NEW WORLDS SCIENCE FICTION

No. 57

2/-

★ GREEN DESTINY by KENNETH BULMER ★

NEW WORLDS

PROFILES

Kenneth Bulmer

London

It would be wrong to say that this month's new serial "Green Destiny" has been a long time in the writing, although author Kenneth Bulmer does inform us that when he was 'of tender years' he conducted some complex experiments with surface ships in the bath and when his mother returned from a shopping expedition she was intrigued (to say the least) to find a gusher of water flowing merrily down the stairs into the garden and then eventually down to the sea.

Despite his early interest in most things nautical, the sea is not a particular friend of his—he is invariably seasick when crossing to Northern Ireland where he frequently visits the small Irish colony of science fiction adherents, "and," he states, "I was seasick on the treacherously deceptive waters of the Bay of Naples during the war, and suffered agonies going and returning from America in 1955. Whilst there, however, I had the opportunity of talking to leading exponents of aqualunging and had underwater explorers' first-hand accounts of life in the deeps.

"Previously," he continues, "there had been an undersea novel planned and laid aside because of my growing realisation that there was a tremendous amount of research to be done. The quicker the world wakes up to what will happen to the food situation the better. The hope of the world's stomach for the future is in the sea and its riches; unless we develop its resources and reap its bounty—we will starve.

"So that when, in discussing the serial, Editor John Carnell suggested that it should be an undersea story, I was delighted. The research—and there were many fathoms of it—has been a joy, and writing the story gave me a great deal of pleasure. I hope that some of that pleasure will also be enjoyed by the readers."

VOLUME 19

No. 57

MONTHLY

NEW WORLDS SCIENCE FICTION

MARCH 1957

CONTENTS

Editor : JOHN CARNELL

Cover : TERRY Interiors : LEWIS and EDDIE

Cover painting : from " The Tools of Orlas Boyn "

TWO SHILLINGS

Subscription Rates

Great Britain and the Commonwealth, 12 issues 26/- post free

United States of America, 12 issues $4.00 post free

Published on the last Friday of each month by

NOVA PUBLICATIONS LTD., 2 Arundel Street, Strand, London, W.C.2

Printed in England by The Rugby Advertiser Ltd., Albert Street, Rugby

Australia's "Olympicon"

Although attention is already beginning to be focused on the 1957 World Science Fiction Convention to be held in London this coming September, to which many European and American delegates will be travelling, there is little chance of any representatives coming especially from Australia to be present at this first " World " conference to be held outside the North American continent. Undoubtedly, however, our Commonwealth cousins will be represented by Australians resident in England at the moment, and they can be assured of a very warm welcome on behalf of all their compatriots back home.

Australia is the youngest of the English-speaking nations in which science fiction has taken rapid growth, especially since 1946, and more and more readers " down under " are being attracted to the imported British magazines which have made up the bulk of their reading material, as well as the new publications which have been launched under their own publishing houses. Science fiction now appears in many Australian newspapers and general periodicals as well as receiving its share of attention on Australian radio stations.

It is not surprising, therefore, that their own Fifth Australian Convention, held in Melbourne on December 8th and 9th last, at the close of the Olympic Games, and organised by the Melbourne Science Fiction Group, was a resounding success. Author Frank Bryning, who was Guest of Honour for the occasion has sent a long and detailed report of the two-day proceedings and says that it was " moderately well attended throughout."

Writers who supported Frank and the Convention with their presence were Eric North, better known as " Bernard Cronin "; Norma Hemming, Sydney authoress and playwright who has also appeared in *New Worlds* ; Mr. Wyn Whiteford, a local Melbourne author currently selling to Australian publications ; and Harvey Blanks, author of the " Captain Miracle " radio serial being broadcast from a number of Australian stations.

In general the " Olympicon " followed the pattern of major Conventions held in America and Britain, with business sessions during the daytime and entertainment during the evenings. Most of the Australian States were represented by delegates at the Richmond Town Hall, where the main sessions were held, and where a very fine exhibition of science fictional works had been arranged by Mervyn Binns. This included considerable

historical material, displays of past and present magazines, stills and posters of science fiction films, a display of sixty-one pieces of original art work including covers and interiors from *New Worlds* and *Science Fantasy*, plus an exhibit of Australian and Overseas fan magazines.

Frank Bryning, long a devotee of the genre, reported on the development of his own Queensland science fiction group, and was followed by reports from delegates representing other States in the country. At that formal session it was decided that Australia's next major Convention will be held in Melbourne during Easter, 1958.

The most outstanding item of the entire Convention proceedings was undoubtedly Norma Hemmings' three-act play "Balance Of Power" which was performed before an appreciative and enthusiastic audience on the evening of the first day. Interplanetary in nature, the play was a magnificent example of co-operation within the Melbourne Group both before the footlights and behind the scenes, some ingenious gadgetry being designed and operated to simulate the control room of a spaceship. Axiomatic of the increasing interest now being taken by women in the lighter side of science fiction, Miss Hemming designed and made all the costumes and played one of the leading roles.

Highlights of the second day's programme was an Authors' Panel at which the Guest of Honour spoke on " Some Things We Should Expect Of Science Fiction "; Wyn Whiteford spoke on " Various Types of Science Fiction Stories "; and radio script writer Harvey Blanks humourously described the trials and tribulations of writing science fiction for the radio.

The Convention finally concluded with the showing of two feature films—*Five*, starring William Phillips and Susan Douglas, and a delightful fantasy " The Five Thousand Fingers of Dr. T." For those who could attend there was the usual Convention-after-the-Convention party (now a time-honoured custom wherever Conventions are held) given by one of the Melbourne members at his home.

While we could wish that Australia as a country was territorially much nearer to ourselves so that closer co-operation between our individual groups could be more effective, it is gratifying to know that half a world away similar groups and personalities are working hard to increase the overall prestige of science fiction.

John Carnell


BRIAN LEWIS.

With the successful advent of skin-diving in the shallower waters of Earth's continental shelves a whole new vista of the possible world beneath our oceans has been opened to our eyes. Farming, mining, fish-control for food production— a whole new world waiting for Man to develop. In such a setting does Kenneth Bulmer introduce the Under Ocean Patrol to fight the exploitation of fish and Man by unscrupulous business combines.

GREEN DESTINY

By Kenneth Bulmer

Illustrated by LEWIS

Prologue

The water was deep and black and cold. Caught in the grip of crushing pressure, the molecules scarcely moved above the pelagic ooze, its profundity embalming reason, its bulk covering a vasty gloom, drowning a mysterious world of eternal night.

The water thrust at the ooze of the ocean floor and thrust against the bleak wall of the escarpment, rising in barren, fissured, soaring columns of rock. Mudfalls draped rocky clefts like curtains and spilled out in undulating fans.

There was no colour here—only the everlasting blackness.

Fissured and indented, the slopes of the scarp rose upwards in an unbroken, uninterrupted ascent, the longest continuous slopes in the world. Raking towards the surface at an ever steepening incline from the ocean floor, twenty thousand feet of lightless, plantless, virgin rock and mud supported and

buttressed the continental shelf. Blackness unrelieved—and yet, lights. Lights everywhere. Luminous motes of colour gliding and darting, poised, halting for a startled fragment of time, and then fleeing and disappearing, swooping and glowing in fierce, brainless hunger-satisfied triumph.

But now another source of light probed the depths. The bruised tag end of the spectrum imperceptibly created an encompassing blueness and as the mass of water above thinned, the blueness grew, lightening through the spectrum, pearling into a translucent twilight where the myriad lights from below flickered and faded with a spectral glimmer.

The bluffs of the continental shelf puffed out their bulging chests into the waters, shouldering from blackness into opaline radiance ; but they themselves were drowned beneath a skin of water—a film of moisture negligible by comparison with the unplumbed depths below—but a film with merciless fingers of constricting pressure.

Under that pressure, strung along the very edge of the shelf, a chain of softly glowing pearls gleamed with a steady radiance. Each dome sent out its welcome beams of light, visible reminders, in that cruel undersea world, of comfort and warmth and rest. In the watery invisible atmosphere, the domes glowed like a diadem of stars.

There was movement around the domes. Shining forms, sparkling and glittering scales in the light, streamlined bodies, waving, glinting fins—fish. Fish by the billion. Schools of fish, colleges of fish, whole universities, twisting and turning—and yet—moving with a strangely ordered purpose. With all their swarming to and fro, their playful scurryings, their gobbling for food, their sudden inexplicable surges, they never strayed beyond the limits of the shelf, never sought to explore the blue depths beneath. And above them, as the water paled ever greener and mellower and began subtly to move in answer to other forces than those slow agonised creepings of drowned currents, there were more fish, civilisations of fish both large and small, all responding in some mysterious way to an over-riding controlling force.

