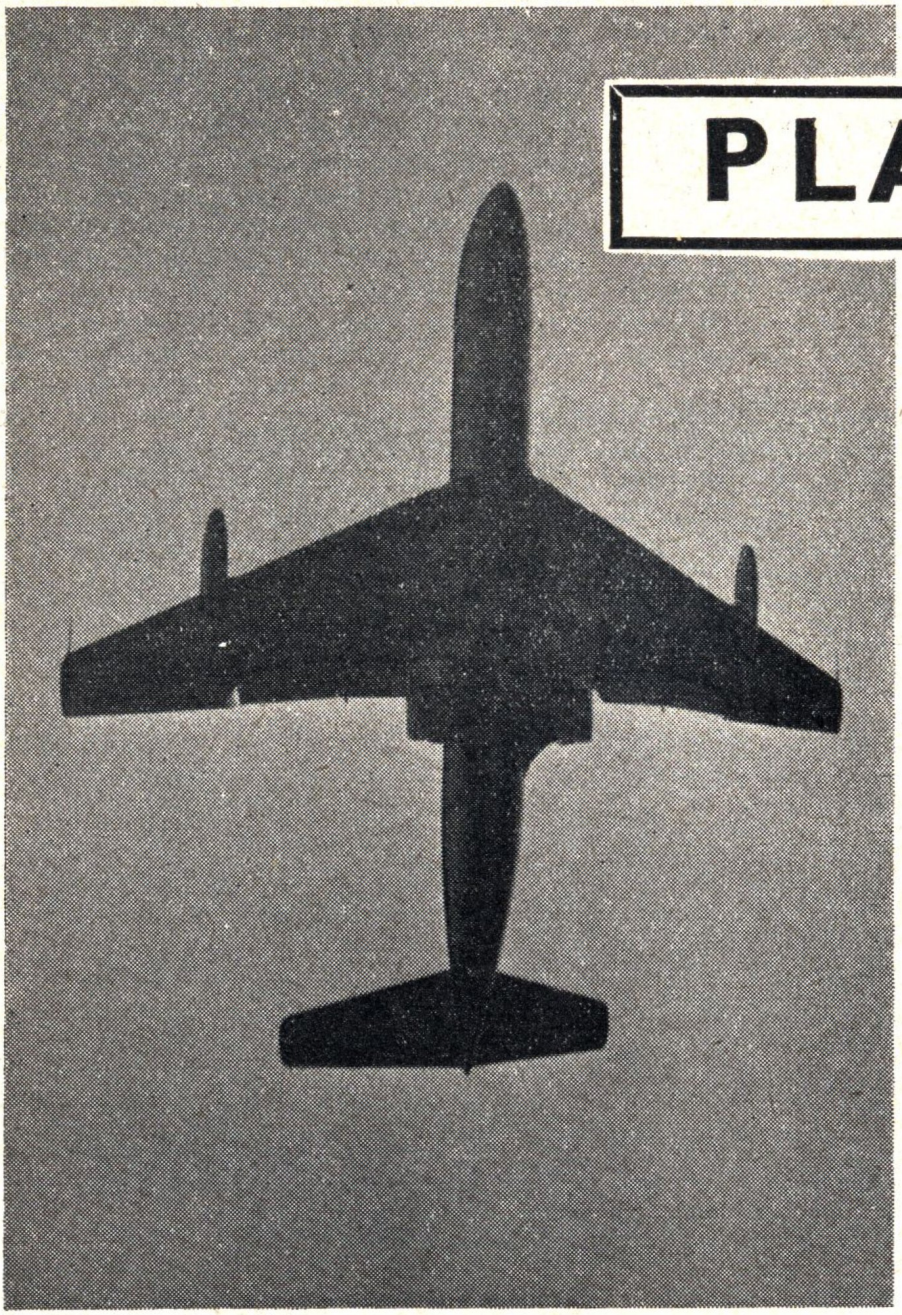
A spaceman must have a keen brain, a flexible mind, able to assess new situations without being weighed down by preconceived ideas. So far we have been able to simulate free fall conditions for only the briefest of times. It will remain for the first men out into space to discover just what will happen when every compass-point, every environmental conditioning, everything normal, is abruptly swept away.

They will have to be resilient, these spacemen. Tough, not in the hulking he-man sense, but in the farther reaching conflicts of the mind. Psychiatrists will spend many long periods weeding out the original thousands, discarding all who exhibit the slightest hint of a flaw, an imbalance, a suggestion of a weakness that would imperil their comrades.

Spacemen will work in teams, each member of the crew in complete rapport with the others. A symbiosis that will be encouraged by group activities, by mutual understanding and by every means in the psychologists' arsenal of mental weapons. So that the lone wolf among men, the man who cannot rub along with his fellows, will not be chosen for the crewed ships.

But the man who likes to paddle his own canoe, who feels that he can make his own way without help or favour from the world, will make ideal material for the one-man ships to carry out reconnaissance journeys around the moon and the planets. The great design will shape up. Every man chosen for a task in space will be screened, tested, psyched and emerge one hundred per cent. fit for his particular duty.

PLANE o



A new aircraft of British design which gives us the pattern of future flight

Photos: de Havillands

Latest in the line of super fast, super-range de Havilland jet airliners, the Comet 3 is still undergoing rigorous testing. It has made well over fifty flights since it first took off on 19th July, 1954. Basically similar to the earlier Comets, yet showing important improvements in design for safety and performance, the Comet 3 may well establish a record in jet achievement. Without doubt it represents the airliner of the future.

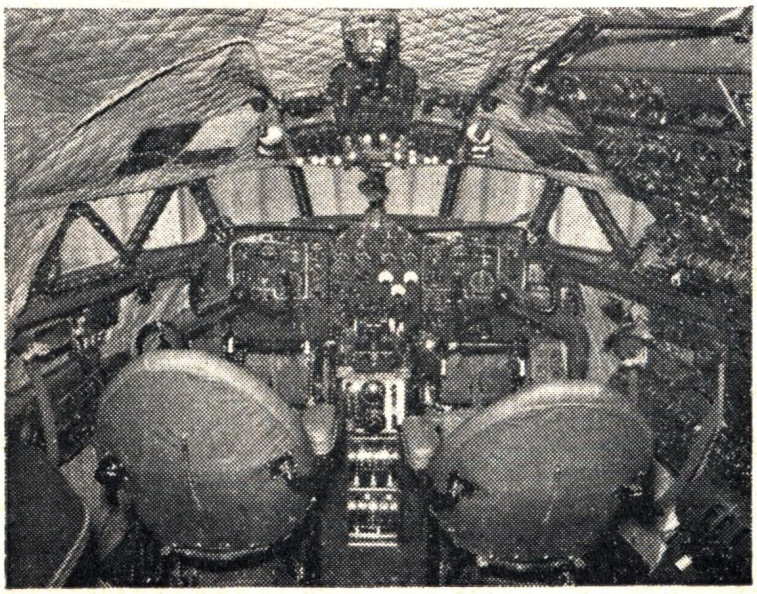
the FUTURE

The COMET 3

Powered by four Rolls-Royce Avon 521 engines in pairs on each side of the fuselage, each with its separate intake, the Comet 3 has cabin air supplied by the axial flow compressors of the engines and cooled by a single intake between each pair of engine-intake apertures—which are about twice as big as those of the Comet 1. Two doors beneath each wing give access to the "works" of the engines (there were four doors on earlier Comets).

To achieve greater quietness, all the passengers' windows occur in front of the jet exhausts, and these orifices are side-swept away from the fuselage. In addition to passengers, 155 cubic feet of freight can be carried.

New to the Comet series are these wing "pinion" tanks, each holding 428 gallons of spare fuel to supplement the 7,518 gallons in the main tanks. A landing light is fixed to each tank, and the starboard one incorporates an ice-detecting spotlight.



Here, essentially similar to those of Comets 1 and 2, is the control cabin with its banks of instruments. These not only fly the plane, but give the pilots complete information about what is happening in all parts of the aircraft. It can be seen that flying a Comet is *not* as easy as falling off a log!

BY WHOSE HAND?

by JOHN CARTER

MARTIN BROUGHT THE HELICOPTER in to land at one end of the valley. He switched off the motors and sat for a few minutes looking out at the rocky landscape, thinking of Benny.

He thought it was pretty bad that Benny should have ended the way he did. Brave, reckless, he didn't give a hang about anything. Space explorer and pioneer, he had fought his way out of a hundred tough situations, and he had died of shock. Martin could not believe it.

When he did not return from a personal exploration trip on the new planet, they had gone to look for him and found him in the valley, unnaturally sprawled out on his back like a distorted puppet; the mouth wide open as if he had been screaming when he died, eyes straining out of their sockets and hair literally fixed on end, so that the usual cool, calm Benny had looked like a horrified golliwog suddenly struck dead.

Martin could still see the face screaming noiselessly up at him, and found that he was sweating slightly. He slid back the hatch, got out of the helicopter, stood uncertainly looking about him.

It was hot; the sun beat down relentlessly, burning the rocks and small, stunted bushes. The air was thin and weak, just above space mask level. Martin fumbled in his pocket, took out a pipe, slowly filled and lit it. Not because he wanted to smoke but because he wasn't quite sure what to do next.

He was sorry for himself, began to wish he had stayed at camp. But it was his idea to search alone. The cause of Benny's death had remained hidden when the whole team had poked and prodded around. Maybe it would turn up when just one man was in the valley, like it had done before. Martin would at least be ready for it, which was more than Benny had been. He fingered the disintegrator strapped to his side and began to feel a little braver.

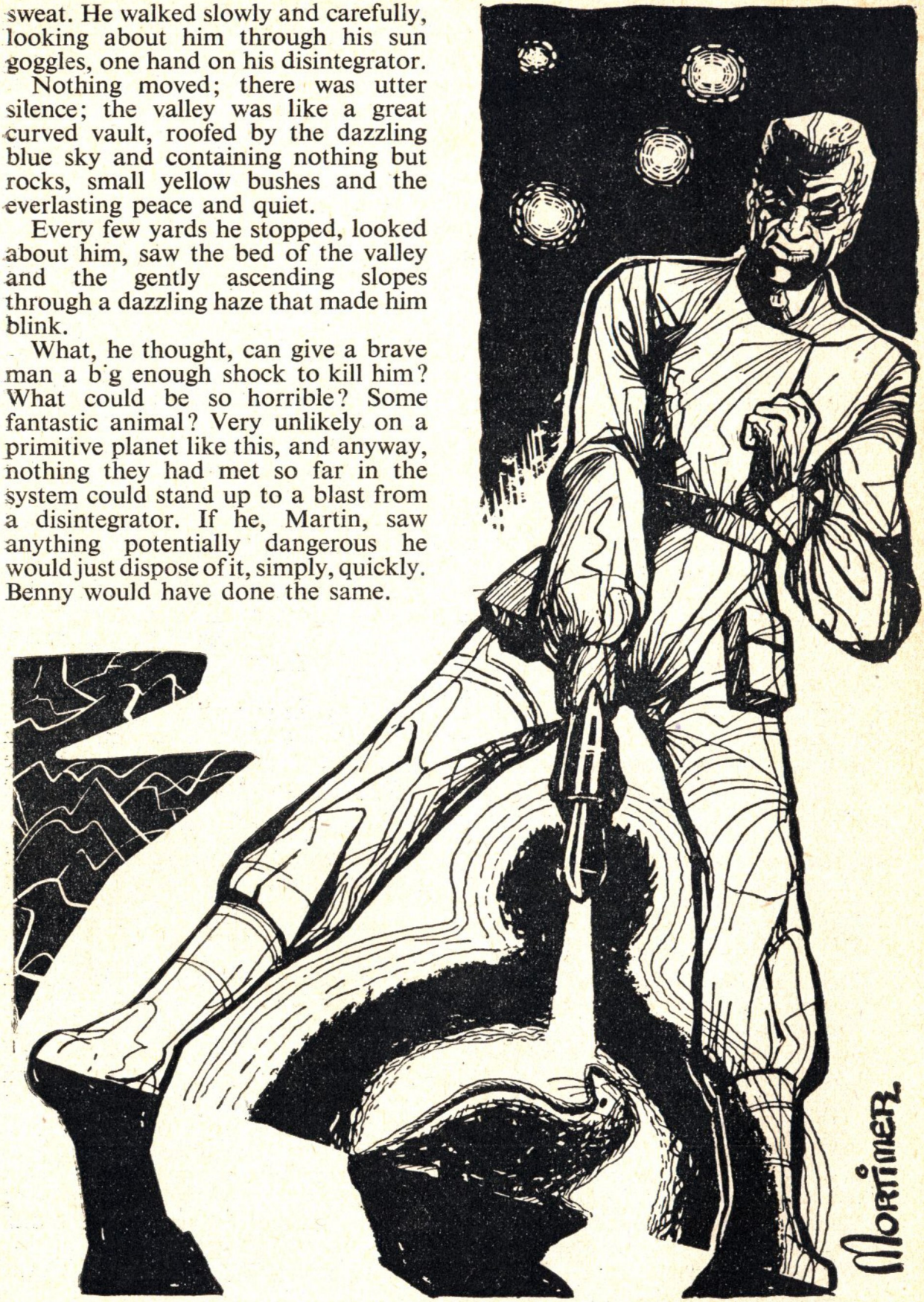
He knocked out his pipe, began to walk over to the rocks out of the shadow of the helicopter. The sun descended on him without pity. It burned through his protective helmet and nylon fibre uniform. He could feel it heating the skin of his back and causing his legs to become sticky with

sweat. He walked slowly and carefully, looking about him through his sun goggles, one hand on his disintegrator.

Nothing moved; there was utter silence; the valley was like a great curved vault, roofed by the dazzling blue sky and containing nothing but rocks, small yellow bushes and the everlasting peace and quiet.

Every few yards he stopped, looked about him, saw the bed of the valley and the gently ascending slopes through a dazzling haze that made him blink.

What, he thought, can give a brave man a b g enough shock to kill him? What could be so horrible? Some fantastic animal? Very unlikely on a primitive planet like this, and anyway, nothing they had met so far in the system could stand up to a blast from a disintegrator. If he, Martin, saw anything potentially dangerous he would just dispose of it, simply, quickly. Benny would have done the same.



But . . .

"Heart failure from acute shock," the surgeon had said.

Martin swallowed. Something inside him said: "Let's get out of here. Let's run back to that helicopter and clear off before we meet the cause of Benny's death."

"No," he said, aloud. "I want to meet it. I'm ready for it."

After ten minutes he came to the place where they had buried the body. Just a gentle rise in the earth between two great rocks. As he stood there looking at the grave, the silence seemed to grow more intense. He felt the hair on the back of his neck rising slowly and a shudder ran through him. He whipped out his disintegrator and spun round. There was nothing there. Never had a scene looked so peaceful.

Maybe, somehow the body would give him an idea, a lead of some sort. It might, it might not. He could only try.

He kicked at the grave, dropped onto his knees and began to pull away the stones and lumps of earth with his fingers. They were hot to touch. Something in his mind said sacrilege. He dug faster, lifting out handfuls of earth and throwing them to one side, grunting and taking in great lungfuls of the thin air. Martin uncovered the face.