Set forward on a jutting cliff that stood out like some sentinel finger from the undersea shelf, there hovered over rock and ooze only darkness where surely there should be another link of light ringing the edge of the scarp. Fragmentary shadows flickered in the water. Lonely lights curved sharply, veered away. Into the twilight dimension seeped a murky cloud. A roiling cloud

that was out of keeping with the crystalline liquid atmosphere. Sounds shattered the silence of the depths. Mutterings and flutings, the involuntary whistles of fish and the sharp hard pinging of sonic waves. Shining bubbles rose and burst. The dome was silent and dead. Shapes clashed and struggled around it. Giant jaws opened wide.

Puny figures struggled—figures un-fishlike in this world of pitiless ferocity and unknowing cruelty—figures with four spindly inefficient appendages in place of powerful streamlined fins and tail.

Tiny figures that had no place in this undersea world of darkness and cold and death.

I

The spaceport was crowded. The monorail was crowded. The streets bulged. Flyovers creaked under pressing humanity. It took him ten minutes before he could dial a taxi. The hotel lobby was crowded. The lift was crowded.

There were just too many damned people.

That was the trouble with Earth, of course. Nothing new in the thought. But coming back after ten years in space it sort of hit him in the eye.

With just one person sitting waiting demurely by the window, the way he was feeling even his hotel room was crowded.

She wasn't the type to be overlooked. She attracted a crowd, she crowded his attentions and she more than crowded the shocking-pink orlon tube sweater. She stood up gracefully, with the fluid motion that, under the full effects of one whole gravity, he was still finding difficult, and turned to face him, smiling.

" Commander Jeremy Dodge ?" Her voice was pleasant and smooth, and yet, in his frame of mind, still linked embarrassingly with the strident hum of the city.

" That's right." He waited for her to go on.

She made a little gesture with her left hand, the square cut nails gleaming. " I'm Elise Tarrant. Mr. Grosvenor's private secretary." She said it as though it explained everything.

Dodge said : " This Grosvenor. When do I meet him ?" He put his bag on the end of the bed. " He drags me off furlough—and believe me, Miss Tarrant, anyone who can persuade

me to give up a mountaineering holiday on the Moon is a grade A persuader—and cajoles me down to Earth. I'm in rather a hurry. If you'd— "

" That is why I am here, Commander."

She was coolly amused, Dodge saw, and that made him feel uncomfortably small-boyish, which made him annoyed. It looked as though this self-possessed young lady had the power to shatter his composure. He drew his eyebrows down.

" Mr. Grosvenor asked me particularly to apologise for your holiday, but he feels that what he has to tell you will more than compensate." She paused, and then, with an air of gravity that caught Dodge's full attention, said : " It's such a big thing, really big, I mean, that your whole life will be altered."

Dodge grunted. " They told me that when we went on the first Jovian expedition."

She made a little moué of disgust. " So many billions that even the U.N. Treasury hasn't told the full story yet, and for half a dozen little balls of eternally frozen mud."

" You don't think much of the Space Force ?"

" I think you're all heroes, certainly. But I think you get too much applause and too much money and too many medals."

" Well, it's nice to know."

She caught her upper lip between her teeth. Dodge noticed how red the lips, how white the teeth. That pleased him, in an obscure way. The varo-coloured make-up flaunted by women he had seen on his brief journey from the spaceport to the hotel had sickened rather than attracted him. The pace of the modern world was so hectic that even ten tiny years could witness changes of astounding magnitude. She released the lip with a gesture of decision.

" I'm sorry, Commander. Perhaps I shouldn't have said that." She looked at him. " You'll have a better idea of how I feel when you've talked to Mr. Grosvenor and seen round—" She stopped speaking with such force that, to Dodge, for a moment it was like falling over a precipice of sound. Then she went on, but that quiet voice was uneven now, struggling to hold down some strong emotion. " If you are ready, Commander we can start now."

" Start ?" Dodge said, really wondering about that strange change of subject, that sharp cutting off of what the girl had been saying. " Start—where to ?"

" To see Mr. Grosvenor. He is staying at the Blue Deep Hotel. It'll take us about an hour."

" An hour !" Dodge looked surprised. " Where is this Hotel, then, on the other side of the planet ?"

Then, thinking of the traffic and the crowds, he said sourly : " Or is it in the next block ?"

She smiled. It was a sunrise in the spartan hotel room. Dodge began to see different angles to this enigmatic girl. He picked up his bag philosophically, prepared to play out this wild-goose chase until he could hear the straight talk from the lips of the persuasive Grosvenor himself.

The telephone rang.

Dodge answered. " Yes, this is Commander Dodge speaking. Who is—"

On the line there was a definite click as the receiver was replaced. Whoever had rung had merely confirmed that he was in his room, and had then rung off. Odd.

Elise Tarrant was staring at him uncertainly. He laughed shortly, and said : " Wrong number, I expect," and realised with a distinct sense of shock that he didn't think anything of the sort. And, what was odder still, he knew with a curious certainty that the girl didn't think so, either, and that she knew that he knew she felt that. Elise crinkled up her nose, refusing to comment further, and Dodge picked up his bag and they left the room together. The electronic lock hummed cheerfully to itself as the door closed.

Dodge was happy to escape into the hissing maw of the Underground, at least there the atmosphere was air-conditioned and breathable. They hadn't got round to air-conditioning the streets yet, between the web-work of flyovers and vertical window-pierced cliffs the air there just wasn't breathable ; not by the standards of a spaceman who lived off canned air and algae-produced oxygen all his life.

The idea of air-conditioning algae tanks suspended from every cross-over attracted him fleetingly ; it was the sort of whacky idea the Dodges could be relied upon to dream up in any idle moment. The coast-hugging network of undersea farms would do well out of it, producing algae on an even greater scale than they now did for food-bases and the Space Force's uses. His Uncle Arthur had gone in for that racket, the last he'd heard of him, and, oddly, it was about Uncle Arthur that this Grosvenor fellow wanted to talk. It would be just like the old villain to have made his pile ploughing up the sea-bottom and herding

fish and milking—well, they hadn't yet arranged to milk fishes, against nature, or something.

The train snaked almost silently beneath the city, carrying them out beyond the park-line suburbs and the ring of factory-areas. Dodge leaned forward on the cushioned seat.

" Can you tell me anything of what this is all about ?" he said pleasantly. " Grosvenor mentioned my Uncle Arthur and intimated that he was connected someway. Are you familiar with this—well—" he paused helplessly, and then said, with a half-humorous chuckle "—with this case ?"

She nodded. " I am. Fully. But Mr. Grosvenor expressly wishes to talk to you personally."

" Uh—it wouldn't be any good if I—no, I thought not." Dodge sat back. He crossed one knee over the other, and flicked his immaculate Space Navy Blacks into a leading-edge crease. " Grosvenor said Uncle Arthur had left me something and I told him that all I expected from Uncle Arthur was a bill for the drinks at the funeral. I told him I wasn't coming back to Earth just to collect a few thousand or a decaying house." He looked puzzled. " Grosvenor said it wasn't a few thousand, and that the house was already decayed. What did he mean, Miss Tarrant ?"

" I'm sorry. I am not at liberty to tell you." She sounded genuinely sorry, too, Dodge realised. The train ran out of the tunnel, nosing upwards to the terminus. People were rising, gathering their belongings, moving for the doors.

Just as Elise rose to her feet, she leaned forward, swaying slightly with the roll of the train, and Dodge, braced against his seat, felt the soft warmth of her body press for a heady moment against him. Then he heard her saying something, something that came in vagrant wafts of sound through the thunder of blood in his temples.

" There is a great deal of injustice in the world. I mean real, brutal, callous, criminal injustice. You'll see. You might be able to do something about it, too." Then the train had stopped and the doors had opened and people were streaming for the escalators and all Dodge could think about was the way Elise had crushed into him. Space makes a man sensitive to these things.

He stumbled along after her, pulling the black space bag free from the crowds jamming the escalator, and began to mull over her words. Injustice ? Well, he supposed there was, although

he'd not experienced any, except, perhaps, when they'd passed him over the first t me for Lieutenant-Commander. But he had the idea that this strong-willed personality, thrusting ahead now, the shocking-pink sweater the target for many wolfish eyes, wouldn't consider that as an example of injustice for the micro-fraction of a second.

The terminus was a wide white sweep of concrete, flat roofed and with serpentine supporting pillars. Through the frame thus formed Dodge saw such a brilliance of sunshine that he blinked his eyes automatically. The air was crisp and biting, with a tang of ozone and bracing nippiness. They went with the crowd out and down the shallow steps and there before him was the sea.

It was the first time in his life that he had seen the sea like this, standing on a low cliff-top, looking out across the white-flecked green and blue and hearing the gentle sussuration of shingled shores and feeling the good clean breeze blowing through the dusty pores of his body. Sea birds wheeled and screamed, their cries drifting down the air to him, their bodies minuetting through intricate, formal dances, suspended on curved brave wings against the sky.

"Surprised?" Elise said gravely.

"Yes." He decided to be honest. "Yes, I am. I'd no idea —it's beautiful."

"It holds its secrets well," she said cryptically.

Above them the sky was the faintest, translucent shade of blue, so brilliant that the mere air-glow hurt their eyes. The shining bowl seemed to surge away from them and, recurving, swooped in towards their feet so that the heavy green grass and rich earth of the cliff seemed suspended in an exquisite, precious and infinite globe of diluted light.

With a feeling almost of trespass, he began to follow Elise down the paved pathway to the foot of the cliffs. He'd seen the seas of Earth as few had seen them, gleaming mottled on the vast bulk of the planet, rushing up as his frail rocket fell headlong towards them. That had been a grand and wonderful experience, giving him for a magic moment a sense of superiority, of dispassionate calm removed from the troubles of the world. But this—this was on a different plane altogether. This sense of wonder that pervaded him now was his birthright, something that his ancestors had taken for thousands of years, taken for granted, taken and moulded as their temperaments directed. And he, a child of Earth, was seeing it for the first time.

He began to appreciate an inkling of Elise's reaction to the Space Force. And then he shrugged off the whole mood and looked about him as he might have done stepping from the landing ramp of his ship on any strange and alien planet.

The beach was an almost perfect arc of white sand. The sea laved it caressingly, without rancour, as though the titanic power of Neptune had been bridled and harnessed. Staring out to sea, he could just make out the long low dam which made that a fact and no longer a fancy. This whole area of water before him was fenced off from the turbulence of the ocean. Across its bosom scudded yachts, trim shapes with pouter-pigeon spinnakers and stiff scraps of coloured bunting at their trucks. Catamarans ploughed railway lines of foam, and laughing people swallow-tailed in the wake of speed-boats, miraculously supported on fragile skis that threw back the light of the sun in golden slivers of speed.

Swimmers were everywhere. Their tanned arms flashed above the waves. Dodge saw with dumbfounded amazement a tot of no more than a year—certainly the little fellow could never yet have walked—calmly butterflying along and leaving a neat, precise wake of regularly spaced whirlpools. He shook his head and followed Elise onto the beach.

On the beach were six wooden shacks, painted in pastel colours, and with bright beach-balls and water-skis and aqua-floats and pedallers scattered casually around them.

Dodge looked. His mouth tightened up.

" Miss Tarrant. I came here to see Mr. Grosvenor. I do not see any hotel."

She gestured casually out towards the horizon. Dodge, impelled by something he could not explain, looked. Now that he stared more closely, he could see bulges at intervals along the top of the mammoth sea wall. And there were other dark island specks here and there in the waters. But there was nothing he could recognise as a hotel.

" Well ?" he said, trying not to put too much acidity into his voice. He had to remember he wasn't ordering a space cruiser's crew about. " I fail to see a hotel."

" It's out there, Commander," she said abstractedly. She had her head back and was squinting her eyes against the glare. She made an interesting profile ; Dodge was more concerned with finalising this business and getting back to the Moon.

He said : " You drag me out here, promise me I'm going to meet Mr. Mystery-man Grosvenor at the Blue Deep hotel, and what hap—" He stopped. His mouth remained open foolishly. He swallowed.

Elise brought her head down, and swivelled to regard him with a calm, humorous, almost pitying look of compassion.

" Blue Deep," Dodge said.

His voice was a squeak. He swallowed again and pointed out to sea.

" Blue Deep ! Under the sea ! Oh, no. I'm not getting wet for you or twenty Grosvenors."

She laughed a little shamefacedly.

" It's not blue, as you can see. And it's not at all deep." She dimpled. " I thought you knew. Really, I did. You see," she added in a rush, " Mr. Grosvenor spends all his time under, that is, all his time near here, and he's such a busy man that it saves a lot of time if he sees people at the Blue Deep. Neither of you have to come all the way then, you see," she finished practically. Dodge couldn't get the hang of that at all.

He said threateningly : " You're not getting me to go down in a dratted submarine. The things are dangerous."

" Didn't you rocket out to Jupiter ? "

" Yes. But that's different. We've organised—"

" Well, don't you think that the Navy have organised too ?"

Dodge knew quite well that he was putting on an act, and that any fears he had were quite unconnected with the mere fact of going under the sea. There was something very much adrift with this whole orbit, he sensed that, but quite naturally he didn't know what. If he did, well—he might go along with it, just for the company of Miss Elise Tarrant.

Yes—he might, at that.

He persevered with the chit-chat. " When you're in a space-ship you've got the stars for company. When you're in a sub-marine you've only yourself—and, believe me, that's bad."

She wasn't listening. She had her hands shading her eyes, and was peering up into the sky again. Dodge looked up.

A bloated cigar of shining silver nosed over the edge of the cliff and sailed out over the beach, gradually dropping towards the sand. A rope snaked from a cabin slung underneath forward and aft, and the whirling propellors either side slowed, became visible and stopped. The airship touched down.

Laughing holiday-makers from the sands mixed with the ground crew tailing on the landing ropes. Everything seemed to be run on casual, democratic, no-fuss-no-rush lines. No-one seemed to give orders, and yet the ship was streamlined into the wind, a ramp slid down, and passengers tumbled off. Children were gambolling around, jumping up and down excitedly as their parents hauled a rope or handled the gangplank.

" That's an airship ?" Dodge said in a strangled voice. " I thought they were deader than the galleys."

" Come on." Elise began to walk, sliding and plunging in the sand, towards the airship. " I thought we might have missed it. We're just in time."

Dodge didn't argue. He was past that. If this sprite of a girl wanted him to stand on his head and recite The Walrus and the Carpenter, he probably would—just for the laughs, though, just for the laughs, he told himself sternly.

II

The airship blossomed over his head as they came up to the ramp. A man with a straw Panama hat, a blue naval uniform jacket over bathing trunks and sandals smiled at them as they went aboard. They stood by a slanting window, watching the other people from the train coming aboard or making for the bar. No-one asked them for a ticket, or for money. Presently the ship lifted off, waved away by the happy bathers below, and slanted out towards the sea.

Dodge had noticed the words, twelve feet high—so he'd just been able to read them—on the flanks of the dirigible.

BLUE DEEP HOTEL. BEST WATER IN SEVEN SEAS.

" How come the hotel has an airship ?" he asked Elise.

They were sitting in the lounge by a window, the sea a glittering carpet of green and violet and blue below.

" We could have taken a helicopter or a flying-carpet, or we could have gone by launch ; but the Blimp happened to be scheduled next. And I happen to like riding her. I like the sensation."

" Dirigible, not Blimp," Dodge said automatically. " All right. Why not a submarine ? "

" You won't have to get your ears wet, Commander. The hotel extends into the air, rising from the sea-bed, and you can go right to the floor in air. It's most convenient."

" I happen to like breathing air," Dodge said. He meant it. Most of his friends who'd tried to breathe space had not come home to tell him about it. " How long do we take ?"

" Fifteen minutes. It's not long."

" I still can't get over the idea of an underwater hotel running an airship for passengers. All mixed up."

Elise favoured him with one of her rare smiles.

" One word," she said sweetly. " Helium."

Dodge understood then ; of course it was a neat idea.

" We use helium in space, and divers and such use it—to stop getting drunk, isn't it—and this ship makes a grand emergency reservoir."

" Not all emergency, either. They replenish from the ballonets when necessary and the ship tanks up when she returns to the shore. Oh, and it's good publicity, too." She crinkled her nose, a gesture that Dodge was beginning to recognise. " How come you know about getting drunk ?"

He tried to look injured. Playing the gay insouciant under these conditions of sunshine and fresh experiences and a full sense of living—and a beautiful girl—was not at all difficult. " Drunk ? Me ? I'm strictly T.T., Miss, I'll have you know."