It was still intact, the expression still horrific. Only the colour had changed; it was a blackish-blue.

There was a slight sound to his right. He stood up quickly, raised his disintegrator, looked towards the place where the sound had come from. Nothing moved; all he could see was a large white rock.

He walked very slowly, very carefully, over to it, holding his breath, a tight feeling in the pit of his stomach.

Behind the rock a small furry animal lay rolled up like a hedge-hog.

"Well, well, well." Martin stretched out a leg and touched the ball with his foot. It did not move.

"Local fauna," he grinned. "I don't see how you could kill anyone."

He bent and gently picked up the animal. It was very light. He held it at arm's length, in case it bit, and began to turn it slowly about in his hands.

Suddenly the creature squirmed and twisted in his grasp. Martin gasped, dropped it, stepped back and pulled out the disintegrator which he had replaced in its holster, and the animal, in its panic, bolted right into his legs.

"Ah!" cried Martin, and automatically pressed the button.

There was a flash. A blue haze appeared around the animal and stayed there as if suspended for a fraction of a second, then it collapsed and faded and there was just a small pile of dust.

Martin relaxed and his face was just creasing into a relaxed grin when a terrible stench hit his nostrils.

"Ugh!" he cried, dropped the weapon, staggered a few steps holding his head. The stench seemed to have gone right inside him, seemed to be prodding around.

He moaned, tripped over a bush, lay there feeling too ill to rise.

"So," he moaned, "so that's it. I'll—er—ahhh!"

"The poor so and so."

Dimly, as if in a dream, Martin could see four figures standing above him, their heads silhouetted against the blue sky.

"It's too bad, he had some nerve!"

"I'm alive you fools, alive," screamed Martin's brain. He tried to rise. His muscles were made of concrete.

"Oh, we'd better bury him now. Get the shovels."

They shovelled earth over Martin and packed it down with the shovels. Then the captain assembled his men.

"O.K., men. You know what these animals do to people. Destroy them on sight before they destroy you. We don't know what they look like, so just fire at anything that moves."

They spread out and began to walk slowly through the valley in a long straight line. Disintegrators were out, eyes were alert.

Man was going to teach those little animals a lesson.

PLANETARY EXPLORATION

3—The Physicist prepares

MY DUTIES ON THE FIRST PLANETARY destination voyage ever, begin not when we arrive, but as soon as the journey starts. It would be nearer the truth to say that I started the work twenty years ago. I was given the appointment as physicist explorer not because the organisers of the expedition liked my face, but because I was able to show them blue prints of equipment I had already designed.

Ever since my boyhood the great wonderland of the solar system has been my objective. When I was at school I read everything I could lay hands on in the way of science fiction, and I can recall how the journals that catered for us early sf fans began to give us more and more of the non-fiction articles. To me they made the thing more real than did the fiction alone and greatly increased my enjoyment of the stories told by some of those early sf writers, who often hid considerable reputations in pure science behind their pen names. Actually to believe in space travel was still considered to be over-credulousness or possibly charlatanism. However, while the twentieth century has still a few years left to run the thing is about to happen—and I am in on it with a job to do.

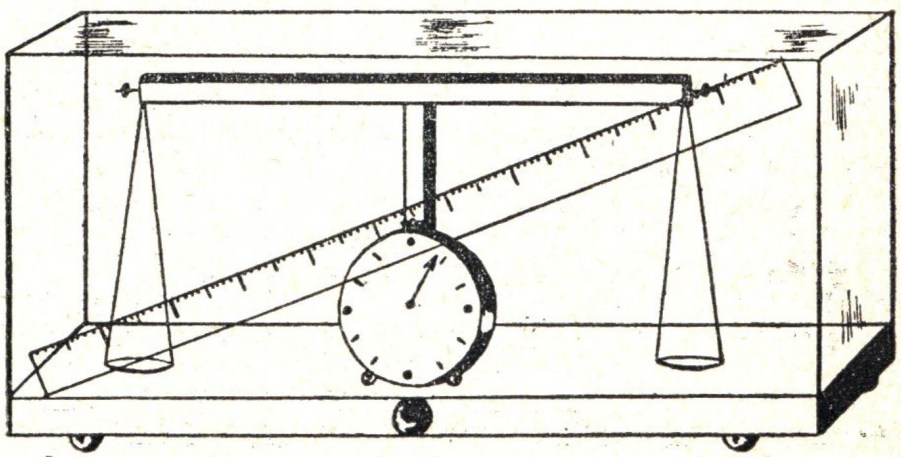
Physics is the science of measurement. It is more than just that. All exact knowledge in all sciences is based on measurement. The international language of these things is written in terms of units of force, units of energy, electrical units, heat units—all of them based on three simple units—a centimetre with which to measure length, a gramme with which to measure mass, and a second with which to measure time. Hence we measure most things by the centimetre, gramme, second, or C.G.S. system.

To measure these things we need measuring instruments—the metre stick, the balance and weights, and the clock. Many things have been measured using these and many very complicated instruments have been devised to measure more complex things than length, mass or time alone by means of the C.G.S. system.

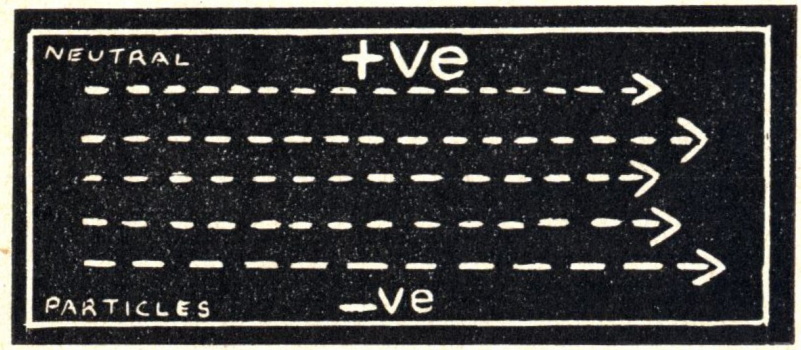
My job is going to be the measurement of the things in space all the way there.

THINGS TO MEASURE

Things in space is, of course, rather a contradiction if we do not qualify the



word things. Obviously, a space with a thing in it is not a space. Normally, by a thing we mean an object composed of a substance which consists of agglomerations of atoms. Such can be said to occupy space. There are, however, things very much smaller than atoms, and, therefore, called



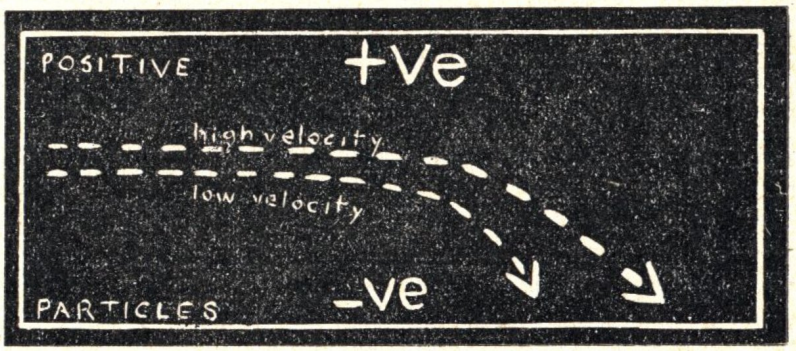
subatomic particles. We know that these are everywhere on, over or under the earth. They are detectable because they are in rapid movement: and we can change their motion. Their high velocities cause certain effects on the monatomic molecules of the dead gases in discharge tubes and on molecules of gases in air. We are aware of their existence because of such effects. We have encountered many of them which we put into motion ourselves by chance in the beginning. Others originate in radio-activity; the kind already in the world, which we cannot halt, and the artificial kind of our own devising. We have put them to all manner of uses, and do so more and more year by year. But in addition there are those others which we call cosmic rays. These come to us from outer space. We have been speculating for almost a century as to their origin.

These are things I am going to measure in space—among other things.

Blackett, Piccard and others wanted to know about cosmic rays. They studied them in deep waters and at quite high altitudes in between the two crazy wars of the first half of this century. We have learned a bit more about them since—sufficient to be able to arm ourselves against what can confidently be anticipated as inimical to our safety. I am going to be able to measure all manner of things by new techniques. To do so I shall turn to my purpose the circumstances which the journey itself ordains.

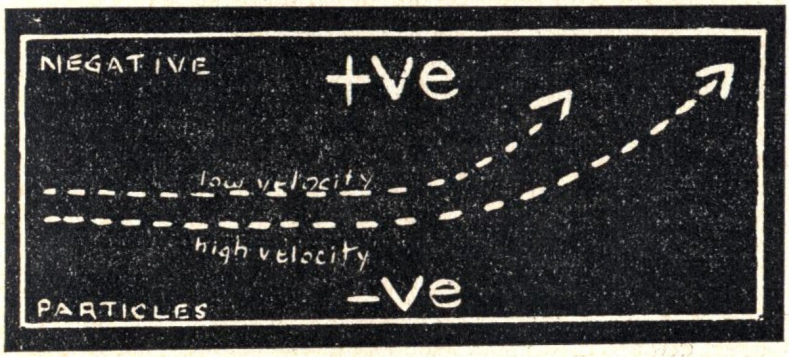
The nature of the charge on moving subatomic particles has been measured in the past by the way in which they are detected by magnetic fields, photographic detection giving such data as charge, velocity and mass as a result of a series of experiments. Counts using Geiger discharge tubes were used to estimate intensity of radiation, two tubes in tandem along a given path being used to check the direction of their motion.

I shall be in the happy position of being able to travel at speeds much less than those of subatomic particles, but high enough to have a measurable



effect on the relative velocity with which my ship goes to meet them, as compared with the velocity at which they catch up with the vessel coming from astern. I have been hoping to do so for forty years, believing I should do so for twenty years, and making my equipment for the last ten years.

Mathematics has always played a large part in getting anywhere. It used to take a long time to make calculations. Man has always been interested in saving that time, especially when travelling. If you want to know where you are, it is not good enough to know where you were half an hour ago, nor do you want to stand still—even if you could—while you solve a bundle of equations. Centuries ago the abacus was invented—a frame of beads on wires, and it must have saved centuries of man-hours in use across the continents. Later came the logarithm tables, the use of which the ocean navigators had to master. The middle of the twentieth century saw the development of electronic calculating machines that could solve in seconds equations that it would take a man working alone many weeks to work out. At first they were bulky, occupying quite sizeable buildings. I



have today on the outside of the spaceship a cylinder lying along the direction in which the vessel will move. At each end it has suitably screened detectors of moving particles. Not all cosmic rays are sub-atomic. Some are as big as the smaller atomic nuclei. In space we may find bigger ones. I can insert appropriate detectors for anything we seem likely to get. These detectors are connected to a little black box no bigger than the family Bible. Throughout the journey the innards of my little box will be receiving impulses from my twin detectors, and from a number of other little gadgets, and when I get home I shall open it up and take out a number of little spools of very fine wire. These will be scanned by a rather larger complexity of coils, valves, relays, resistances, etc., and tumbling out will come a series of bands of perforated tapes. These will duly be interpreted into figures and I shall have a complete record of my situation in space with direction of movement, at any time throughout my travels. For each moment I shall also have the *number* of particles coming from each of two directions, together with their *mass* and charge. With six months' work on these figures I shall be able to make equations, give them to the electronic computor and get answers to most of the questions we are now asking ourselves about cosmic rays.

LINES OF FORCE

Around any magnet there is a field of magnetic force. By sprinkling iron filings onto a sheet of paper placed over a magnet, it is possible to get a picture of the magnetic field; the filings arrange themselves in lines spreading out from the poles of the magnet. The direction of the lines in any place shows the direction in which the magnetic force is acting at that point. Where the lines are close together the magnetic force is strong; where they are more widely spaced the force is weaker.

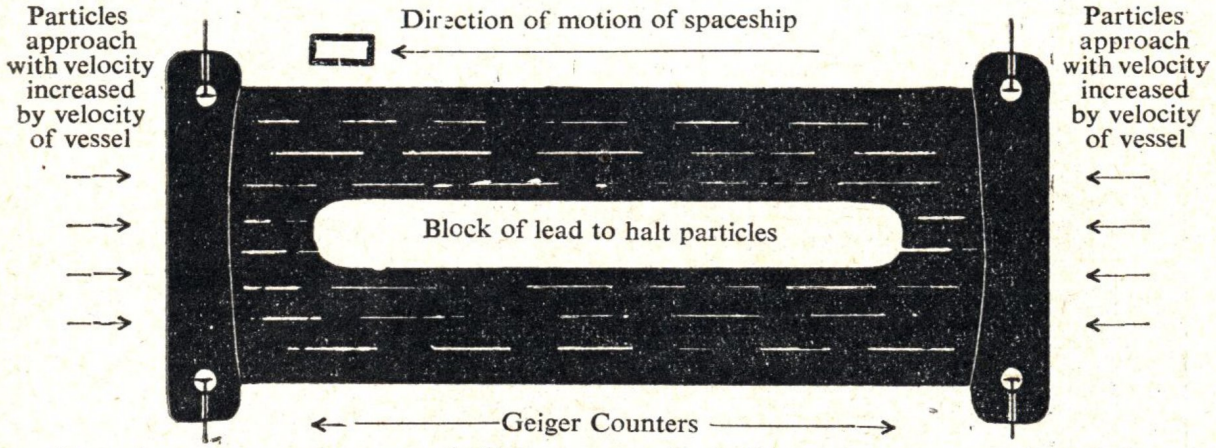
When a coil of wire moves near a magnet it is said to cut through lines of force, and in doing so it is so affected that an electric current flows through it. The strength of the current depends on the number of loops in the coil, the strength of the field, and the speed at which the coil is moving. We can say, in fact, that the current is decided by the number of lines of force cut per second.

The earth is a magnet. It is surrounded by lines of force.

We shall lift slowly out of the

earth's atmosphere on our journey, but once clear of the air friction, we will begin to accelerate to reach speeds at which we shall be cutting lines of force pretty rapidly. The intensity of the earth's magnetic field will weaken as we get further from it and in a matter of minutes become negligible, but in these minutes I shall get another batch of impulses stored on other little spools of wire. I shall have aboard a coil to catch the effect of cutting all those lines of force. When I return, it will not be long before we know quite a lot more about the earth's magnetic field.

Having landed, the less novel side of my work will begin. There will be so much of an elementary nature to establish, but I have prepared the necessary simple instruments. I shall first set up a pendulum rather like that in the Science Museum at Kensington. I shall quickly get from it an estimate of the planet's gravity at the first camp. I shall use the value obtained to calibrate other instruments. Observation of the pendulum over a complete rotation of the planet, that is throughout a day and a night, will tell me much about the rotational axis of the planet. It will add to my information daily.



Once in space proper, we shall soon attain speeds at which it will be possible to detect very feeble magnetic fields, because although the lines of force are a long way apart, we shall still cut many of them every second. We shall probably go much nearer to the Sun than ever the earth does. We may be able to establish whether the Sun has a magnetic field strong enough for me to detect with my coil.

As we approach our destination the coil will give early notice of any magnetic field we may find in the planet which we visit. We shall make a spiral approach to the surface in order to resist its gravitational pull and arrive at a diminishing velocity. In the outer loops of the spiral we shall be travelling quickly enough to cut many lines of force and I have, attached to my coil, a little calculating machine which will probably have located the magnetic poles of the planet before we land.

I shall mark out a spring balance when I know the gravitational pull accurately, and use it to determine the densities of various solids and liquids I shall find on the surface of the planet. I shall set up a simple mercury barometer to determine the pressure of the atmosphere, if there is any atmosphere.

I shall set up a laboratory and get down to the job of determining all the ordinary constants of as many novel local materials as possible—densities, coefficients of expansion, electrical conductivities, tensile strengths, latent heats, refractive indices and a host of other things. Drat it! I've just realised I did not order a spectrometer, and I've got to get coverings on all these control screws. Brass is nasty stuff to touch too far below zero. Sorry—can't stay any longer—I've got work to do!

One world out of millions—but which?

Lover, where art thou?

by ALICE BEECHAM

JARVIS SPOKE CASUALLY TO his overalled partner as he saw a figure hesitating outside the gate of the wired-in lot. "Get ready, Sam, we've got a customer."

"Him?" The mechanic squinted doubtfully at the prospect. "That kid? What would he be wanting a Wendle for?"

"Maybe to take his girl for a ride." The salesman grinned as the youthful figure slowly opened the gate and walked between the assorted space craft. "See? Beat it now and get ready to do your stuff." He smoothed the cynicism from his face and adopted a professional smile as he stepped forward to meet the lone figure. "Good morning, sir. Can I help you?"

Leonado hesitated, looking doubtfully at the obvious signs of wear on the machines around him, then, trying to appear man-of-the-worldish and experienced beyond his years, jerked a thumb at the nearest Wendle. "How much?"

"That model?" Jarvis rested a hand on the patched hull. "This is a Starguide, a family model we accepted in trade for a later type." He beamed at it with open admiration. "A fine vessel, though I say so myself. Four berth, amphibious, equipped with automatic homing device and fool-proof screens. A real

bargain for twenty thousand."

"Twenty thousand!" Leonado bit his lips, not realising how much he was betraying himself. Jarvis didn't lose his professional smile.

"This one's a little dear," he admitted. "But then it's got a lot of extras, special equipment not really necessary to the normal operation, luxury goods, you might say." He smiled and pointed towards a battered, relatively tiny hulk. "Take this one, now. A good, sound, reliable machine. I own one just like it myself. Guaranteed and quite large enough for the normal user. No berths, of course, but who wants to sleep in transit?"

"Guaranteed?"

"That's right." Jarvis didn't say just what the guarantee was. "For ten thousand you couldn't get a better buy."

"Ten?" Leonado nodded and stepped towards the machine. "Could I . . ."

"Go over it?" Jarvis flung open the double doors. "Certainly." He rapped the hull. "Vacuum insulation, as fitted to all the later types." He led the way into the tiny cabin. "Sealed computor and automatic air conditioning. Helio-vanes and landing wheels." He looked apologetic. "Not amphibious, and the pilot will have to do a little more work than on the Starguide, but why load up with unessentials?"

Leonado nodded, staring at the humped bulks of the computors, the shielding of the compact power pile, and the worn plastic of the seats. Jarvis watched him as he examined the mechanisms with inexpert touches, his experience telling him that the youngster knew next to nothing about Wendles. After a while he moved from the first stage of his technique—find out what the customer wanted to pay—into the second—find out how much he could be squeezed for.

"I have a slightly larger model, one that's just come in, which I can honestly

recommend." He smiled. "A little more expensive, of course, but a sound machine." He looked at the young man. "Will you be doing your own piloting?"

"Yes."

"I thought so; you have the pilot's look about you." Jarvis lied with soulless ease. "Perhaps you'd like to look over it?"

"How much would it be?"

"Fifteen thousand."

"Fifteen?" Leonado shook his head. "I'm afraid . . ."

The shrill clangour of the attention signal from the hut which served as an office interrupted his protest, and Jarvis frowned as he listened to the call. "Will you excuse me, please? Take a look round, see if you can spot a model you like. I won't be long." He kept his thumb on the trigger switch in his pocket as he left the youth alone in the vessel and looked round for his partner. Sam winked at him and Jarvis nodded, keeping the switch activated until he had reached the hut, then released the pressure and relaxed in the abrupt silence.

Back at the ship his partner set to work.

In his grease-stained coveralls and dirt-spotted face he looked exactly what he was supposed to look, an honest mechanic employed to maintain the Wendles. He stared over his shoulder towards the office, and jerked his head towards the young man. "Interested?"

"Yes."

"Know much about 'em?"

"Not much," admitted Leonado, "but isn't the operation almost wholly automatic?"

"Maybe, but even then you want to watch what you're buying." Sam spat on the dust and jerked his thumb at the ship Jarvis had just left. "Take that crate, for instance. How much did he ask?"

"Ten thousand."

"Ten!" Sam shook his head. "For that wreck? The pile's pretty near shot and it'll cost you a couple of

thousand before you could even hit sub-space." He lowered his voice as he stepped nearer. "Don't let on I told you this, but he's been trying to unload that heap of junk for almost a year now."

"Thanks." Leonado gasped at his sudden escape. He had practically decided to buy the ship, and if he hadn't been warned . . . He fumbled in his pocket and found a crumpled bill. "Here," he passed it over to a ready hand. "Look, which one would you recommend?"

"How much can you pay?"

"Twelve, maybe thirteen, but that's the limit.'

"Fair enough." Sam glanced over the assorted craft. "You may be able to get that Galaxy IV for about thirteen. It's the best buy on the lot and he'll probably ask more, but you should be able to beat him down. Aside from that . . ." He moved away as Jarvis stepped from the office. "Watch it! It's my job if he ever finds out what I told you."

By the time Jarvis had rejoined Leonado, Sam had disappeared between the Wendles and the young man had made up his mind.

"That ship you were telling me about," he said, firmly. "The one at fifteen thousand."

"The Galaxy IV?" Jarvis nodded. "A fine vessel." He led the way towards it. "Sound in every seam and should last you for as long as you intend to use it." He rested his hand on the scarred hull. "One thing about these models, they hold their price. If you ever want to trade it in for a new one you'll get your full value." He opened the air lock. "Like to try it?"

Inside he sealed the doors and kept up a running commentary as he settled himself in the pilot's chair. "First, we activate the pile . . . so. Then we wait for the power to build up as shown on the meter, and while we're doing that we'll lift her up

a hundred feet or so." Above their heads the motionless vanes spun to shimmering life, and with a grating and creaking, the ship lifted off the packed dirt of the field. "Notice how she hovers, hardly more than a few metres of drift, and the stabilizers are almost self-compensating."

"Will I get an instruction manual?"

"Naturally, but the operation is practically child's play." Jarvis squinted at the meter. "Now. Potential has built up and we engage the warp." He tripped a switch and the machine seemed to twist and writhe before settling down to an uncanny motionlessness. On the screen the sun-baked day had given way to deepest night, illuminated by tiny spots of varicoloured light.

"Now we're in sub-space." Jarvis chuckled as he relaxed in the control seat. "You know, I often wonder what the old timers would have thought about all this. They were firm in the belief that the only way to travel to new worlds was by means of rocket engines. Hopeless, of course, but they wouldn't see it. Wendle stopped all that nonsense when he invented his warp and literally brought all the worlds in the universe to our doorstep."

"They are the planets? Those patches of light?"

"That's right. All we need do is to aim the directional control at the one we want to go to, slip the warp, and there we are. Quick, efficient, and perfectly safe. The field prevents landing inside a mountain or too near anything solid and the vanes will settle us down." Jarvis squinted at the flickering dials of the ranked meters. "To go back all we need do is to activate the automatic recall." He tripped more switches. "There is a slight delay but . . ."

Again the machine writhed with noisy protestations and sunlight blazed around them. Leonado stared interestedly

at the unfamiliar landscape as Jarvis tilted the vanes for forward motion.

"Where are we?"

"Earth, of course, but we drifted a little while in subspace." The salesman grunted as a city swept by to their right. "Not far now; the field is about fifty miles to the west." He smiled at the young man. "Like it?"

"Seems a good machine, but I can't go as high as fifteen thousand."

"No?" Jarvis seemed disappointed. "It's worth every cent of it. You've seen for yourself how she operates, smooth as a bird, and frankly, I don't think that you'll be able to do better."

"It's a good machine," admitted Leonado, "but I can't pay that much." He took a deep breath. "I'll offer twelve."

"Impossible." Jarvis looked at the young man. "I'll tell you what I'll do. Make it fourteen and she's yours."

"Thirteen's my limit," said Leonado, miserably. "Sorry."

"Thirteen, eh?" The salesman frowned. "Look. If I let you have it for that will you promise to recommend me to your friends?" He smiled. "Maybe I can make up what I'd lose meeting your price from one of the others. In any case the business would be worth it to me. Well?"

"I'll promise," said Leonado, gratefully. "I'll tell them all."

"You'll have to sign a waiver," said Jarvis, as if it were an afterthought. "You can hardly expect me to give an unequivocal guarantee on less than cost price."

Leonado nodded. He was too relieved to argue.

Back at the field, after the young man had creaked off in his newly acquired machine, Jarvis smiled as he riffled the wad of notes and nodded towards his partner. "Well, Sam, so we managed to get rid of the stinker at last."

"That kid was dumb," said his partner, sourly.

"Maybe you'll have some explaining to do."

"Why should I? He signed the waiver and, after all, I did operate the ship for him."

"You took a chance there. Did you land?"

"You crazy? As it was we drifted like hell in the few seconds we were in subspace." Jarvis winced at the memory, then shrugged. "What the hell? It's off our hands now, we should worry." He grinned at his partner. "Quit worrying! You know what these zany kids are like. He'll probably get a kick out of it."

"Maybe." Sam didn't sound too happy as he stared after the dwindling shape of the Wendle.

Lucy was small, warm, kitten-soft, and infinitely in love. She snuggled into the curve of Leonado's arm and relaxed in the warm darkness of the walled garden.

"I've got it," he said with quiet pride.

"Have you, dear?" She stared up at the dim contours of his face, then as his meaning registered, sat upright with a little squeal. "Leonado! You haven't!"

"Bought it today. A Galaxy IV; tested it, too." He found it easier to adopt a world-wise air when with her than with the shrewd-eyed salesman. "A nice ship; old, but I bribed the mechanic to tip me off and he recommended it." He stared up at the glittering decoration of night. "Guess I'll grab me a world."

"Oh, Leonado!"

"Why not, Lucy? I'm getting nowhere fast stuck here on Earth. Your father won't agree to our getting married, says the eugenetics counsellor doesn't recommend it, but I think that the real reason is that your family is rich and mine isn't."

"That isn't fair, dear. Dad is only thinking of me."

"So he's managed to convince you, has he?" He didn't trouble to hide his

bitterness. "After all your promises, too."

"It isn't so!" She stared up at him, her wide eyes brimming with unshed tears. "I love you, and I always will, but you mustn't blame daddy for doing what he thinks is best for me."

"Such as choosing your husband?"

"Of course not. I would never allow that."

"But that's what he's trying to do. What's wrong with me as a husband?"

"They say that you're basically unstable, the artist type, moody and self-centred." She flushed in the darkness. "I peeked at their report and that's how I know, but it doesn't make any difference, Leonado, not to me it doesn't."

"It's just like being on a farm," he said, angrily, "selecting what they consider to be good breeding stock. Money doesn't make a man better than what he is, and a rich man can still have puny children. My grandfather was an artist and never owned more than one suit all his life, but he bred strong children and so could I. No, Lucy, the real reason is that I'm poor."

"It doesn't matter, darling," she murmured, softly. "I love you just as you are."

"I'll be rich one day," he promised. "Now that I've got a Wendle I can go out and find a virgin world. I can claim it and it will be all mine." Excitement made him forget his anger. "Think of it, Lucy! I'll own an entire planet!"

"Can you, dear?" Doubt tinged her voice. "Find a virgin world, I mean? Thousands of people have used Wendles for years now. Wouldn't they have claimed all the habitable worlds?"

"No." He pointed towards the stars. "What you see up there is only a fraction of all the stars in the universe. And nearly all those stars have planets. There are millions of them, Lucy. Billions! I've been into sub-

space and I've seen them, and they couldn't possibly all have been claimed yet." He laughed. "All I want is to find one unclaimed world, darling, just one. Then I'll be richer than your father, richer than any man on Earth. I'll own my own world—and no one on Earth can ever say that."

"It sounds nice." Lucy didn't seem too sure about it. "How do you claim a world?"

"You settle on it, set up a radio beacon to warn others that it's been claimed, and farm some of the soil. After ten years from registering your claim the titles are yours to do with as you please."

"Ten years!"

"Yes."

"But, Leonado! Ten years!"

"I know, darling, but what else can I do?" Gently he stroked her thick dark hair. "It won't seem so long. I'm young and there'll be lots to do. Before you even miss me I'll be back with an entire planet to offer you as a wedding present."

"I won't want it then," she sniffed. "I'll be old and you'll have forgotten me by that time." She dabbed at her eyes. "Isn't there a quicker way?"

"Well—yes." He didn't look at her. "If a man lands on a virgin world and his wife has a baby there, then the planet becomes theirs straight away."

"Leonado! You wouldn't!"

"Of course not." Hastily he took her in his arms. "I wouldn't dream of marrying another woman, not even for a short while, but you did ask, you know."

"I know, but . . ." She became thoughtful. "Is it safe?"

"Is what safe, dear?"

"The Wendle?"

"Of course it's safe. Thousands of people use them, millions, even. They're as common as the ground cars used to be in the old days. All you do is throw switches

and press buttons—even you could operate one." He twisted her away from him and stared into her star-washed face. "Lucy!"

"Well, why not?" she said, defiantly. "We're in love and we want to be married anyway. What harm could there be in our finding a new planet together, making it ours the short way, and then coming back to tell Daddy all about it?" She giggled. "I'll bet he'll be mad! Him and his eugenetics counsellors! And won't the rest of the girls be surprised! I can just imagine that Mary Sharpe; she'll turn green with envy, I just know she will."

"But . . ." He felt himself weakening as he smelled her perfume and sensed the warm nearness of her body. After all it was logical enough. They could be married at one of the automatic bureaux, a coin-in-the-slot marriage, but perfectly legal if no one opposed it—and who could do that once they were off-planet? The more he thought about it the more tempting the idea became and he only put up token barriers to her insistence.

"Very well then, dear, but you'll have to hurry. I'm leaving tonight."

"So soon?"

"Yes, I . . ." He didn't feel like explaining that if he was around much longer he would have to answer awkward questions on a certain financial matter. "The quicker we get started the sooner we will be back." He smiled down into her eyes. "No regrets?"

"With you? Don't be silly." She hesitated. "One thing, darling, you do love me, don't you?"

"Of course I do."

"For myself, I mean, as a woman, not as the daughter of a rich man?"