She didn't smile, though. She said : " I meant about your knowing that divers get drunk—if they don't use helium."

Dodge happened to be following the creamy wake of a double-decked catamaran below, and the craft swept out of sight below the window directly above Elise's hand, lying on the arm of her chair. Dodge saw that hand clenched as she spoke, the knuckles go tallow-white and shiny.

" Why," he said without betraying his growing unease in the odd little facets of this affair. " We had a job out on the Hartshorn Reef on Venus one time. The old *Arakan* went in with all jets blasting. Did a bit of salvage, adapting space gear. We knew about the effects of nitrogen—narcosis and pressure-illness—used to call it the ' bends '—but that's all."

" So you do know something of the undersea world," she said thoughtfully. " For a moment I thought—oh, well, never mind. We're here."

Dodge leaned forward over the table. " You thought I might be putting up a front, didn't you, Miss Tarrant? You thought I might not be Commander Jeremy Dodge, didn't you ? You thought I might be someone else ?"

Her reaction was shocking. Her face drained of colour, suddenly leaving noticeable rings of purple beneath her eyes,

and lines of strain he had not seen there before. Her little gasp was not stopped as the tip of her tongue flicked into sight between her teeth. She was badly frightened.

Then she had recovered. She brushed a quick hand through her dark hair, tossing her head back, rising to her feet and swaying with the gentle motions of the airship. She was completely in control of herself again. But Dodge wasn't fooled. His suspicions crystallised. This girl was living under the weight of oppressive fear, it had glared from her eyes in that moment of unguardedness. And whatever she was frightened of was bad medicine for Jeremy Dodge, of that he was completely certain. It behoved him to be watchful, then.

The airship had been fastened to a mooring mast and now lay snuggled against it, head to wind, like an infant at a feeding tube. As they descended with the other passengers, this time in a smooth hydraulic lift, Dodge felt amazed at the casual tempo of life. Things got done, fast and efficiently, but there was no fuss, no shouting, no hallooing of orders and questions and counter-suggestions. It didn't seem to matter who did what, everything was performed good-naturedly and with a ready smile. Jokes flew thick and fast. If this was life on Earth—outside the cities—it seemed the best place possible for anyone to be. Dodge realised that it was the lack of strain : in space every moment might bring abrupt, awful danger ; here on the quiet Earth people could go about their daily tasks without that ever-present sense of impending doom. You could be happy on Earth. It was quite a revelation. And against that bright background crouched this girl's secret fear.

On the landing platform he turned towards the horizon, one hand still on the guard rail, wondering just how near the retaining wall of the artificial lake the hotel lay. He looked across the long smooth swell of the open sea, empty and rolling under the sky. Clouds massed above like serrated leaves, and a few birds skimmed low over the rollers. He whirled, fast. The wall lay a few hundred yards towards the shore, cutting off much of the lake from view ; the white cliffs looked impossibly remote, like a streaming tail of cloud above the water.

" I told you it was called the Blue Deep," Elise said, realising Dodge's reactions. " It's in the open sea—although on this coast that's as safe as behind the chicken wire."

Dodge let that pass. They went down into the hotel depths. The building was a ring, two hundred yards across, built upon

the solid rock of the sea floor, its four upper stories and the landing platform above the waves, the rest of its bulk wrapped in two hundred and fifty feet of water. The walls were transparent and cunning lighting fixtures had been positioned outside, so that a deep green luminescence filled the descending spiral of the stairway surrounding the inner lobbies and rooms and restaurants.

People swarmed everywhere. And yet there was not that insufferable crush that Dodge had experienced with irritation in the city. Men and women wearing only the briefest of trunks and bra's and transparent capes moved leisurely up and down. Many carried swimming flippers and face masks. Tiny children, stark naked, ran and squealed and queued up in fighting bundles for preference at the airlocks up and down the hotel's walls. Husky, broad-shouldered, good-looking youths with 'Lifeguard' stencilled all over them tried to instil some discipline into the kids, and others marshalled parties equipped with slingshots and spring guns and compressed-air harpoons for underwater hunting expeditions. Studious looking high-brows wandered about with a profusion of camera equipment. Giggling girls who were clearly—and so-rightly—prime exponents of the back-to-nature movement, glided gracefully past the windows, waving to friends within the building. A bubbling, squirming, contorting class of neophytes were going through their paces under the eyes of watchful instructors. Elise sniffed scornfully at them.

"Even though this is a make-believe deep-sea hotel," she said disdainfully. "At least it is more adventurous than those within the chicken wire. And that's where those dry-necks belong."

From one airlock protruded the stern of a submarine, and excited passengers were taking their places within.

"Joy-rides round the reef," said Elise.

They passed into a wide hall where comfortable foam plastic chairs were ranged before a single vast sheet of clear plastic. Throbbing music permeated the warm air. Outside, in the clear water, a whole chorus-line of girls were going through their routine, their liquid bodies flowing through the water as though part of it. They were wearing gleaming, reflecting tinsel costumes, and the patterns they created were almost hypnotic. Dodge had to tear his eyes away and follow Elise through the rear of the auditorium.

This wasn't just a new life—this was a whole new world.

At the reception desk Elise spoke to the girl. The receptionist had red hair, and its coiffed waves were interlaced with sea-shells and pearls and star-fish. Everywhere Dodge looked the motif was one of marine life. Etched into plastic wall panels, moulded around lamp fittings, painted in sweeping frescoes on the ceilings, patterned in the rugs, all the mysterious life of the sea was illuminated and invigorated by a master hand.

" Oh, dear," Elise said, turning to Dodge. " I'm sorry, Commander. Mr. Grosvenor has gone on a hunt. He wasn't really expecting you until later, you know."

" I don't know," Dodge felt annoyed. " Well, how long will he be ?"

She didn't flush, but her eyebrows arched fractionally. As she spoke, Dodge felt a heel.

" He has gone with an inner-wall party to watch a new consignment of dentex—that's a small carnivorous fish—and they may be out some time. There's a chance that they will go on to hunt in one of the preserves."

Dodge nodded grumpily and spotted a passing waiter. He attracted the man's attention, trying not to be disconcerted by his waiter's uniform of bathing trunks and black bow-tie.

" Bring me a whisky, please," he said.

Elise spoke quickly.

" Ah—er . . . I wouldn't, Commander."

Dodge was dumbfounded.

" What goes on here, Miss Tarrant ? Are you some sort of wet-nurse or something ? Look—I'm not an habitual drunk. I can drink a single whisky now and again without ill effects, you know." He couldn't resist adding : " Your honour will still be safe."

As soon as he'd said it he wished he hadn't.

Thankfully enough, she let it ride. " Look, Commander, there's a small underwater chalet out where Mr. Grosvenor is hunting. I know you're in a hurry,"—Dodge grunted at this—" so I suggest we both fly out there now. We can catch an aquaplane easily."

For a moment Dodge considered.

" All right. You've brought me this far on this will o' the wisp chase. I might as well go the full distance. What is this aquaplane ?"

She dimpled. " You'll see. If you'll register—you'll have to stay the night now—we can go straight to the dressing rooms and airlock. I have a room here."

After he had been shown into his room where he found a standard of comfort he had not expected and had purchased a pair of swimming trunks, he changed and went quickly past the other residents to the dressing rooms, conscious of his space-pallor. His white skin stood out like a lump of chalk in a poppy field.

The dressing room was an oblong chamber with one side studded with the inner valves of airlocks. The opposite wall contained a long counter, behind which stood attendants and racks of flippers, face masks, underwater hunting weapons, cameras, lines, all the impedimenta that a person might want to take into the sea. A helpful attendant was quickly persuaded by Dodge that a Commander in the Space Force knew all about living under alien conditions and that he had no need of special tuition.

Dodge hired a pair of plastic flippers and put them on gingerly, trying to appear nonchalant. He was just reaching forward to take a face mask when a cool voice came from the region of his right ear.

" All ready to go, Commander ? Good."

He turned.

He had had enough shocks this day to last him quite a time. But he'd experienced nothing to compare with this. What he saw convinced him that he'd been wasting his time in space—he should have been with Elise Tarrant a very long while ago. A very long while indeed. A panicky thought crossed his mind. Suppose she were married ?

She was smiling at him, and he saw at once that she was just a little uneasy at the impression she was creating.

Her bathing costume was a brilliant, livid scarlet. It consisted of a narrow string supporting a wedge-shaped flame of scarlet and two small cups of scarlet plastic. It hid just enough to rank as clothes—and did what clothes always can do to a woman. As for the rest of Miss Tarrant—well, Dodge passed a dry tongue across his lips, and became slowly aware that she was, at last, blushing.

He took his eyes—that felt as though they were on stalks—away and mumbled something about being sorry, and then realised sinkingly that that made it worse.

He searched frantically for something to say.

Picking up the face mask he said, inanely : " Where are the air cylinders ? "

Elise seized the change of conversation—Dodge's silent admiration had been all the more vocal for being dumb—and busily pulled forward her own mask. She pointed to the cheek-pieces.

"These are the cylinders. We use spun glass-fibre and plastic—much stronger than steel for holding compressed gases—and the pressure is a lot of atmospheres. They don't use liquid oxy up here. The pressure demand regulator here"—she touched the round machined box at the nape of the mask—"is a quadruple effect regulator. Brings the pressure of air in the flasks down through four stages until it reaches the pressure of the surrounding water. Then you breathe it."

She had talked out the by-play, and now Dodge felt more composed. It was a hell of a jolt to turn round to see a girl like that at his elbow. He wished he knew more about her. Some of the things she said would bear closer inspection. How could this hotel be 'up' here?

He looked at the cheekpieces, saw that they were small cylinders with re-inforced corrugated tubes running from either side to a mouthpiece with a rubber grip for the teeth.

The attendant, a husky negro with a grin that split his face in two and a torso that could have held Atlas and the world, had watched the meeting of Elise and Dodge and now he coughed discreetly. Dodge remembered that he was supposed to be an underwater expert. He tried to be clever.

"In the Space Force we have the intake and mask in one," he said loftily. "None of this gripping onto it with your teeth, frightened to spit it out."

Elise jumped in with both flippers.

"The Space Force work under nil pressure," she said, twisting the mask in her hand. "Carbon di-oxide exhaled through the nose goes viscous under pressure and hangs around poisoning you. So we make the places where it can collect as small as possible. That's why."

Dodge felt as small as he knew he deserved to feel.

He turned away from the counter and began to walk towards the airlock.

"Your speaker, sir," the attendant said in his melodious Southern voice.

Dodge picked up the little transceiver and then went off stumbling in the flippers and allowed Elise to show him how it fitted on the mask.

A microphone and an amplifier connected with a diaphragm in direct contact with the water. It was probably good for a few feet communication underwater, he reckoned. He was beginning to see that there was more to this sub-aqua stuff than he had realised. He had previously thought that you simply transferred proved space techniques underwater ; but he realised that there was more to it than that. It was the pressure. They'd found out a bit about that on the Hartshorn Reef, on Venus.

When his gear was stowed all about him—they didn't take harpoon guns, much to Dodge's secret disappointment—he went with Elise over to the airlocks. They waited their turn and as they were stepping over the wet gratings, Elise suddenly took his arm and spoke softly into his ear.

" Oh, Commander, I should have warned you. The water may be a trifle cold to you. We're going inside the chicken wire and they warm it up there with a net-work of heaters along the bottom. If you just let yourself go and strike out with your feet we'll soon be in the warm."

Then the valve had closed at their backs and the water began to rise around their feet. The six other people in the lock, young couples, were already skylarking around. Warm the water ! That must be quite an engineering proposition, Dodge summed up, trying to distract his mind from the air he was sucking into his mouth and the slight pressure of the water rising inexorably around his thighs and stomach and chest.

III

It seemed an age before the outer lock opened and they were through. Immediately outside was a caged platform and here attendants, masked and flippered like themselves, attached weights and adjusted their bouyancy. Dodge just hung in the water.

It was cold.

Damned cold.

Goose-pimples started up at once, telling Dodge that his first layer of insulation had gone down. He thrashed with his legs and shot forward. Elise's voice, faintly amused, came bubblingly but clearly through the water.

" You're going the wrong way, Commander. Over here."

He tried to turn, and felt the mask biting into his face. She must have spotted this.

" Breathe out from your nose. That'll equalise the pressure and stop the mask cutting your face off."

He did so and the pressure vanished. He waggled his flippers. Sensations attacked him from all sides simultaneously. The feeling of floating, of being buoyed up, was quite familiar to a man who had lived out weeks of free-fall. But he immediately ran into one profound difference.

He tried to flip himself round to face towards Elise as he would have done in space. Everything happened except what he wanted. It felt as though he were trying to force his way through a planet-sized treacle tart with a child's pusher for a weapon. He thrashed wildly with his arms, afraid to move his feet for fear of shooting off at some fresh impossible tangent.

For one horrible moment he had the feeling that he was buried alive.

" Hold steady." Elise's voice through the water was full of laughter, of impish hilarity. That acted like a tonic on Dodge. " Just let yourself hang, keep still. Then we'll try some exercises."

He refused to be needled. Obediently he stopped moving. He knew enough about this business of pressure to swallow to clear his Eustachian tubes, at least to open them so that air pressure could meet and balance the outside water pressure on his ear drums. So far he hadn't spoken a word, now he articulated through the throat mike : " How deep are we ?"

Elise had a depth meter strapped to her wrist. She said, without looking at it : " Forty feet. Nothing at all, except for pressure variations. Now, if you'll just lay like a log I'll tow you across to an aquaplane—there's one just ready to go."

Fuming, embarrassed by his own suddenly demonstrated incompetence, and yet annoyingly and humiliatingly pleased by the sybaritic feeling of the girl towing him in smooth undulating surges through the water, Dodge relaxed and was towed. He had forgotten the last time he had felt so utterly helpless before purely physical conditions : it was all a trick, of course, a matter of adjustment. His almost symbiotic relationship with spatial conditions, leading to an automatic reaction, had betrayed him here in this underwater realm. He'd learn.

The aquaplane was a hydrodynamic wing surface, with rudder and diving planes controlled by a joystick. The pilot reclined in the centre, at the controls, and from the trailing edges of the wing depended at regular intervals lengths of rope with ring-

handles at their ends. Already two or three couples had hung on, looking like trapeze artists warming up for the show. Elise deftly slid sideways, freeing Dodge and all in the same motion thrusting a pair of rings into his hands. He grasped them, watching her take the adjacent pair and turn a laughing face towards him.

Laughing. Yes—she blew a big bubble of air at him and then replaced her mouthpiece. Big joke. Great fun. Dodge turned his facemask the other way, sourly, and watched as the pilot fiddled with his controls. As Elise and he had hooked on the pilot glanced to his rear, then looked forward again. The cable which looped from the aquaplane's bow and disappeared up-

wards into colour-shot haze shivered its sinuous length, straightened, and then as the aquaplane gathered momentum, relaxed again into its graceful curve. The whole travelling circus moved through the water, towed, Dodge surmised, by a motor boat on the surface above their heads.

To his left the water was a glowing sheet of colour from the levels of the hotel windows and the outside lights. Its transparency surprised him. Somehow, underwater, he had expected to see and be continually reminded of the liquid element : he found that it was like space in that he saw through it and the objects within his field of vision attracted his attention far more than the substance—or lack of it—in which they were embedded. Seeing was particularly good. His spirits began to rise as he felt the forward motion of his body, balancing the unease he felt, occasioned not least by the irrational feeling of pressure on his body. He was under a pressure of three atmospheres down here, but, for all the feeling of difference it made, it could have been thirty-three.

He suddenly felt bad at snubbing Elise, and turned to her. He was just about to phrase a carefully non-commital sort of remark when he felt the forward movement of his body pulling him up on the aquaplane. The lights of the hotel had vanished ; before him reared a huge rectangle of yellow light, outlining smaller oval of light. The aquaplane slowed before the oval, which Dodge saw indistinctly was the entrance to a tunnel.

Elise said sharply : " Double up and decelerate, Commander. We're going through the lock."

How it was done, Dodge didn't know. One moment he was freezing in the open sea, the next, he was blindly following the aquaplane, with its tow-rope sliding through a slit in the roof, and emerging into a brightly-lit area where the water was of a heavenly warmth. He shivered in involuntary reaction.

The pilot glanced behind again, then a number of small plane-shaped rectangles of plastic drifted back on lines from the wing. Elise shook her head. The next pair of rings supported a young Siamese girl. She caught the horizontal bar of the plane, released the rings, and then swept away behind the aquaplane. Dodge lay over on his side to watch.