"Please!"

"I'm sorry, dear, but I do so want to be sure." She blinked and smiled. "You'll never leave me, will you? Promise that you'll never leave me."

"I'll never leave you, darling," he promised, and his arms matched the sincerity of his voice as he held her close.

The ship lifted itself like a tired old man, from the public field at the edge of town and hung from spinning vanes in creaking protest. In the tiny cabin Lucy radiated a constant, almost overwhelming enthusiasm, and, in the naked admiration of her trust in his superior knowledge, Leonado felt his ego expand until it seemed that he knew all the answers to everything.

Deftly he threw the switches and watched the slow climb of power to the warp potential, acting partly on memory and partly on scanty knowledge gleaned from a hasty reading of the service manual. Impatiently he waited until the thin hand reached the red line; then, smiling at his new bride, threw the warp release.

The twisting, writhing, inside-out feeling was over almost before it had begun, and round them the polka-dotted blackness of sub-space glittered with iridescent pin points of light.

"There they are." Leonado pointed towards them as if he were God. "Each speck of light is a sun or planet. Every world in the universe is shown here—and you wondered if there were any new planets left."

"I didn't know that there were so many of them." Lucy stared wide-eyed at the screen. "Do they go all the way round?"

"Of course." Gyroscopes whined as the apparently motionless vessel spun on its short axis. "See? It's just as if we were in the centre of a globe with the stars and planets all around us. All we have to do is to pick one, collapse the warp, and there we are."

"But how?" She frowned at dimly remembered schooling. "I thought that even the

nearest stars were light years away from us."

"And so they are—in normal space, but we've moved to a special region discovered by Wendis and normal rules no longer apply." Leonado smiled at her baffled expression. "I don't know just how it happens," he admitted, "but I was told that it was as if all the universe had shrunk until every world touched the ship, or that the ship had expanded until we touched every planet. We are literally in contact with every star and planet in the universe, but it doesn't make any difference until we aim the field and collapse the warp. When that happens the energy flow will concentrate our mass at a particular point and we'll return to normal space there and nowhere else." He shrugged. "Don't worry about it, darling."

"But suppose we land inside a planet?"

"We can't. There's a field to prevent that, same as there's one to stop us landing on a sun—or trying to." He stared at the colourful glory of the screen. "Which one shall we pick?"

"That one." She pointed towards a fleck of light. "Let's try that one first."

"Right." He sat at the control panel and aimed a short tube at the indicated spot. "We'll expand it and see if the readings are favourable." Abruptly the end of the tube flared with light, the expanded image of the tiny spot, and he squinted at the line-streaked spectrum.

"Any good?"

"I don't know yet. I'll check it against the favourable-world pattern and we'll see." More switches clicked and another pattern superimposed itself over the light-image. At once a bell clanged and a red lamp flashed.

"Leonado!" Lucy clutched his arm. "What's wrong?"

"Nothing." He frowned as he flipped through the service manual. "That isn't a habit-

able world; the chemistry is all wrong. Pick another."

The next had too much fluorine. The third had no oxygen. The fourth showed methane and the fifth lacked hydrogen. At the tenth attempt they were lucky and, thankfully, Leonado aimed the directional control and collapsed the field.

He returned to sub-space as a high-pitched, interrupted *bleep . . . bleep . . . bleep . . .* echoed from the radio speaker.

"Occupied," he explained. "That was a radio beacon identifying the world and warning off planet hunters. Let's try again."

Fifty-eight worlds later Lucy fell asleep in one of the chairs and Leonado remembered with bitterness the casual manner in which the salesman had dismissed the lack of berths. Sleeping in transit, so far from being a luxury, seemed to be a necessity. With billions of light flecks to choose from they could spend days in sub-space without locating a habitable world. How long it might be before he hit on an unclaimed one he didn't like to think.

He landed on a favourable planet before Lucy awoke, cutting off the radio speaker and killing the continuous signal. Thankfully he stretched his legs beside a tinkling stream, washed his face and hands, rolled up on the soft grass beside the hull, and fell asleep.

He awoke to the impact of a heavy boot and blinked up at a bearded face and the muzzle of a rifle.

"Get up."

"What?" Leonado rubbed his sore throat and stared at the man. "What's the matter?"

"This your Wendle?"

"That's right."

"Your wife, too?"

"Yes." Leonado climbed to his feet. "We landed to get some rest. Anything wrong?"

"You didn't radio on arrival and didn't head for the settlement." The bearded man sucked at his lips and

shifted his rifle to a more comfortable position. "This is MacGlowrie's Planet and we intend keeping it that way. Planet jumpers aren't wanted." He glowered at the young man. "You intend settling here you'd better see the Chief of the Clan. If not, get moving."

"We'll go." Leonado brushed some grass from his legs and stepped towards the Wendle. The bearded man barred his way.

"Just a minute, son. I'll erase your marker first."

"What?"

"Your marker." The man glared his impatience. "Here." He thrust his way into the cabin, ignoring the startled expression on Lucy's face as she crouched in the worn seat, and tripped a lever at the side of a machine. "What the hell?" The man stared at a jumbled heap of thin metal strips. "You been checking up or something?"

"No."

"Then why keep all these records? Never mind—I'll erase the lot just to make sure." Deftly he fed the strips into a slot and threw a contact. "There. Now get off-planet and don't come back unless you want to settle." He leered at Lucy. "We could do with some new blood at that."

"I'm going now," said Leonado, hastily. He didn't like the looks of the man and especially he didn't like the way the rifle kept swinging in his direction. "Sorry, and it won't happen again."

He didn't relax until they were safe in sub-space once more.

While Lucy brewed some coffee on a tiny stove, he checked up on the service manual. Up to now he hadn't had the slightest idea of what the machine at the side of the control panel was for, and was equally ignorant about the purpose of the metal strips. Now he discovered that every time they landed on a world a record was taken of the spectroscopic pattern so that it could be

recognised on a second visit. Unwanted records could be erased and the strips re-used; and the manual mentioned an automatic scanning device which could locate a selected world. It answered one question—how planet hoppers could ever get back home again, and he knew that the same selector probably took care of the homing device which would return them to Earth if ever they wanted to go.

After coffee and a scratch meal of canned beans, they set to work.

Four hundred and eighteen worlds later they found what they were looking for.

They had been lucky at that, even Leonado admitted it. He stared down at a rolling green plain, smiled at the distant smudge of forest, and listened, half-unbelievingly, to the silent radio speaker.

"We've found it," he said, shakily. "Lucy! We've found it!"

"Our own world!" She smiled through the grime on her face and made an attempt to tidy her bedraggled hair. "Darling!"

"No radio signal—that's proof enough. Chemical analysis favourable, and a G-type sun similar to our own." He frowned. "There may be alien life here, of course, or some other reason why it's still a virgin world, but I doubt it." Impulsively he took Lucy by the waist and kissed her full red lips. "It's all ours, darling. What shall we call it?"

"Paradise?" She shook her head. "No, it's been used before. Eden? No, same reason. Leonado? How about Leonado?"

"Lucado," he said, firmly. "That's a combination of both our names." He smiled at her. "I'll get out the beacon and set it up while you make some sort of camp. A good place would be down by the stream. There should be fish and I can trap small animals. I'll start farming

right away, any crop will do, and we can build a house later. But first the radio beacon."

He carried it from the ship, activated the built-in power unit, and listened to the Bureau issued identification signal echoing from the ship's speaker.

He smiled.

There were no fish in the stream, and small animals were conspicuous only by their absence. The grass wasn't grass but the external growth of a close-meshed underground system of tendrils, tougher than barbed wire and impervious to chemicals and flame. Power machinery might just have been able to do some good, but picks and shovels wielded by human arms made not the slightest impression.

After three weeks of futile effort Leonado packed everything back into the Wendle, lifted the creaking hull from the ground, and headed towards a distant range of mountains.

The proposed house yielded to a fairly dry cave. The underground tendrils were replaced by adamantine rock, and the lack of fish and game was more than compensated for by a tasteless, though edible, lichen-like growth. They could live—just, but it was a manner of life to which neither was accustomed.

But it was their world.

Inevitably, as her body thickened and she lost her slender perfection, Lucy's temper became sharper and her optimism less. Leonado drove himself to the limits of physical endurance, fetching painfully chopped wood from the forest, making crude beds and gathering leaves for bedding. He worked from the rising of the sun to the blossoming of the stars, but it wasn't enough, and, deep within himself, he knew it.

Lucy first put it into words.

"What happens if we leave here before the baby is born?"

"We waive our claim to the planet." He stared

sombrely into the tiny glow of a smouldering fire, lit more for comfort than for any other reason.

"And after?"

"It's still ours. We can record our stay and the birth and set up a permanent beacon—one that doesn't have to be serviced every day. The examiners will want proof, of course."

"What sort of proof?"

"Lie detector, mostly. Both of us will swear to the truth. There are other tests. I'm not sure just what they are, but they can tell somehow if the baby is Earthborn."

"I see." She moved clumsily towards the fire. "This means a lot to you, doesn't it?"

"It used to." He stared out beyond the fire and over the night-shrouded plains stretching from the foot of the mountains. "A world of my own. Sounds wonderful, doesn't it? I should have known that there'd be a catch in it, somewhere." He looked at Lucy. "You want to go back, don't you?"

"Yes."

"I can't blame you, I suppose. This is no life for any woman, especially the daughter of a rich man." He sighed and stared again into the darkness. "I should never have allowed you to come."

"I don't regret coming. We've been together, and that's all that matters." Impulsively she touched his hand. "What's happened to us, Leonado? We never used to be like this. Love was everything and life was wonderful. Now? Now we hardly ever speak, hardly kiss any more, and when was the last time you called me 'darling'? I'm frightened, Leonado. You remember a promise you made to me? It seems so long ago now, before this nightmare ever began, and we were safe and snug."

"I promised that I would never leave you," he said, dully. "Have I broken my word?"

"I think that you have." Pregnancy and hardship had

taken the girlish innocence from her features and burned the affectations from her mind and body, but still she retained the thing which had given birth to his love, and now, robbed of its superficialities, it was stronger than ever before. He, too, had changed. Without either of them realising it, both of them had suddenly grown mature, and, looking at her, he knew what she meant.

"I'm sorry," he said, simply. "But there has been so much to do and so little time in which to do it. I . . ." He sighed and stopped trying to remember all the pretty words which once would have come naturally to his tongue. "I'm sorry."

"I'm sorry, too," she admitted. "I'm sorry to have failed you after you have done so much. But I'm frightened. We're alone here, no hospitals or doctors and not even another woman, in case . . ." She pressed her hands to her stomach. "It won't be long now. A few weeks at the most—and I'm frightened!"

She was in his arms then, sobbing as though her heart would break, venting all her fears and misery in a cleansing flood of tears. He held her close to him, not speaking, letting his calloused hands run softly over her hair, trying to radiate tenderness and understanding, and forgetting his own hopes and ambitions in the desire to comfort the one he loved.

"We'll go home," he whispered. "We'll leave this damn place and go back to civilisation and sanity. You'll be safe there. You'll forget all this."

"We'll both forget it. Daddy will look after us, I know that he will, and everything will be so nice and comfortable for the both of us." She sighed with anticipation; then, sensing rather than feeling the lack of response in his arms, twisted until she could stare into his face. "Leonado! Is something wrong?"

"No, darling. We'll go back to Earth and you'll be happy."

"We'll both be happy."

"Perhaps."

"There is something wrong," she said, fiercely. "I know there is. What is it, Leonado? I've got to know."

"I stole the money to buy the Wendle," he said, quietly. "I must have been insane to do it, but I was desperate, and I thought that it was the only way to stop from losing you. If I go back to where I'm known I'll be arrested for sure." He tried to smile. "A fine husband I turned out to be. A criminal. A brainless, selfish, cocky fool."

"You did it for me," she whispered, and her hand found his in the fire-lit gloom.

"I thought that once I'd made my pile I could pay it back. Carter made over a hundred millions when he sold his world, and another man made ten by selling the mining rights to a syndicate. I thought that I'd be able to do the same."

"Could you? Make money like that, I mean?"

"Perhaps." He gestured towards the hidden plains and forests. "This place could be rotten with minerals, heavy metals or radioactive ores. The plants could contain rare medicinal drugs, the blossoms could be valuable as horticultural exhibits, the very rock itself could contain the basis of a fortune. Once we own the planet we could get a survey team to come out here on a speculative basis—they examine the world and take a chance of cutting in on what they find—but now we'll never know."

"A whole world," she said, softly. "Surely there must be something valuable here. It stands to reason on a planet this big." She smiled at him as she adjusted her hair. "That settles it. We must stay here until baby is born."

"No."

"We must. If we don't we lose all title to Lucado

and we lose whatever this place is worth. A few more weeks and it will all be over." She bit her lips to hide her fears. "Having a baby is nothing, really. Women do it all the time and they never have trouble. I'm young and healthy and . . ." She swallowed. "Help me, darling. I know it's silly, but I can't help feeling afraid."

"You're going back home, Lucy. No planet or fortune is worth the misery you're going through."

"No." She smiled through her tears. "If only there was a doctor here, or another woman, even. Perhaps . . ?"

"Why not?" He leaned forward, his eyes glistening with renewed hope. "It shouldn't take long to get back to Earth. I could pick up a doctor and be back here in plenty of time." He chuckled. "The medico could be a witness, too. We really could do with one, and after it's all over we can all go back together." His smile died. "No. I can't leave you here alone."

"You must. It wouldn't be for long, and you could leave in plenty of time so that you'd be back well before baby was due."

"I could cut plenty of wood, gather lichens and make everything ready." Despite his reluctance his mind was already busy with the details. "Say a day to return, a day to find a doctor, and say even two days to get back here. Four days, more likely three, or even two, but at the most, five. Would you be all right alone for five days?"

"Of course."

"Then . . ?"

"I'll be all right." She clung to him then, fiercely, possessively, and he felt the wetness of her tears on his bare shoulder. "Hurry back to me, darling. Please hurry back."

Gently he stroked her hair.

The doctor wasn't amused. He stormed about the tiny

cabin and glared with angry disbelief at the pin-pointed blackness of sub-space, still only half-aware of what had happened to him.

"You'll suffer for this, young man. You told me that I was needed on an urgent maternity case, offer me a lift, and this happens. I demand that you take me home immediately."

"I can't do that, doctor, and you *are* needed on a maternity case."

"Where? On some God-forsaken planet at the end of the galaxy? There is a corps to handle things like that. I'm a private physician and you've kidnapped me from my home! Are you aware of the penalties for that?"

"Shut up!"

"What!"

"I said 'shut up'." Leonado turned and faced the irate doctor. "Listen, do you know anything about operating a Wendle?"

"No."

"Then the quicker you close your mouth and let me get on with my job, the sooner you'll be back home." The young man swallowed and tried to control his voice. "I'm sorry for tricking you the way I did, but believe me, it was necessary. My wife is on one of those worlds and she's expecting a baby. She's alone there, do you understand? There isn't another human soul on the entire planet—and we're running out of time."