The girl handled the little plane superbly. She twisted the bar, the plane dipped and she went swooping down until all that Dodge could see was the descending rope. Then she rose into vision again, hair a flying cloud as she braked, and twisted her triangular face towards her companion. He took off in a

second plane ; the girl tried a complicated manoeuvre to avoid him, and the next second they were both spinning away beyond the limits of vision.

" It's grand fun, Commander. But you're in a hurry, you say ? "

" That's right. Is it much further ? "

" Not far. This water is all plankton free, they like it like that for clarity ; but they have to provide food for the fish at regular intervals, otherwise the fish just wouldn't stay around." She pointed with one hand. " You'll see the wire soon. Preserves. Various kinds, hunting, photography, breeding. All very scientific."

At odd moments they passed spheres of light, suspended in the water by their own balanced buoyancy, It was as light as day beneath the surface. It was all very pleasant, very refreshing, very exciting, really ; and yet Dodge couldn't throw off that feeling of depression, of savage refusal to accept things at their face value, a mood, almost, of masochism.

Just sour grapes, he supposed, because Elise was so perfectly at home underwater, and had no hesitation about helping him like a lame dog—which was very annoying, when he thought about it. Out in space, with the clear clean sweep of the stars for company, he could feel at home. Down here, paddling around like a shrimp in a pool he felt shut off, trapped ; with all his freedom of movement and a knowledge of the vastness of the oceans he had a strong sensation of claustrophobia. Get this interview over with—and he'd have his bath walled up and use the shower from now on.

Elise waved to the pilot and said to Dodge : " Let go, Commander. We're here. Keep your body still and just waggle your feet up and down. I'll guide you."

Manfully, Dodge didn't reply but did as he was directed. Rather to his own surprise, he found himself moving after Elise, a little uncertainly, true, and with many a wobble and convulsion to regain his original direction ; but he was proceeding—and learning.

Elise caught the wire—close meshed and triple reinforced—hung on and waited for him. She was looking all about her, expectantly, Dodge thought. He could see no sign of an opening and was just about to enquire sarcastically whether she thought he could emulate an eel as well as a fish, when three dark shadows slipped towards him. For a single instant panic threatened to

whelm him, then he recovered shakily as he saw Elise's vivid scarlet bathing costume in brilliant colour from a drifting globe of yellowish white light. The shadows resolved into men with face masks, flippers and harpoon guns.

They swam, Dodge saw, with prodigious ease, swinging high over Elise and swooping down towards her. She lifted her hand. The men by some subtle shift of direction angled directly towards him. Fractionally, as they surged towards him like three torpedoes homing on an unwanted asteroid, he caught sight of something he did not understand and could not believe.

Then the first man had grasped Dodge's arms, the second his legs, and the third raced in towards his side.

Dodge shouted—got a mouthful of water and felt his mouthpiece thrust clumsily back into position. He felt the prick in his arm quite distinctly. Hypodermic.

Even then some wayward thought tried to work out the pressure-resistant qualities a hypo would need for underwater use. Even as the answer that it was easy came, he felt the first surges of blackness taking over. He tried to move his legs, his arms, but they were weighted with all the lead on the Moon. Sparks swam across his eyes. He felt a grip tighten across his chest.

Just before the final blackness and deep oblivion came down like night on Mercury, he saw that what he had not believed was true.

These three men had facemasks—but they didn't have any air-tanks that he could see. There were no mouthpieces in their mouths—and these mouths were wide open to the sea water.

Dodge, firmly convinced that he was having a nightmare, blacked out.

IV

Within and about, the water-flow moved with the gentle, profound, deliberate movements of ages of ritual and centuries o. centuries of habit that not even Man with his brash and energetic intrusion could alter or modify. Within the living rock, air spaces, bubbles of an alien element, warred continually with the thrusting pressure of the sea. Men and women, no less fishlike than the creatures that swam and drifted far above them, persued their own familiar ways of life and created a haven of the upper world here on the sea bed six hundred feet down

and two hundred miles from the shore line, where at last the patient land could shake the sea from its hoary shoulders and rise into the sunlight.

Simon Hardy exhaled gustily and dropped onto the bench from which he could study the TV screen on the far wall.

" Another one ! " he said.

" We can't be sure yet." Pierre Ferenc gestured towards the screen. Its grey, lifeless face stared back. " They may have had a breakdown."

Hardy grunted. He had a fine-carved face similar to the teak figurehead of some old clipper ship, with close-cropped white hair that covered his skull like a swimming cap. His eyes were a pale, washed-out violet, and he had a habit of clutching his jaw, that was as square and arrogant as a spiked helmet, with the blunt fingers of his right hand. His left arm ended at the elbow. That had been a shark, before Hardy had triggered the second harpoon. He didn't bother too much about it now, and kept a couple of prosthetic limbs somewhere in a cupboard.

" Sure they have had a breakdown—the same damned breakdown that the other three subs had." He looked at Ferenc critically. The youngster was a good aide, valuing the power of optimism and yet with a strong practical streak behind the classic profile and wavy hair. He must be about due to be made up to Captain by this time. Hardy himself thought he must be making Admiral of the Fleet soon ; but no-one bothered overmuch about rank down here. The job was what mattered. And the job wasn't going right. This was the fourth deep-sea sub that had failed to return, and for all the good the direct communications-link he had ordered set-up on his personal ultra-sonic TV screen was doing, he might as well be out hunting sea-urchins.

A voice spurted from the speaker grille.

" D.S. Nine calling U.O.P. Trident. Conditions emergency. Will try to connect outside pickup. Conditions emergency. Looks as though we've had it."

The screen wavered with a pale green luminescence. Both Hardy and Ferenc leaned forward, breathing lightly, not speaking. The picture was badly defined. Blobs of colour gyrated, lights flickered, throwing a momentary impression of the sleek side of the deepsea sub into shining relief. Then a single light source grew, steadied, showed the forward fins of the ship with the exterior harpoon gun cradled low on the deck in the foreground.

Out beyond the prow, indistinct, infuriating in their vagueness, small forms hovered and swooped, closing up until they were almost distinguishable, and then retreating with the impression of flauntingly insolent fins.

" Not men," Ferenc said.

The voice from the speaker chattered. " Something's knocking on the hull !" The sheer terror in the voice turned Hardy's face to granite. " Outside. Trying to get in. And we're at Mermaids twelve !" The clear sound of a gulp across those miles of icy water. " I'll try to shift record to other pickups."

The screen went crazy, then dissolved back to its featureless grey. Time ticked away.

" No go, I'm afraid. Whoever's outside doesn't want to pose for photographs." The voice had regained some semblance of humanity. The sub-officer down there had faced his own moment of truth and had come through, with the knowledge that he and his crew were doomed, and that, if they were going to die anyway, they might as well send as much information back as they could. They knew their friends would be diving down into these depths again, following them.

" Mermaids fourteen, now. We're not under control of the fins. Propulsors stopped a while ago. I don't think I'm crazy ; and yet I hesitatingly say that we are being taken somewhere by someone—or something—outside." The voice was calm, steady. The screen flicked back to the first view, and now Hardy saw the sudden boiling away of slender fins as the light over the camera came on. In the distance, a matter of ten feet at that depth and with that light source, he thought he caught a glimpse of a gleaming silver shape that reminded him of something he should have recognised at once and yet which remained tantalizingly beyond the grip of his memory.

" Mermaids fifteen and a half. The old Nine will take twenty without too much trouble—the snag is that the bottom is twenty-five or thereabouts here. I think we'll crush flatter than a steam-rollered toothpaste-tube." There was nothing now in the young voice from the speaker to tell what he was thinking. Hardy could guess. Twenty-five thousand feet down in the sea. Waiting, with the steady thrum of the recording camera over his shoulder, storing up the last moments of the sub and her men, he wished he could sweat naturally.

What happened was not pretty.

The Juliana Trench—a monstrous gash in the sea bed, five hundred miles long, a score wide and 25,000 feet deep at its

greatest depth—lay across the southerly routed trade lines like a great dike. Surface liners ploughed the waves far above it, scarcely conscious of its existence except for the sudden sharp lines recorded on their echo sounders. Submarines had penetrated to its lip, and nosed over, sliding silently above the black abyss yawning below. And now, Deep Sub Nine had ventured too far down, had been—caught ?—by some malignant force dwelling deep in the cold black fastnesses of that huge crevice in the Earth's crust. Simon Hardy felt like an old man, crushed in spirit as Nine was crushed in metal and plastic. The last moments were spent, after the outside pickup finally blew in under pressure, with a hastily rigged camera relaying dial and meter information back to Under Ocean Patrol Base Trident.

Nine took twenty-three thousand five hundred feet before the screen went blank.

" Why do we do it ?" Ferenc was saying, his face twitching. He had lost comrades on Nine. " Why do we have to go down into the sea ? We were made for sun and air and the breezes of Earth—"

" One phrase, Pierre," Hardy said harshly. " Self respect. Man must know that he is master on his own planet. Whilst those depths are there, we will descend into them. Just as we must climb mountains on the roof of the world, just because they are there. Man cannot afford to be afraid of the dark corners of his planet."

" We've had equipment to reach those depths safely for years," Ferenc burst out. " There's something down there — some horrible force that sucks men down—"

" All right !" Hardy re-channeled the ultra-sonic TV set personally. " I'm going to speak to Henderson. There'll be hell to play when UN hears about this."

The ultra-sonic waves from the undersea fortress were translated into radio waves by the automatic slave transmitter bobbing in the swell on the surface, beamed to UN Headquarters. Ocean Secretary Henderson answered at once in response to the call from the Head of Under Ocean Patrol. Henderson was small and compact, a lithe dynamo of a man who possessed a computer for a brain and statistical index for a heart. What he wanted, he persuaded other people to get for him. Now, his thin intense face creased by lines of worry, he exploded into excited comment when Hardy had finished speaking.

" The Board won't like this, Simon. There's too much money being thrown away. Lord knows I go along with your schemes "

" Not just my schemes, Henderson. Everyone needs what we plan, even though they don't realise it. If Earth is to feed herself, we must keep the Bishop Wilkins' projects going, but we must also conquer the whole ocean. We know that is essential."

Henderson nibbled his lip. " I know you're right, Simon. But sometimes I wonder. Toxter of the Space Board was in to see me earlier. He means to fight. They want a whole heap of appropriations—fantastic sums—for the assault on Saturn. UN can't keep too many balls in the air at the same time. Someone's going to get the thin edge of the wedge."

" You mean they'll cut down our deep-sea appropriations ?"

" We must continue with the Patrol's main function, to guard and protect the interests of the Wilkins farms. Yes, I think the deep-sea projects may have to be shelved. I don't know, Simon, I just don't know." Henderson forced a smile. " If you could lay before the board some successes—this is the fourth sub to disappear, isn't it ?"

Hardy was emphatic. " Tell the Board that we have reason to believe that there is—something—down in the sea. Something that can drag a submarine down to death. That should shake them out of their complacency."

" But, Simon, don't you see. Whatever is down there—and we've no real proof, remember—must have been down there a long while. It hasn't bothered us before. Only when we probe down there ourselves—"

" You mean we should let sleeping dogs lie ?"

" Nothing fresh on the scattering layers ?" Henderson replied obliquely.

" No," Hardy said shortly. " Subs report nothing when they reach that depth. But as soon as they leave we get the same echos—as though they'd sunk onto a patch of oil and thrust it away from all about them." There was urgency in his voice. " I'm convinced that the two phenomena are related."

Ferenc moved uneasily in the background, then stilled at Hardy's impatient wave. Far away on the surface Henderson warmed to his main theme.

" Now look, Simon. I can't promise anything about deep-sea just now. I think it would be wiser if you did not send any more deep-sea subs out." He licked his lips. " I've had disturbing reports from plenty of continental shelves—the North Sea is pretty quiet—their production is well above schedule.

It's not so good on the Eastern American Banks, and some of the Pacific coasts are losing men by droves, in broad daylight. This kidnapping has got to stop ! It's your job to ensure that the corporations run an equitable and fair underwater industry. This press-ganging is getting up the noses of the whole UN, Simon, and Under Ocean is beginning to stink all over the world."

Hardy did not answer.

Henderson went on : " There's even been a rumour circulating that a movement is afoot to close down some of the Wilkins colonies. They say the money would be better spent putting man on Saturn's satellites."

" What would they eat when they got there ?" Hardy asked contemptuously. " Look, Henderson—I don't have to convince you that is a crass policy—and I shouldn't have to take it from you like a big stick. I'm doing all I can with the resources at my disposal. The force is far too small. Some of the corporations have miles of continental shelf honeycombed with air and water spaces. As soon as a patrol puts its nose in all the slave labour is hustled away. The trim, well-fed volunteers work around until the patrol leaves, then the press-ganged poor devils are hauled out and set to work."

" Can't you insinuate—" Henderson began.

Hardy flicked a finger and Ferenc slid a film pack into the projector.

" Watch this, Henderson," Hardy said grimly.

Henderson's screen took on the blue-green lustre of the sea below the sixty feet mark, where the reds and oranges of the spectrum had been washed out. A vertical rock face covered the right hand side of the screen and from this wall trailed the familiar profusion of underwater fronds, a fantastic welter of struggling life, many-branched gorgonians—looking blue and dark when Henderson knew they were really a flaming crimson —sea urchins prickling at the passage of swarms of erratic fish, their limpid bodies cavorting in every direction as they fled at the approach of a monster of the deep.

He was a man—rather, he had been a man.

His facemask covered his features ; but the signs of privation, of incredible suffering were written large on the rest of his body. His flippers moved sluggishly, painfully ; he crept through the water like a half-crushed snail. He was wearing a vest that, at the depth, appeared green and emblazoned across the chest was an interlinked monogram formed from the letters A.D.W.C.

One leg twisted unnaturally and refused to propel him evenly through the water ; he sagged drunkenly from side to side, and he had trouble adjusting his buoyancy.

" He got into the Artful Dodger's little lot," Hardy said flatly. " This is what they did, purely as normal routine, before he escaped. He was with them a month. That's all."

From both sides of the screen members of the U.O.P. swept forward, their tall conical helmets up and the slats opened. They took the injured man in their arms, flew swiftly with him past the camera which panned to follow them into the airlock concealed under outgrowths of coral on the reef wall.

No air bubbled from the lock as the valves shut. Men under the sea who needed air didn't waste it. The camera stayed on the valve for an instant, and then the screen went grey ; but Henderson could still see the broken harpoon standing up like some obscene cocktail-stick from the broad back of the man who had limped home from the sea.

Ferenc's hands were trembling as he shut off the projector. A quiet settled on the room deep beneath the sea, and a stillness, for a moment, held the room far away in UN Headquarters. Then Henderson spoke, and his voice was rough with passion.

" I'd no idea. Artful Dodger, I saw that. All right." His nostrils dilated. " We'll prosecute. Right away."

" What on ?" Hardy said wearily. " No evidence. He couldn't bring any back, and he died without telling me much I didn't know." He gestured tiredly. " All the Wilkins Corporations are the same ; you must know that. Undersea Oils aren't o bad ; they need skilled men."

" Any poor drunken fool can look after fish !" Ferenc put in viciously. Neither of the others looked at him.

" I thought for a while last week we might have trouble with those new manganese mines they've begun on Tsori Guyot in the middle of the Pacific. A native village was cleaned out, all the strong young men were taken." Hardy's lined face betrayed little feeling. " We traced it to a Halaokan Wilkins Corporation. We managed to return most of them ; some died. It wasn't nine thousand feet down, like the manganese Guyot ; but pressure fluctuation got them, the Halaokan people were using primitive equipment—sheer murder."

" If this stuff gets out to the Press," Henderson said, his face stiff, " they'll crucify us ! I knew things were bad ; but not like this. Toxter would bellow like a bull and spray pieces of U.O.P. all the way to Saturn."

" We need more appropriations, not less," Hardy said. "What do those space boys expect to do out on Saturn ? Play hoops with the rings ?"

Henderson gestured vaguely. " Expansion of Man's frontiers" The way he said it sounded like bubbling lava.

" We've fought a long struggle for undersea development, you and I," Hardy remarked, almost noncommitally. " I think we've one last throw before us. We daren't let any news of the way the Wilkins Corporations are acting leak out until the time is ripe ; then we reveal enough to secure a revulsion of feeling."

" That's what we want to avoid, isn't it ?" Henderson knew enough about his old friend to scent a plot.

" Yes. And this way we'll get what we want. We'll scare the pants off Toxter and all the bemedalled space boys."