He didn't bother to explain how it had taken too long to gather essential supplies of food and fuel. How he had almost died of suspense as the homing scanner had clicked its slow way through four days before it had located Earth, and how he had returned to normal space more than a thousand miles out to sea. It had taken too long to arrive at a landing place, too long before he had found courage and determination to rob a pedestrian of his money in order to replenish exhausted fuel tanks.

With two crimes against him he hadn't dared approach the Interstellar Medico Corps; they would have helped Lucy, but they would have held him against his routine lie detector examination for confessed crimes.

He hardly thought of the consequences of kidnapping the doctor.

Carefully, he slipped the marker from the recording machine and fed it into the scanner. Impatiently he threw the switches and watched as the stubby tube began its slow task of scanning the billions of iridescent patches to find a matching pattern. Now there was nothing he could do but wait. Nothing either of them could do.

The doctor calmed down, finally. An elderly man, he could appreciate the nervous strain Leonado was suffering, and busied himself preparing a meal over the tiny stove. Watching him, Leonado was reminded forcibly of Lucy and the way she had performed the same duties, and he gripped the worn padding of the control chair until his fingers burst through the time-worn plastic.

"Take it easy, son." The doctor (his name was Wilson) handed over a steaming mug of coffee. "From what I've heard of these things there's nothing you can do now." He chuckled. "Just like babies, they come in their own good time."

"Yes." Leonado slopped coffee as he took the mug. "But they come to time."

"Sorry." Wilson glanced towards his bag. "Want me to give you something? A sedative to quieten your nerves?" He narrowed his eyes with professional interest. "When did you sleep last?"

"I don't know. When I left I suppose. I can't remember."

"Why not have a sleep? I'll watch and wake you if anything happens."

"No."

"Can't you trust me, is that it?" Wilson shrugged.

"I'm a philosopher, son. I was angry at first; any man would have been, but that's all over now." He stared at the screen. "So this is subspace, eh? First time I've been in it, though I've read up a bit on the subject. You an experienced pilot?"

"No."

"Thought not. I watched you pretty closely and you didn't do any of the preflight checking I've read about." He shook his head as he stared at the luminescent flecks of light. "Who'd have thought it? Makes a man almost religious to come out here and see all those worlds. How many are there?"

"I don't know; millions, I suppose."

"That's what it looks like to me. How long will it take for this machine of yours to scan them all?"

"I don't know. Any time up to a week, I suppose."

"For a man who risks his life there's a surprising lot of things you don't seem to know," said the doctor, drily. "Don't it tell you in the manual? You've got one, I suppose?"

"Yes." Leonado blinked some of the grit from his eyes and reached for the dog-eared book. The close-set type seemed to waver a little and he scowled as he squinted at the index and turned to the page. "Damn!"

"What's the matter?"

"It's been ripped out. Hell!" He flung the book away. "We'll just have to wait."

They waited five days. Leonado slept twice in all that time; the old doctor did nothing but doze, make coffee and prepare scratch meals, then doze again with the easy, light sleep of age. Leonado couldn't sleep, and at the end of the fifth day was running out of nervous energy.

"I hate to suggest this, son," said Wilson, after watching the young man glare at the scanner for the tenth

time in two minutes, "but couldn't it be broken?"

"No."

"Why not? This isn't a new ship, and electronic gear can get out of order. Seems possible to me."

"If it was broken I'd never have got back to Earth," explained Leonado, impatiently. "There's nothing wrong with the scanner."

"Why not make certain? Run a test, I mean?"

"Waste of time."

"Is it? How much air does this ship carry?"

Leonado caught the hint and reluctantly prepared for the test. Aiming the directional tube at a point of light he tripped the switch, and wasting no time on examining the planet below, re-engaged the field. Carefully he removed the marker from its slot, changed it for the one in the scanner, and casually threw the switch.

"This shouldn't take long. We've only just left the place, and it must be in the forward sector."

Nothing happened. Nothing happened for an hour, ten hours, twenty, and Leonado was quivering with impatience and the relentless sense of the passing of valuable time. Wilson watched him, his elderly face grave, then fumbled inside his bag and slipped something into his pocket.

"Something's wrong somewhere, son. We should have located that planet again by now."

"I know it." Savagely Leonado ripped the marker from the scanner and held it to the light. "What's wrong with this thing?"

"Did the recorder work before?"

"I don't know, we never tried it." Metal tinkled as he stared at the doctor and stepped forward, ignoring the marker at his feet. "Damn it! It's got to work!"

"Let me look at that." Wilson scooped up the plate. "As far as I can remember the pattern is magnetically

impressed and can be erased afterwards." He pursed his lips as he stared at the thin metal strip. "If something is wrong with the recorder so that it doesn't operate as it should . . ."

"Don't say that!"

"If it is broken," continued the old man, calmly, "then you'll never be able to find your way back without incredible luck and a few lifetimes of trial and error." He stepped over to the recorder "Let me have a look at this thing. I've done some work on electronic apparatus back at the clinic; was a radio and television ham once, too. Now . . ." His voice faded as he probed among the complex wiring of the machine. "Nope. As I thought, the recorder isn't working, and hasn't worked for some time I'd say." He pointed towards a mass of fused metal. "There's your trouble. The magnetising unit has failed, probably through worn insulation or makeshift repairs, and while it erases, it won't record." He slipped a hand into his pocket. "Well, son, that's about it. We might as well go home now."

"Are you mad? My wife is waiting for me out there. I can't just go home without trying to find her."

"How are you going to do that?"

"How? I . . ." Murderous rage twisted the young man's face into an animal mask. "The swine! The dirty stinking rotten swine! I'll kill them for this. I'll choke them to death with their own guts and rip the tongues from their lying mouths!"

"Who?"

"The rats who sold me this Wendle. They knew that it was broken. They knew what would happen. The . . ."

"Did you check the machine? Have a mechanic go over it for you?"

"No, but . . ."

"There's your answer. You were robbed, sure, but what happened after that is your own fault." Wilson jerked

his head with quiet command. "Come on now, let's get home."

"Like hell!" Quickly Leonado slipped into the control chair and aimed the directional tube. "There's only one thing I can do now, and that's find Lucy."

"Impossible!"

"What else can I do? Forget her?" The young man shook his head. "She's alone, don't you understand that? She's having a baby, might have had it already, and she's all alone. I've got to find her. I've got to!"

He snarled as the alarm flashed red and re-aimed the tube. Again the world proved uninhabitable, a third time, a fourth, and then he stiffened as something hard and small and round dug into his spine.

"We're going home," said Wilson, quietly. "I always carry a gun on night calls. I keep it in my bag, and now I've got it pressed against your spine."

"You . . ."

"Perhaps, but where's the sense in all this? You won t find her, and the air in here can't last for ever. I can understand how you feel about your wife, but I have a wife, too, and I reckon that she's done enough worrying without my adding to it. You're taking me home, son, and then, if you want to, you can search for your wife, alone."

"I haven't the time." Sweat shone on the young man's face as he stared at the doctor. "It may take days to get back, then I'll have to refuel, and then more days to scan more worlds. I can't afford the time—and I'm not going to."

"No?"

"No." Leonado stared pleadingly at the old man. "Can't you see it my way? It's my wife and she's alone, and she's having a baby. I . . ."

The report of the gun sounded strangely loud in the

confines of the cabin and the following sound, of splintering bone, made a dull echo as the control lever smashed through the thin skull. Leonado stared blankly at the blood-spattered lever, winced as he touched his ripped side, then without a second glance at the body before him, returned to his seat.

Again the red light and the warning alarm. Again, then a habitable world, a moment of blazing hope, then despair, more potent because of that hope, as the *bleep . . . bleep . . . bleep* of the identification made a wholly strange pattern utterly unlike his own.

Back to sub-space and the eternal search. Methane, chlorine, fluorine, ammonia, carbon dioxide. No water vapour, no oxygen, no hydrogen, no iron. World after world passed before the scanning tube, dozens out of millions, and the rare few capable of supporting human life all radiated their own identification signals.

Dully he stared at the screen. Somewhere on one of the worlds the flecks of light represented, a woman waited with dying hope. A young girl, scarcely mature, and yet who would now have a new-born baby in her arms. Waiting, alone, her eyes turned hungrily towards the stars and her heart a growing mountain of bitterness as the days passed and still he did not come.

One world out of millions—but which?

CSFC

The Cheltenham Science Fiction Circle was recently formed by Eric Jones, of 44, Barbridge Road, Cheltenham, Glos., to whom interested persons should write. The meeting place is provisionally fixed at the Umbrella Inn, Hester's Way, Cheltenham, for Thursday each week.

The Divine Wind

by W. W. BYFORD, B.Sc.

At the western edge of the great Euro-Asian land mass is the little group of islands once proud to be known as Great Britain. At the eastern edge there is another little group of islands —the Land of the Rising Sun. Time was when Nippon was threatened by a vast Armada from the mainland even as we were by the might of Spain when the first Elizabeth reigned. A storm arose to help us to disperse our floating foes. A great wind did as much for Japan. The Divine Wind—Kamikaze—has been honoured ever since by the Sons of Nippon.

Changing times bring changing notions. The humility of deliverance gives place to self glorification, and Kamikaze came to be the name associated with the sorriest attempts of the aggressive Japanese war lords to save their faces by the exploitation of the virtues of the Japanese people.

They made little aircraft with warheads filled with nitro-anisole where the engine ought to be. Sitting behind it was a boy, feted the day before with worldly pleasures, fated in his flight to land in Eternity. Behind him were three cylinders of nitro cellulose, one large one centrally aligned, a small one a little to port, another to starboard. He and his grisly craft were carried aloft by a "Betty" and released some miles away from one of the allied warships which were steadily decreasing the area of ocean between Japan and her foes.

The big middle cylinder took over the propulsion of the warhead, shooting back a stream of hot gas to urge the baby plane forward. The little wing and tail controls alone had little power to change the course of the heavy warhead at the speed it rapidly acquired. The pilot had to decide when to fire which of the little auxiliary propellant cylinders to crash his bursting charge onto the target. Crude? Well—they scored an amazing number of bulls-eyes and did a great deal of damage, and the pilots

could hardly be described as highly experienced or well practised in the handling of such craft.

What on earth is all this past history doing in a progressive, forward-looking science fiction magazine?

The fact is I have been thinking quite a bit recently about how a fast-moving vessel in space is going to be able to effect direction control.

MANŒUVRABILITY IN SPACE

Spaceships will be moving with many times the velocity of the Kamikaze boys. They will be even more in need of means other than flaps and tailplanes to change direction. Such things depend for their effectiveness upon the reaction of surrounding air to bring about a change in course. In much the same way a rudder makes the steering of a boat possible by using the pressure of the water. Obviously in the absence of air some completely different method is required to bring about a change in course.

Did you ever make paper gliders? Sure you did—probably very efficient ones, too, even allowing for the distorted view a boy takes of anything he has himself created. Probably you got into the advanced class, making a model to circle in a clockwise spiral and another to spiral anti-clockwise. If you did this you may remember there were three ways of getting the desired effect. Even now you may be young enough to repeat the exercises with or without a small boy watching, to serve as an excuse for what the take-the-world-as-they-find-it people would call childishness. Thank goodness there are still thousands of first class adult minds always ready to play around to increase their understanding of the world as they find it, and as a result change the world into what it will be tomorrow. Naturally they prefer to call the playing around scientific research. Anyway, let's give the paper Handley Pages, Blenheims, Spitfires—choose according to your age group—a little thought.

You could give such aircraft a tendency to turn in a given direction by one of several minor modifications all amounting to the same thing. You could bend up one wing, make a tailplane set at an oblique angle with the line of the wings, or you could set the tail fin so that it was not in alignment

with the axis of symmetry. I class each of them as one and the same inasmuch as they all depend for their effect upon the inequality of air resistance to forward motion on one side of the craft with that on the other side of it.

A second method consists of loading one side of the glider to make it heavier than the other. A pin could be inserted in a tailplane, or a piece of heavy metal foil—tobacco packet stuff was good—could be fashioned into a chip that fitted onto a trailing edge of a wing a little way out from the hull.

The third method is really only a variant of the second, except that to some extent the first principle is also involved. A little triangle of paper was snipped out of one wing. This method was a particular favourite because you could take it out at a wing tip, from the leading edge or from the trailing edge, and any sufficiently fascinating erratic flight could be attributed to the designer's extraordinary skill, no matter how unpredicted. Delighted surprise, of course, had to be masked by a triumphant nonchalance.

Well, now, about our spaceship. It will not be desirable that it should merely spiral prettily, either clockwise or anti-clockwise. However, the factor causing change of direction can be variable. After all, aircraft are manœuvrable with controlled flaps and tail units, but such air resistance devices are ruled out for the space craft. What of the other two?

NEWTON AGAIN

Here let me recall two points from earlier articles of mine. Remember Newton's first law? "Every body continues in a state of rest or of uniform motion in a straight line unless acted upon by an applied force."

The significance of that is that when a moving object changes direction something has to be done in the way of supplying energy to make it do so. The greater the mass of the object the more force is needed to turn it from a straight path. A spaceship will be no lightweight. A very small cox sitting at the stern opposite eight hefty oarsmen has more than sufficient strength to guide their efforts, all of which goes to show that when you have a medium such as water to pass

through, you can use the existing movement as a source of energy by which to change direction. In space, unfortunately, we shall not have a relatively still substance against which to turn. Method one with the paper glider is out.

The second point formerly mentioned concerns Newton's other law. "To every action there is an equal and opposite reaction." When we shoot gases rapidly backward from our vessel, the ship will be propelled in a forward direction. But just what do we mean by backward and forward? First we must have a front and a back, and the important thing is the line joining them—that is the axis of the craft. This line gives the direction in which the firing charge must be pointed.

The axis has additional significance as the line on either side of which in any plane there is equal distribution of mass. If there is more weight to one side of this line in any plane than there is in the other side, it will not be a true axis. In effect the discharged fuel gases would be sent out at an angle with the true axis. Consequently the flight would not be along the line of discharge. Methods two and three with the paper gliders use this idea to prevent straight flying.

It is not going to be easy to keep a rocket-propelled vessel moving in a straight line in space. An aerial rocket —a Guy Fawkes' Night job— can be kept climbing by being attached to a long stick. The force of gravity acting on this pulls the rocket back to a vertical course as soon as any deviation begins to develop. The tight-rope walker's pole serves a similar purpose in a similar fashion. The explosive missile, when rocket propelled, uses fins to stabilise its course, but these are effective in air, even very thin air at high velocity. A shell fired from a gun achieves direct flight by being set in rotation. A copper driving band engages in spiralling grooves (rifling) in the gun barrel so that the shell leaves the gun spinning rapidly about its axis. Any extra weight on one side of the axis is thus cancelled out because in a fraction of a second the extra weight will have pulled equally on all sides of the axis, cancelling itself out. We should get a violent gravitational pull on all things in a vessel towards the outer

wall if we stabilized its flight on the same principle.

Something, however, will have to be done if the vessel is not to change its direction every time a member of the crew moves nearer to or further from the axis. The steersman will have to be able to control the nett distribution of mass relative to the axis. How? Here's a suggestion. Somewhere in the centre of the ship there might be a drum-shaped reservoir filled with mercury. All round it would run small valves opening into radiating tubes. These tubes would be filled with compressed air to keep the valves shut normally. The mercury in the drum could be kept under a pressure slightly less than that of the air in the tubes.

The pilot's joy-stick would resemble a Viking's studded shield. Each stud would control the air pressure in one tube. A decrease in air pressure in any tube would allow mercury to flow into the tube, away from the axis, to correct any displacement of mass from its normal position anywhere in the aircraft, from whatever cause. Increase in air pressure in the tube would return the mercury to the drum when necessary. In a subsequent article I shall try to describe an instrument which would tell the pilot when to turn which stud how far. Quite possibly the pilot will be a robot device with a much briefer reaction time than a mere human, and less prone to error.

So far so good. I have described a possibly practical way of dealing with the first problem of maintaining an even course. The major problem remains—deliberate controlled change of course, requiring a considerable energy source. The vessel will be very heavy—it will be travelling at great speed.

With known facilities I can see no better way than auxiliary rockets offset from the true axis, possibly even at an angle with the axis, as much as a right angle, maybe. In other words, the little Japanese martyrs may have died in the service of posterity in so far as they demonstrated what could be done. I offer no advance on the Kamikaze—the Divine Wind.

The problem was—how to commit murder, and get away with it

MURDER MOST INNOCENT

By E. C. TUBB

THE FIRST PART WAS EASY. There are a thousand ways to kill a man. But the second part, the all-important second part . . .

Because, of course, there would be no point in having committed the crime if he was going to be caught. That was the whole crux of the problem. He must not be caught. If he were, then the murder would be criminal in its sheer stupidity, and Whitney was not a stupid man.

But he wasn't a patient one, either. If he waited he knew that his opportunity would come by simply not doing something. Not stopping the air lock, for example, when it closed on a helpless body. Not taking care to check any of a dozen different items. Not bothering to go to the rescue when needed. But those negative actions needed time, and he had no time, not when Lola was a mounting fire in his blood and a vision of unattainable delight tantalising him with brief glimpses of the paradise he might have. John was always there then, smiling, proud, quietly possessive and, somehow, always in the way. John was Lola's husband.

He was also the man Whitney wanted to kill.

With any other man it wouldn't have mattered. Any other man would have been an unknown quantity, a fact, there, but wholly unimportant. Whitney could have accepted him, discounting him in the

ecstasy of the moment. But Lola was married to John, and John was Whitney's partner and the two were always home at the same time. Until John died Whitney could never take his place.

He stared at him as he moved about the cabin, big, calm, methodical in everything he did. A safe, smug, confident man. A reliable man, reliable in that he would not make mistakes, and Whitney suffered the agonies of the damned as he tried to think of a way to kill him—and get away with it.

"We're making good time, Pete." John stared at the instruments, then at his partner. "We should hit Venus a day ahead of schedule."

"Should we?" Whitney wasn't interested. A day saved was that much extra time to earn a profit, that much extra money to swell his bank account and, once, he would have been eager to hear the news. Not now. Not when every day less in space lessened his chances of staging a perfect murder. "Got any ideas of a return cargo?"

"No, but McPhearson should have something for us."

McPhearson was the shipping agent. A dour, phlegmatic Scotsman, who for some reason had always disliked Whitney. Pete returned the feeling—with interest.

"Why don't we switch to Jelks? He can get us better cargoes than that old coot."

"Better, perhaps, but not so regular." John checked the instruments with loving care. "We'll stick to Mac."

And that was it. That was the way it always was. John made the decisions and Whitney made the protests, but each time he could have saved his breath. John owned two thirds of the ship. John took two thirds of the profit. Whitney had bought in with all he had, and up till now had never regretted it. He could sell out, but what was the good of a third share? Lola wouldn't take him with that, he knew it. Lola wanted the good things of life, the things which cost money, and Whitney didn't have the money. Not yet. Not until

John died and he obtained full share under their partnership agreement. Plus the mutual-benefit insurance, of course; he mustn't forget the insurance. Lola would be his then. The ship would be his, the money in the bank, everything. A human life was a cheap price to pay for that.

He rose to his feet and cursed as he drifted upwards to crash against the "roof." "Damn it! Why can't we have some spin on the ship? This free fall makes me sick."

"It costs money to spin ship." John hadn't moved from his seat by the instrument panel. "What's got into you, Pete?"

"What?" Whitney felt a swift alarm as he stared towards his partner. If John had guessed!

"You're edgy and seem to have something on your mind." John's eyes flickered towards the instruments, the air gauge, the radiation meter, then swung back towards Whitney. "Is there?"

"Is there what?"

"Something on your mind?"

"No."

"Sure? If you don't like the way I'm handling things . . ."

"It isn't that." Whitney forced himself to grin. "It's . . . it's just a girl I met. Forget it."

"You're the one who wants to forget it. It takes two to run ship, Pete, and I've a right to expect you to do your share."

Whitney didn't answer. He gripped a stanchion, swung himself to his bunk and lay, his eyes narrowed to slits, his mind a twisting turmoil of speculation.

He could kill John. He could do it now, a sudden thrust and his entire mass driving towards the big man's throat. He could kill him while he was asleep. He could open a vein—no, that would mean too much blood and, in free fall, it would paint the entire interior of the cabin. No blood. How then? How?

He couldn't dispose of the body—or could he? The trouble was that it wasn't just enough to kill him.

Whitney had to save his own skin, and with modern law-enforcement, that wasn't easy. In the old days, now . . .

He wished that they were back in the old days. Then a man could kill and lie and get away with it. A man's word was accepted as the truth unless there was evidence to prove the contrary. Whitney wondered just how many stiffened bodies were drifting around the void, victims of perfect murders, their partners safe so long as they kept their mouths shut. Now it wasn't as easy as that.

For the hundredth time he visualised, in imagination, just what he would have to go through.

First the landing. Then to report to McPhearson, damn him, his partner's death. McPhearson, as well as being a shipping agent, was also the local law officer, and he would be thorough, very. Right, then; he had reported John's death with appropriate evidences of grief and remorse. That part was easy; all he had to do was to sign a form, but that wasn't all there was to it.

Then would come the questions.

Simple questions. Straight yes-no answers. One question would set him free—or send him straight to the prison on Mercury. "Did you kill your partner?"

He would answer "No," of course, and on that answer would hang his future. If they believed him he would walk out a free man, full owner of the ship, of Lola, and the insurance money. *If* they believed him. But they didn't trust anyone. They would test him with their machines, the horribly efficient and quite emotionless lie detectors, and there was no way to beat the machines.

Or was there?

Whitney frowned as he thought of it, trying for the thousandth time to think of a way in which he could kill and yet remain technically innocent. No violence, of course—that was out. For a moment he toyed with the idea of provoking John to

attack him and then killing him in self defence. He could get away with that. But John was a big man and he might not be so easy to kill once warned and ready. No. He had to use guile, subtlety, premeditated cunning, and always he had to remember the lie detectors waiting to examine him with soulless efficiency.

Death by negation?

That was the obvious answer. There was no law which stated that a man had to go to another's aid. John could be dying and, if Whitney could save him by the lifting of a finger, and did not lift that finger, then he was technically innocent. Never mind what others thought. Their sneers and gibes, black looks and ostracism wouldn't matter once John was dead. To hell with them. All he had to worry about was the machine.

He stirred as John drifted towards him, coming to rest with an easy control of his muscles, swaying a little as he stared down at his partner.

"I'm going outside. It's about time we checked the tubes."

"Can't it wait until we land?" Whitney hated working outside the ship while in flight. Space was too big, the stars too cold, the colossal emptiness too vast for his mind ever to be easy while out there.

"It's easier to do it while in space, and we'll save time that way, too." John stared coldly at the man on the bunk. "Well?"

"All right." Whitney floated upright as he released the catches. "You going first?"

"Yes. Stand by the radio in case of trouble."

It was routine. One man outside doing the work while the other stood by in case of emergency. The ship-suit radio kept them in constant touch and casualties were rare. Not unknown, though, just rare, and Whitney felt a mounting excitement as he watched John don the thick fabric and metal of his suit.

"You checked the air tanks?" John paused, half

in the suit. "Everything O.K.?"

"Trying to teach me my job?" Whitney didn't have to pretend anger. He was fed up with the other's implications and barely veiled contempt. What if he did sometimes forget? A man couldn't be expected to think of everything, could he?

"Right." John closed the faceplate and stepped towards the air lock. He didn't test the suit radio, he didn't make any last second suggestions or, as he used to, spend a little time double checking his equipment. His face, beneath the transparent faceplate, was grim and taut with anger. Whitney glared at him, waiting until the heavy inner door had swung shut on its gimbals, waiting until he heard the whine of the cycling motor, the transmitted thud of the outer door as it opened and closed.

Then he grinned.

The fool had done it! John had assumed that his tanks were full of air and that his equipment had been checked. Whitney should have checked them but hadn't, and now John was out there, out in the great emptiness, with scant air and faulty equipment.

He was as good as dead.

The little ebonite switch of the radio control seemed to wink at him with belated urgency. Whitney ignored it. Why should he switch on the radio? They had quarrelled, hadn't they? Why should he exchange small-talk with a man he hated? Damn him. Nothing could hurt him out there and he could always return if he wanted to. Better still, let him sweat for a while. The outer door could be locked and Whitney locked it, sealing the ship against entry from outside. Locking his partner out in the silence and vast loneliness. Then he sat down to rehearse.

John and he had had a quarrel. John had forgotten to check his air tanks and equipment. Whitney hadn't switched on the radio because he was sore at his partner and didn't want to talk to him. The outer door? Well,

it had been a childish thing to do, but he hadn't intended any harm. Whitney frowned at the switch and, after a moment's hesitation, unlocked the outer door. There! He'd had a change of heart immediately afterwards and opened it again. Now what?

John wasn't dead yet. He was still out there, working in one of the gaping venturis, scraping off the thick deposits and checking the firing gear. He wouldn't notice his air getting bad, not until the steady flow hissed into silence and by then the accumulated carbon dioxide would have made him feel sleepy. Too sleepy, in fact, to do anything about it. Radio contact would have saved him. Whitney could have donned his own suit and gone out to rescue him, dragged him back inside the ship and pumped new life into his starved lungs. But he wasn't going to do that. He was going to sit and wait, sit and think, sit and wait some more until it was far too late for rescue.

But he wouldn't have killed John.

He smiled as he thought about it. No body, of course. John would have kicked himself away from the ship in a last frenzy and would be drifting for an eternity in the void. No body. No evidence. And he hadn't killed John.

After a long while he rose and slowly began to don his suit. With full tanks of air John should still be alive and working—and Whitney didn't know but that he had full tanks. He would go outside to see if he could help. They would be sure to ask that, and then it would be all over.

He was thinking of Lola as the outer door swung shut behind him.

McPhearson looked up from beneath his shaggy eyebrows, then stared at the signed form on the desk.

"You say that your partner died in space?"

"That's right."

"I see." The dour Scotsman pulled thoughtfully at the lobe of his left ear. "You'll have to be examined,

you know. I can't just accept your statement."

"I realise that. Where are the machines?"

"Here. Just grip those two handles and answer a straight yes or no. Ready?"

"I'm ready."

"Did you murder your partner?"

"No."

"Did you kill him?"

"No."

"Was his body lost in space?"

"Yes."

"Are you guilty or not guilty of causing his death?"

"Guilty."

"I see." McPhearson sighed as he switched on a recorder. "Maybe you'd better tell me all about it, John. Just what did happen?"

"That's something I shall probably never really know." John gripped the twin handles of the lie detector and shook his head at the Scot's expression. "I mean it, Mac. You knew Whitney; he was a morose, sullen kind of a man, and he seemed to have something on his mind. Frankly, he was a little too careless for my liking; several times I've found that he hadn't checked the equipment as he should have done, and, after this trip, I was going to buy him out. I could do that beneath our agreement, but I needed the profit from this trip to do it."

"What happened, John?"

"I wanted to go outside to scrape the tubes. I put on a suit and asked him if he'd checked the tanks. He flared up at that; things had been getting strained between us, so I didn't argue. Outside I tried to contact him by radio but, for some reason, he hadn't switched on the set. I didn't worry about it, he was a strange man and, as I said, seemed to have something on his mind. I worked for a while clearing the jets and, just as I was about to re-enter the ship, Whitney came outside."

"Was there any reason for him to have done so? Speak into the recorder, John."

"None."

"You hadn't asked him to join you?"

"No. As I told you the radio was dead."

"I see. Carry on, John."

"As he left the air lock I bumped into him." John paused and shook his head. "Just one of those things, you know how it is. Two people at the same place at the same time. Anyway, I bumped into him and knocked him away from the ship. Something must have been wrong with his reaction pistol, because he didn't seem able to get back again. I couldn't do anything the way I was, my air was low and I had no line. I went back inside the ship, changed tanks, loaded myself with line and reaction pistols, and went out to look for him."

"And you didn't find him?"

"No. I can't understand why not. He could have called me by suit radio, or fired a signal flare—if he'd had one, or done something to let me know where he was." John shrugged. "Space is a pretty big place, Mac. I just couldn't find him at all."

"I see." Mac nodded as he switched off the recorder. "Nothing to blame yourself for, John. The only thing you are guilty of is in having bumped into him, and that was a pure accident." He stamped and signed the form. "All right, boy. Find yourself another partner."

John nodded as he rose and picked up his clearance. He didn't smile until he was outside the office, and even then he was sweating a little. But he was safe now, as safe as a man could be. The agent had trusted him, and even if he hadn't, what harm was there in having changed suits? None at all. Because, even though Whitney was dead, he hadn't killed him.

Whitney had killed himself.

Is this the way photos. of the future will be made?

XEROGRAPHY

by JOY K. GOODWIN

BACK in 1839 Fox Talbot published particulars of his method of photography which he referred to as *photogenic drawing*. In 1841, he patented his Calotype process, which resulted in a negative image on paper, from which a positive image could be obtained by printing through it onto another sheet of paper. This was the first real step in modern photography, since almost all modern processes have been developments of his experiments.

Just under one hundred years since Talbot took a picture of a window in his house at Lacock, Wiltshire, a new development in the field of photography became of interest. The process of xerography, a method of photography without the use of liquids, and which makes use of electrostatic charges, is now under experiment, and is, furthermore, in regular use with the American Signal Corps' engineers.

In 1937, a patent agent in New York, Chester F. Carlson, described and patented this new process. In 1944, the Battelle Development Corporation of America obtained the exclusive rights to this patent and demonstrated its practical value. In 1950, the Haloid Corporation placed on the market in America a piece of office equipment that used this process for the copying of documents.

At the present time, in the

U.S. Army Signals Corps, a camera, known by the irreverent name of Two-Minute Minnie, makes use of this process and has given good service in the photography of atomic blasts.

Xerography—from the Greek *xeros* meaning dry—depends basically upon the characteristics of a thin film of photoconductive insulating material, which could be of sulphur, amorphous selenium or anthracene. The most popular of these—amorphous selenium—has several advantages. It does not suffer distortions such as are frequently found with a gelatine emulsion—reticulation, for instance. The film itself is grainless, and the only worry about grain comes from the size of particles used in the powder that develops the image. A high degree of resolution is, therefore, obtainable by this method.

The most important disadvantage is that, at the moment, a slightly longer exposure time is required in this process than with the normal photographic method.

The film of amorphous selenium is deposited thinly on a conductive backing plate, which is then sensitised by corona discharge in the dark. For small plates a point electrode is used—with larger ones the corona discharge comes from a wire placed parallel to the surface of the backing plate, which then moves slowly underneath it.

From this discharge the film receives a positive electric charge and is then ready for use. This is exposed in a camera exactly as if it were a normal plate. The electric charge then leaks away in direct relationship to the amount of light falling upon it, through the conductive backing plate. This invisible charge image is known as the *latent electrostatic image* and will not suffer from loss of contrast or definition in less than fifty to one hundred hours from time of exposure.

The development of the image is simplicity itself in that a powder—white in the case of a positive image being required—is dusted over the plate. The powder, which is charged positively, is thus repelled from the areas where

the charge has not leaked away and retained in proportion to the leakage from the other areas. Were the powder negatively charged, a negative picture would be obtained.

The picture can now be projected onto a screen by an epidiascope, but if a fixed image is required, the powder is mixed with a resinous substance before it is blown onto the plate. The picture is then transferred to a sheet of paper—although wood, glass and other materials can be used—by electrostatic means. If gentle heat is then applied, the resin fuses and fixes the powder onto the paper. The plate can then be cleaned and used again. The limit of use of one of these plates is the amount of abrasion it receives during handling and cleaning.

While Americans have preferred the use of what is termed the *cascade* method of developing the image—that is, tipping the cloud of powder across the plate in a box—the British researchers favour the *powder cloud* method. The plate with the film side downward is placed on top of a box above a precipitator grid. The powder is contained in a cone at the bottom of the box, with a small hole at the apex through which the powder cloud can expand. The mass of powder is agitated, during which process the particles become charged both positively and negatively. The precipitator grid's polarity is chosen to suit the type of image required—negative or positive—and thus prevents the wrongly polarised particles reaching the plate.

The powder most favoured at present is cosmetic face powder, for two reasons—the extreme fineness of the particles, about one to two microns, and its adhesive properties. These last are important since the electric charge on the film gradually leaks away when a developed plate is taken into the light, and the image is sustained only by the power of the powder to cling to the film.

Xerography is finding favour in X-ray photography, especially where it is necessary to have several exposures taken during an operation. A normal X-ray photograph taken during an operation

would have to be sent to a darkroom for development and then brought back for study. Even though this be done before it is dry, the time taken is in the region of four minutes, whereas a xeroradiographic image can be obtained in about one minute. The importance of the time saved in a situation such as this is easily realised.

Unfortunately, however, deep X-ray photographs are not possible with this method because of the possibility of injury to the patient due to the unduly long exposure that would be required. This can be overcome in film photography by the use of fluorescent screens placed in contact with the emulsion, but these cannot be used with xeroradiographic plates, since the front surface of such a plate must not come into contact with other materials or loss of charge will result.

In other fields of X-ray photography, such as industry, where no injury will be caused by long exposure to X-rays, xeroradiography is preferable to film photography because of the high resolution, and the greater contrast available, thus making fine details more readily visible.

The development of the hand camera, Two-Minute Minnie, by the U.S. Army is an encouraging sign of future possibilities. The camera, as its name suggests, produces finished images within two minutes after the shutter is tripped. In this camera negatively charged black powder is blown across the plate and sticks where the charge still remains—a reversal of the more normal process. This image is then transferred to a paper coated with a sticky layer such as rubber cement, and the finished print is protected by a film of transparent plastic.

The advantages of Minnie are that all processing is done in the back of the camera: atomic radiation won't fog the plates as it would ordinary film; a small supply of plates is sufficient, and they are not sensitive to light until charged. These advantages also apply to xerography in general. No darkroom is needed—no liquids need be used, and since it is possible to

use the plates again and again this eliminates a considerable amount of weight when transporting the cameras and equipment.

Two-Minute Minnie uses an ordinary lens and shutter, and can take pictures wherever the light would be suitable for pictures taken by a normal camera. The images can be made into slides suitable for projection by transferring them to a glass plate instead of onto paper, a process much less inconvenient than using light sensitive plates which must be exposed in a darkroom. The Signal Corps engineers who developed this camera under the sponsorship of the Haloid Company are now hoping to cut down the processing time to one minute.

This process will most likely find much popularity with the ordinary photographer, once the camera is developed sufficiently to be manufactured for the open market. To have a camera that will give the advantages of a Polaroid-Land camera—pictures within a minute—but without the disadvantage of not having a negative, combined with the few plates necessary for its operation in pictorial work, will bring a gleam to the eyes of photographers. A camera, too, that will eliminate the darkroom, the liquids, and the time-wasting that are the despair of photographers today will have much to recommend it, and it would seem that xerography is opening the way to this object.

All the latest news on viruses

ALIENS ON EARTH

by JOHN TAYNE

THERE MUST BE VERY FEW people who have never heard the word "viruses," even though these organisms were discovered only recently. They are so small and so peculiar in their behaviour that they seem to have captured the imaginations of scientists and laymen alike. And, of course, they achieve prominence through being responsible for a number of nasty diseases such as infantile paralysis, smallpox and yellow fever. A great many first-rate scientific minds have been applied to the study of viruses, and a great deal of knowledge has been obtained. But there is still a lot of mystery. They are of interest to science fiction fans because they seem to represent a form of life as strange and alien as might be met on any far-off planet. Indeed, they seem to be aliens on Earth.

The whole science of virology started when conditions cropped up that looked like infectious diseases but in which no causative organism could be demonstrated. In typhoid or malaria it is a simple matter to show the "germs" in the patient's blood —bacilli in typhoid and protozoa in malaria. But nothing could be found in the blood of patients suffering from such a disease as poliomyelitis. And when the blood of such patients was passed through filters with extremely fine pores—small enough to hold back any known bacterium—the filtrate was still capable of causing the disease. Scientists realised that they were dealing with something so minute as to be invisible under the most powerful optical microscope. They called the "something" a filter-passing organism, though it is still not agreed that viruses *are* organisms, *i.e.*, living things.

UNIQUE

For one of the strangest things about viruses, a characteristic which makes them unique, is that when they are

not in a living cell—say a white blood cell or a nerve cell—but are just floating in the air or lying in a dustbin, they are to all appearances non-living. They do not respire, grow or do any of the other things that living creatures *ought* to do. Very often they occur in this state as crystals—hardly different from a crystal of salt or sugar! In this condition they may remain absolutely inert for years on end, just sitting there like boulders in the desert or pebbles on the beach. They take in no food or oxygen; they give out no waste products; they do not take up or liberate energy in any form. And yet, after years of such complete inactivity, they will immediately resume their disease-producing nature when placed in contact with living cells.

This is one of the properties that makes viruses so dangerous. If you get a case of anthrax, for example, you can be pretty sure of avoiding the disease simply by not using for a year or two the field in which the diseased animal lived; the anthrax bacillus in the soil dies for want of something to infect and feed on. But no such measure is effective with viruses. You could leave the infected region for a hundred years and still the virus particles would be deadly.

In the study of viruses two great sciences came together and joined forces with really admirable results. The biologists in the early days of virology were getting hardly anywhere. Ordinary tools of biological research were not suitable for dealing with viruses. Not until the physicists became interested in these "creatures" did virology make any real fundamental progress.

Still, the biologists had done a lot of necessary work by that time. They had pinned down a large number of plant and animal diseases as virus-produced, and they had got a very rough idea of what viruses were—proteins. The biological chemists had succeeded in isolating several viruses in the pure crystalline state, so that material was available when the physicist brought out his tool box. The two tools of most importance were the electron microscope and atomic particles.

THE ELECTRON MICROSCOPE

Until the electron microscope had been brought into use in virology, no one had

ever seen a virus individual. The crystals that had been laboriously obtained seemed to consist of sufficient material for several individuals. But, by the special techniques of metal-shadowing it soon became possible to see and photograph single individuals in their non-crystalline "living" condition. As was expected, the individuals were found to be extremely small—down to 1/100,000 of a millimetre.

Intensive examination at magnifications as high as 93,000 diameters showed that nearly all viruses (using that term now to mean living individuals) have one basic shape. This is a polyhedral "head" to which is attached a cylindrical "tail" that may be several times as long as the head or so short as to be almost invisible even at these high magnifications. These studies have now demonstrated the virus organism in nearly all those diseases which had earlier been assumed to be caused by viruses.

A majority of the observational work has been done—for convenience—on the class of viruses known as bacterial viruses or bacteriophages. These attack bacteria, and thus may be readily studied in bacterial cultures. There is no reason to suppose that the general lines of behaviour of the bacteriophage are any different from those of viruses which attack the nervous system or some other tissue.

Close examination of bacteriophages has revealed a most remarkable series of events. When a bacteriophage individual (which looks rather like a stubby bolt) comes near a bacterial cell, it moves towards the bacterium tail first and sticks to the bacterium's outer membrane by the tip of its tail. Then, a hole appears in the virus' tail tip and some of the contents of the bacterium pass up the tail towards the head. Finally, all the material in the head passes down the tail and into the bacterium, leaving a pale, empty "ghost" virus outside. All this—from first contact to empty ghost—occurs in a small fraction of a second.

This much has been seen with the electron microscope. Further work, along biochemical lines, has shown that as soon as the virus material enters the bacterium, the latter puts a stop to all the processes that normally go on within it and starts to manufacture little bits of material identical chemically

with the virus. These little bits are not detectable as such, but they must be there because after about twenty minutes from first contact the bacterium bursts and about 300 virus particles are liberated. This is reproduction with a vengeance!

Each of the 300 new virus particles is capable of infecting another bacterium and repeating the cycle. Thus in a very short time, a culture to which a few virus particles has been added will contain several million infective particles. Indeed, a bacterial suspension which has become cloudy due to the multiplication of the bacteria will, some minutes after virus has been added, become suddenly quite clear, every bacterial cell having been more or less simultaneously burst.

ATOMIC PARTICLES

Few curious scientific minds could resist thinking about these incredible findings. One man was so impressed that he switched his lines of work from those of pure physicist and came to work on viruses exclusively. His name is E. C. Pollard, and he has shown the world that a scientist who has spent many years in one branch of science can turn his hand with much advantage to another branch quite remote from the first one.

Pollard came into the game with one of the physicist's favourite toys—the cyclotron. This is that wonderful modern device that enables a scientist to manipulate a stream of charged atomic particles as easily as a jet of water from a hose. In the biophysics department at Yale University Pollard and his colleagues prepared suspensions of bacterial viruses and submitted them to different kinds of atomic bombardment, with the idea of finding out just where the important parts of the virus lay. This was a really brilliant idea, for there seemed hitherto no possible way of digging into these incredibly minute structures to see how they were constructed.

The principle of the bombardment work was that the parts of the virus would be influenced by the ionisation caused by the passage through them of atomic particles. As the amount of ionisation increased, so the functions of the various parts would be depressed or eliminated. First of all the viruses were bombarded with deuterons

in random fashion. In other words, the deuterons were simply showered at the virus all over its surface. This technique, which would cause the most ionisation in the parts of largest area, can be used to suggest what *functions* are served by the parts with the largest area, for those functions will be reduced or absent after bombardment.

A more controlled method of bombardment can suggest what functions are served by the parts with the largest volume; and a technique of controlled-depth bombardment can indicate how deep within the virus are the effective parts.

Many experiments along these lines were carried out over several years and with great patience. The conclusions drawn from these experiments may be summarised as follows: About a fifth of the virus particle is taken up by the part which causes infection, this being long, thin and coiled upon itself in the "head" of the particle. In descending order of size are the parts responsible for: killing the bacterium, interference with other viruses, attachment to bacteria. The virus particle has a thickish coat of protein surrounding a core of nucleic acid in the head, this core being the "works" so to speak. It appears that the tail is almost wholly composed of the protein coating material, except for a small region at the tip where there is a bit of material whose function is to dissolve a hole in the bacterial wall.

Thus, if we took a polyhedral sugared almond and stuck a sugar rod onto it, we should have a pretty close physical model of a virus particle, with the almond as the "works"—only in the virus the "works" consists of a long rod coiled many times upon itself.

That, in general terms, is all that is at present known about viruses. We still do not know whether we are justified in looking upon them as living things. One school believes that they represent a transition material from the non-living to the living, and suggests that virus-like organic compounds arose from inorganic matter in the dim past and gave rise by combination to the first truly living creatures. So now Darwin's ideas can be given a new kind of distortion. Instead of saying that men came from monkeys we can say that men came from crystals!

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FICTION

Some publishers just about now have rather clamped down on their science fiction output, but one or two try to keep the pot boiling with books that, we suppose, come out of an empty bottom drawer. To give Museum Press their due, they do not actually label Patrick Moore's THE FROZEN PLANET as science fiction; they call it a "book of the future," whatever that means. But there can be no doubt that it is intended to take its place among the ranks of science fiction books —though anything less like science fiction than this juvenilia we find difficulty in imagining.

This is a tale of space madness, several sorts of rays and tall, telepathic Martians. Can you bear to read further?

A spaceship sets out from Earth to try to discover the source of some mysterious rays that are coming in from space, causing madness. A lot of things happen before the source is tracked down. You've read it before, maybe, a hundred times.

Patrick Moore is adept at inventing words, if that kind of thing thrills you. He has: *Radz* detectors, *Vasnar* generators. *Sarre* rays, *Jarvis* motors, *Laetite*, *Heltite* and *Cyroxine* are some more of them.

The science is a little on the shaky side. Difficult to pin down, but shaky all the same, like: "It's not an animal—there's no face."

Still, the book rattles along in good old English Public School language and it is possible that some people would like it. You could get it from Museum Press at 26 Old Brompton Road, London, S.W.7, price 7s. 6d.

Now, it is quite possible

that there is something wrong with us. We admit there is room for discussion on that point. And here is something that antagonists may seize upon. We believe that a number of the so-called science fiction "classics" got called that because they happened to be pretty good stories published years ago when a lot of science fiction was mere gadgetry. It seems to us that whenever a story turned up way back with a bit of thought in it, it was dubbed a "classic." To us, some of these stories have no worth at all when viewed against what is modernly available.

We think that about TRIPLANETARY, by E. E. Smith, which has been put out by Boardman (14, Cockspur Street, London, S.W.1) at 9s. 6d. This first appeared as a serial story in 1934 and was promptly hailed then as remarkably out of the rut—which it no doubt was. But that is no reason for continuing to shower praise on this complicated, erratic, sensational, incomprehensible novel! Still, we are bound to tell you that many hundreds of people say they have been held spellbound by this tale, and it does seem that one is not a true science fiction fan unless one has read and possesses a copy. But then, we can't stand Dickens either!

NON-FICTION

Now we're on to Patrick Moore again. This time Frederick Muller are behind him with his SUNS, MYTHS AND MEN, at 12s. 6d. (from 110 Fleet Street, London, E.C.4). Here we have a hodge-podge of material and ideas. Mythology of many countries and civilisations mingles in quite uncertain fashion with the history of instruments and sciences. Flying saucers are mentioned in context with interplanetary travel, politics, meteors, artificial satellites, Northern lights and astrology. Most of the chapters end with a peculiar kind of poetry: "Perhaps the key, the Rosetta Stone of the cosmos, lies far out among the dim star-cities, where our Earth becomes a speck of dust in the loneliness of space."

The mythological and historical stuff is most interesting and would make a good book if expanded on its own.

Ah, how nice to find a book by Marie Neurath, especially when it is a Max Parrish Colour Book for Children. So lovely when the publisher

actually *tells* you it's for children and then you find that it interests adults! This one is called MACHINES WHICH SEEM TO THINK, and it costs only 6s. (from 55 Queen Anne Street, London, W.1). Herein are all the secrets of alarm clocks, electric toasters of the pop-up variety, burglar alarms, traffic lights, train stopping mechanisms, "George" the magic pilot and a whole lot of other things. The way these things work is shown with admirable clarity in pleasing colours on big pages with skilful layout. This book is a boon to parents whose children ask such questions as: "Why do these lights go green when those lights go red and then these go amber and those go . . ." A splendid little book.

THE HYDROGEN BOMB, by James Shepley and Clay Blair, Jnr., which has been put out by David McKay (225 Park Avenue, New York 17, N.Y., U.S.A.) at $3.00, tells the whole dreary undignified story behind the development of this terrible weapon. No doubt most of it is absolute truth, but one gets the feeling that a certain amount of embroidery has been added, and there can be no question about the amount of bias in the book.

It's the Oppenheimer affair all over again, in rather more detail, starting rather earlier and tracing the twisting course of intrigue, politics, conflicting loyalties and downright jockeying for position among the personalities who staged this elaborate Greek tragedy. From the first page, the authors are against Oppenheimer and anybody else who believes the hydrogen bomb should not have been developed. Sometimes, their dislike of Oppenheimer's attitude creeps over and spills among his colleagues, who were in fact quite innocent of any fellow-travelling. Things like that make one tend to suspect the authors' impartiality.

One thing that this book shows clearly is that no longer can science and scientists expect to be treated as something apart from the world. Science intermingles with politics and militarism mingles with both. The scientist has to take his place as a citizen with responsibilities. The only trouble is—when he became a scientist they never told him about this.

This book should be read by every science fiction fan, and anybody else who cares about the future that is right around the corner.

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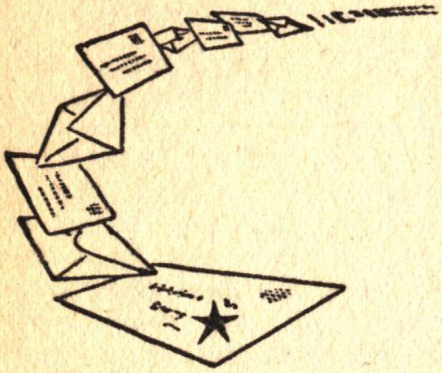

Projectiles

OVERSEAS SECTION

HIGH LEVEL

I'm one of the many—undoubtedly—readers of your magazine. I've gone through eleven of them, having begun from No. 41, and I'll continue reading any subsequent issues. As to the issues Nos. 1 to 28 will you please ask your subscribers to let me have them? I undertake to pay their value and postages. But will you inform your subscribers that I want *all* the issues to be in a very good position, if not in an excellent one. I'll be also very happy if I see this information printed in two issues so everyone will notice it. Also, they who want to sell the issues I want, may write to me directly instead of informing me through the "projectiles." Also why don't you print your magazine twice a month? I think it would be much better if we had our magazine every fortnight. Now, here is something about *Authentic!* It's true that your magazine improves month by month! I'm sure that in a very short time it will be the best "science fiction magazine" in England—if it's not now, as I think. Fine book, indeed! The covers are the best I've ever seen! The articles are very interesting as well as "fiction" and "non-fiction." Also the way of printing in two columns, is a very good one. I can read quicker and easier. It's true also that your magazine stands on a very high level, but you must try to improve and improve it. And, according to my opinion, it would be far better if you had at least a page for the meaningless words which I can't find in dictionaries, but I'm always coming up against them. If you do this, the "science fiction handbook" would be useless and so the subscribers would have what is needed only in *Authentic*. Also, will you add some more interior pictures, also some maps of the universe and kinds of fantastic or real rockets, all of them coloured "cover-like" style? You may write also some stories relating to wars between human beings as well as various kinds of monsters which can be found in other planets. Perhaps you may answer that you haven't the room in your magazine for all these things. Well, then, you

may add some more pages and also the magazine may be more expensive. Well, I think it wouldn't trouble the REAL friends of *Authentic*.

Now here's some doubts: Will you please answer me through the "Projectiles," solving them simultaneously? So, firstly, do you think also—for I do think—that the sun is ever going to lose its warmth? And if so, when? Secondly, in which planet do you think that there are human beings? And if there are, are they as we do? Thirdly, do you think that the flying saucers are coming from planets? And if so, from where? Now I've just read in a book that years ago lived a man named Li-Ching-Yun; he discovered a plant called "Hydrocotyle Asiatica Minor," and when he died he was 256 years old! Note that this man was a Chinese. Do you believe this? Now here's some news about Cyprus. We buy this magazine on the 23rd of each month and they ask me 2s. for this. Of course, as you understand, I don't like this, and when I'll send you the money, for the back numbers I need, I'll send you the money for the next twelve issues, instead of buying them here. I saw *Authentic* last year for the first time, and since then I convinced five of my friends, that *Authentic* is the ideal magazine for everyone. They are buying it regularly, as I do, we like it very much, and at the same time we improve our English also, for we're learning now the language. So, sir, if you find any mistakes, excuse my bad English, but I hope that in a very short time my English will be far satisfactory. Then I'll write you very often. My friends and I are going to have a meeting in this week, in order to discuss about you magazine. I'll write to you again, also I'm waiting your letter, as well as news about the Nos. 1 to 28!

Michael I. Kanellides,
Freedom Avenue, No. 3 Famagusta,
Cyprus.

Well, Michael, we'd love to do all the things you suggest, but that would bring the price up to about 2s. 6d. Still want the changes? Re your questions—we think that the sun will first increase *its heat and then lose it, but neither for millions of years yet. We think there are no humanoids on any solar system planet. We think there is not enough evidence either way about flying saucers. Sorry, but we know nothing about Li Ching Yun. Let's hear from you again, soon.*

VACILLATED

At first I felt that the stories in *Authentic* were disappointingly juvenile—very much so. Each time a sub became due, I vacillated between stopping and continuing the sub, each time deciding to continue. I did this because out of all the other SF mags (British) available, I thought yours the best. You *have* improved the mag beyond all comparison to the earlier issues.

Anthony Adey,
115 Marden Avenue, Mt. Eden,
Auckland, S.1.

Glad you've settled down to steady readership, Anthony. Keep on liking us.

TFSS

At long last I have managed to pluck up enough courage to write and congratulate you on your extremely satisfying magazine. As an ordinary reader I have been

buying *Authentic* since it first appeared here in Sydney, and, although giving up in disgust quite a few times, I suddenly found myself buying it regularly. I wonder when that would have been? Your covers have been most interesting, but—don't they seem to have been running on rather a long time? Unfortunately, I haven't any marvellous ideas to offer. I rather surprisingly discovered that the stories I remember as very good seem to have been written by Bryan Berry—I was quite sure I didn't particularly care for him. Amazing! Speaking as a member of the Executive Council of this club, I would like to inform you that we have the largest lending library in the Southern Hemisphere (over 2,000 books), and to club members there are *no*—repeat *no*—lending fees. We also have a film night once a month, chess competitions, theatre parties and barbecues and anything else the members are interested in doing. There has been some discussion in your letter column about women, to quote a quote, "poking their nose in." Curiously, this is one subject I have never heard mentioned in our club rooms. It takes both kinds to make the world go round, so I've been told, so why all the noise anyway? Women got no brains or sumpin'? I liked very much your series on "Logic is Fun." Keep them coming, cobber, and you'll be right, to use a colloquialism. Any penfriends are guaranteed answers.

Pat Smith,

The Futurian Society of Sydney,

Box 4440, G.P.O., Sydney.

Glad to hear from you Pat (Patrick? Patricia?). Your club sounds to be a right good thing. Wish we could come along with you!

CANADIAN NEWS

Nothing much has happened on the Canadian front since I last wrote to you. No new fanzines have appeared, save GASP! Oh, yes, almost forgot. Howard Lyons has produced one of his fanzines, Pre-Apa. This will become IBIDEM as soon as Howard is admitted into FAPA. Pre-Apa is very good. The artwork is positively the best I have ever seen in a fanzine, is better than a lot of stuff in the pro-zines, and is drawn by local artist, Pat Patterson.

Gerald A. Steward,

166 McRoberts Avenue, Toronto, Ontario, Canada.

Thanks for keeping us informed, Gerald. We really do appreciate a word from you fellows so far away. Do it again.

HEART CRY

I am, I think, a wild voice crying in the wilderness. Would some kind-hearted readers take pity on me and let me have some back copies of ASF?

Lorna G. de Villiers,

7 Lady Anne's Walk, Brooklyn, Capetown, S.A.

Poor Lorna! We hope some of our young bloods will spring to your aid, lass. Let us know if they do, will you?

ALMIGHTY

There are two items in the 51st issue that I would like to take exception to . . . the first being your review of FEMIZINE. Don't you think you're taking just a little too much liberty as a so-called critic? "No doubt these women

will one day stop trying to act a part and will be themselves. When they do we'll tell you where to get this fanzine and how much it costs." This is a direct quote from your review, and in all my years of active fan publishing, I have never seen such a statement from any reviewer. If you don't like the magazines, say so, but give your readers the chance to exercise their critical sense also. Don't set yourself up as an almighty know-it-all and if-I-don't-like-it no-one-else-should-critic. Frankly, I enjoyed the second issue of this fanzine and have written Sgt. Carr so; I intend to give it a good review in PEON. But I have never reviewed anything like you have. When I have panned a fanzine, I have always included the address so my reader can decide for himself.

Charles Lee Riddle,
108 Dunham Street, Norwich,
Connecticut, U.S.A.

Maybe you've got something there, Charles. Never struck us before. To make up for it, here's FEMIZINE'S *address: Frances Evans, School House, Teignmouth Street, Collyhurst, Manchester, 9.*

HOME SECTION

CRITIQUE

I think your mag has improved a great deal. I read a few issues about twelve months ago, and, frankly, they made no favourable impression then. I still think there's room for improvement. Ted Tubb's effort in the 50th issue was about the worst of his I've ever read. There was no plot to the story, just a theme (and a well-worn one at that) padded like hell. *The Blackdown Miracle*, while taking no prizes for literary worth, was at least *new*, even topical. Congratulations! SF does seem to be repeating itself *terribly*, and I do mean terribly, these days. I know there are no new plots, but Peter Hazell has proved that at least there are new ideas. In your editorial, you state you will be disappointed if readers don't write in saying your lead story is the finest you've ever had. I can't believe that this is a true statement—rather, a piece of editorial blurb. The central characters in this piece were figures of straw; not once did they "come alive" for me. No! I thought *The Envied* was the poorest tale in the issue. I like the articles. I don't mind being armchair educated in this way, but I'm glad to see you've dropped those silly little questionnaires. Isn't SF *escapist* after all? Just one more thing. I don't think you gave Einstein the man a good enough writeup, but this was probably due to lack of space. I'm sure it could not be because of lack of material. Like my husband remarked after reading his *Life as I see it*, "I like this bloke; he sees so many things in exactly the same way as I do!" In conclusion, I would *really* like to know what offended you in FEMIZINE 2. As for telling women to start being themselves, who knows *which* is a woman's true self?

Frances Evans, School House,
Teignmouth Street, Collyhurst,
Manchester, 9.

Ah, Frances, let's not go stirring it up again! You tell me that the next issue will be better. That's fine. That's what I wanted. And thanks for a very nice, interesting letter. Keep writing.

M.D.?

Perhaps you'll allow me to air an opinion or two on your magazine as a whole. *Authentic's* major fault is, I think, its lack of colour. It is devoid of personality, being neither a good scientific publication, nor an interesting fictional magazine. I do believe that in your half-hearted efforts to be different, you merely succeed in achieving the subnormal. Do you really think it advisable to run articles by the wrongly qualified people? A dangerous practice, I think—in fact I'm afraid the inaccuracy of quite a few of the statements by your tame scientific misfits is giving you a reputation for misinformation—whether or not some readers find them amusing is beside the point—since they are in intention perfectly sincere statements of alleged fact. Harking back to the subject of propriety, in the same issue criticising the entirely amateur FEMIZINE on the score of indecency, you saw fit to print that little item on the imbibition of liquid excretory products for their hallucinogen content. Considering that one does not usually meet with that sort of thing outside of medical journals, did you think that was really necessary? What was it the Master said about the relative sizes of foreign bodies lodged in the eye?

M.D., Birmingham, 12.

Doctor, we feel that an element of bias has crept in here. Still, we must have some redeeming features that keeps you with us. What can it be? If you find inaccuracies, why don't you point them out specifically.

CACTI

Please don't take to heart what follows. I am only trying to help you retain the title of your excellent magazine. I am fortunate to have two hobbies—succulent plants and science fiction. But in this month's *Authentic* is an article *Hallucinogens*, by George C. Duncan, and there are a couple of things that must be rectified. Firstly, the name Anhalonium has now changed to Sophophora. There are three species in this genus, Williamsii, Servenii and Tiegleri, which contain three alkaloids, Mescaline, Sophophorine, and Anhalonine. These are the drugs that cause the trouble. Worsely, it states: "The *leaves* of the cactus are dried and sliced." Now (holding my hair on with my spare hand) in the family Cactaceæ are three tribes: 1, *Pereskieæ* (leaves); 2, Opuntieæ (rudimentary leaves which fall off within a short time); 3, Cereeane (no leaves). As the genus Sophophora falls within the latter (actually subtribe IV Echinocactanæ) this makes the operation rather difficult. In fact, the mescal buttons or peyotle are the dried tops of this plant which have been severed from the enormous taproot and threaded on strings. The name mescal means a mushroom, and it was once thought by the natives to be a fungus.

I would like to praise the present cover paintings, especially this month's, and please continue to keep the printing *off* the picture.

A. S. Rowe, "Sequoia,"
40 Wood Street, Chatteris,
Cambridgeshire.

Our God! What can we do when we're up against fellows like this? Seriously, Mr. Rowe, we're glad you pick us up on these points; stops us getting swollen-headed.

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G.A.S., Ossett, Yorks

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Mrs. C.A.H., Coventry

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F.F., Hertford.

Dear Sirs,
I bought an APAL from you nearly eighteen months ago, and it did for me all that you said it would. I have not smoked for seventeen months, and have no desire at all to do so.
G.H., Marham, Norfolk

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