" I don't quite see—"

Hardy explained. Not fully—his own ideas were still nebulous—but enough so that, when he had finished talking, Henderson was more than half won over. The Ocean Secretary and Simon Hardy had bullied and cajoled UN into granting charters to private corporations so that rapid development of continental shelves should not be held up. Whatever evils were inherent in such a scheme, they had felt at the time, would be more than compensated for by the immediate increase in land availability and an upswing in the production of food and raw materials, of oil and minerals. And they had been right. Huge combines had been formed to exploit the sea bed. Literally hundreds of small private companies had sprung up, taking out a patent on a few hundred acres of continental shelf, working them under the aegis of UN with limited resources and often with primitive undersea equipment.

But the bold gamble had paid off.

Now the landside received over half its food from sources under the sea. The Bishop Wilkins undersea farms spread and grew, fish pens and corrals and canneries bloomed between the edge of the shelf and the coast. The wealth of the seas lay open to humanity.

But the small companies were gradually taken over by the large; the same old story of land development followed. Frontier battles against an alien element took place almost side by side—and depth below depth—the board-room struggles for shares and control, debentures and stock interests. Whilst men with aqualungs dived deep to tend the harvest of the seas other men,

men with different visions and different values, sat and schemed, and, inevitably, abuses began, slowly at first, and then, as the difficulty of effective control became monstrously apparent, sprang bloated into a world-wide scandal.

A scandal that lay only in the balance sheets of the corporations and the inhuman controls of aqualunging foremen.

A man can be broken very easily when he is alone under the sea.

And now, with the menfish, the problem had grown abruptly acute. Now, the corporations knew they stood without the law, and were glad because of it. They could afford to go to any lengths, now, to obtain recruits. And U.O.P. sculled around, attempting the impossible task of policing eight million square miles, all the vast area of new lands of the continental plateaux under the seas.

"All right, Simon," Henderson said at last. "All right. We'll play it your way for now." His smile was warm and friendly. "But God help you if it goes wrong—because no-one else will."

Man moved into the sea. Man retraced the trail of ancestors that had flopped, near drowning in air, onto the warm mud inter-tidal flats, escaping from the ferocious enemies of the deep, crawling on paddle fins out into a new world and a heritage that would not stop at the stars.

But before Man could take up the challenge of those winking spots of light that he had never seen in the seas, he must return to the womb he had spurned, and gather his resources there, garner the harvests of his ancestral home, feed and grow strong for the long silent journeys between the stars.

V

He never felt it coming. Two things coincided and gave him a moment of sheer hell. The roller must have been a big one, deep and smooth and shining green with foam-flecked flanks. And his air-tubes and valves stuck fractionally, as they seemed so often to do, and this time stayed stuck.

Scotomata flashed and flared before his eyes. His head felt as though someone was trying to wrench it off.

Then Harp thumped his tubes, freeing the valve, the roller took its sudden pressure imbalance away, and Dodge struggled

with the suicidal desire to vomit. Being sick underwater was a one way trip to hell.

Not, he thought dully, that he wasn't in hell right now. Why not just spit out the mouthpiece ? Some men did. Some men refused any more to fly among the algae, through the rich weeds, the mutated plants, refused to herd fish for another moment. It would be so easy—just push with his tongue and spit . . . Harp banged him cheerfully on the shoulder and waggled his fingers, thumb up. Dodge nodded back, and his old purpose surged back, ten-fold reinforced by his momentary lapse. He was getting out of this watery grave, was flying back to the surface, was crawling out and tearing off his flippers and mask and was going gunning for Elise Tarrant . . .

Harp motioned towards the shoal, their silvery bodies alive with twisting reflections from thinly scattered lamps. The control tower up ahead was emitting its pinging warning signal ; soon now the polarity of the current would be switched and all the fish, like one, would turn tail and begin blindly swimming back the way they had come, greedily gobbling up the carefully distributed food from the men's packs.

And when Harp and he had reached the further end of the enormous netted area, they would not obey the warning ping from the tower, and retrace their course, feeding the fish ; no —they would slide through the hole they had cut with such infinite patience and strike out for the shore and freedom.

It hadn't been easy making all the plans. It hadn't been easy obtaining the wire cutters. But Harp and he had managed it, and they both had the same flame of anger burning in them, the raging fury to return and revenge themselves on the authors of their mutual misery.

He could still recall the misery of his awakening, his first shocked awareness of his surroundings. His last thought had been of nightmare, of seeing men swimming with open mouths deep beneath the sea. And all of Elise Tarrant's veiled hints and oblique remarks had boiled to a mushroom explosion in his mind. Since that moment of awakening in the locker rooms of this Wilkins Corporation, he had fanned that flame of anger, had known that he was near insane with a rending, futile rage against the girl who had arranged for his kidnapping.

She must have organised it. There was no other explanation. Even the scarlet flame of her bathing costume was a part of the plot ; Dodge remembered vividly the white light that had blazed

on them, throwing colours into their true place in the spectrum. The scarlet scraps of dress and the white flame of the body within —what an utter fool he had been ! Reacting like the standard female-starved dope from the spaceways, avidly following the luring flower of a woman's body straight into the jaws of hell. He'd reacted as planned, all right. And so here he was, prisoned beneath the sea.

Remembering that, Dodge's muscles lumped along his jaw. They'd come for him and very soon he'd seen that any resistance was worse than futile. They had given him a face mask and flippers and driven him out into the water, pressuring him just as the water pressured him ; and he had nothing—then—to resist as the air within his body resisted. He had waited. Biding his time. They had set him to clearing up slimy old beds of algae, clearing them with a short handled rake. His stomach revolted at the job. A short course, in an air-space beneath a dome, convinced him that the work out in the sea was preferable to a rubber truncheon.

That was their simplest remedy for recalcitrants. The old Nazi *totschlager*—only they didn't quite beat to death. They caused pain. Pain that made work out on the razor-sharp coral reefs, among the poison-ivy of the sea and the merciless fire-coral, almost a pleasure. That was their simplest remedy. They had others.

Dodge had seen a man dragged fainting from a sandless tank after a deliberately goaded venomous weever had finished with him.

There were other pleasures indulged in by the agile-minded guardians of the human fish-fodder working around the reefs and out on the sea beds sweeping away to the edge of the blue. They had all the fauna of the sea to play with ; and ingenuity bred of boredom and absolute power.

Dodge understood now Elise's remark that there was inhuman cruelty abroad in the world, and savoured again and again the innuendo that had been there when she had promised that he would see. And he had been reeling like a woman-crazed adolescent on his first date. It made him sick. But, under the sea, you can't afford to be sick. You can't breath and vomit at the same time—with only your mouth to fulfill both functions.

Of course, he'd tried to escape. After they had dragged him back from his first escapade he had tried again in exactly the same way, and this time they had sport before they sent him back to the algae beds. After the third attempt they moved

him down to the deeper levels and set him to tending fish, caged in wire mesh, under constant surveillance from guard towers.

And still he had tried. He'd nearly lost his life that time. They had some way of controlling fishes that was at once repellant and fascinating. He had been ringed by six-foot sharks—quite small ones and harmless, although he hadn't known that at the time—who circled him watchfully, like fishy man-dogs, until they came for him.

It was then that he'd met Harp.

He'd been jettisoned into the sea once more, his wounds laved by the salt-water womb of mankind, and had gone flapping off to his stone niche in an air-bubble, feeling that he would never escape from this torment. The only thing that lived in him was his hatred for Elise. It was only that hatred which prevented his madness from taking another turn, a turn from which he would never have recovered.

Another sadly-limping slave of the underseas flew past him, then curved painfully back, fell in and so they flew together back to the rest bubble. Inside, breathing air through nose as well as mouth and stretching cramped limbs Dodge saw that his companion was short and broad. That was the first thing he noticed about him, his squareness. Then he saw the square jaw, square nose and strangely light-coloured eyes that had a habit of widening suddenly as though in perpetual surprise at the world. There were cruel wounds on his back, like those on Dodge's, and he had no need to ask any questions.

" How'd you get off ?"

Dodge laughed shortly, an ugly bark of sound.

" I waited until they were bringing in a fresh lot of sardines and flew out against the stream. Sharks," he finished succinctly. To the underseas slave, all fish were sardines that were not carnivores.

The man nodded. " I'm Harp. Call me that because I used to be handy with a harpoon."

" Used to be ?"

" Haven't handled one in what must be years. At least, it seems like it." Dodge knew what he meant. The stars—to see the stars, just once again . . .

They'd fallen to talking, and Dodge found that Harp too shared a deep and bitter resentment against his kidnappers. He whistled when Dodge mentioned that he'd been taken off Blue Deep Hotel.

" They're getting too insolent." He shifted his naked thighs on the stone. " They'll be flying up the Thames soon and snatching Members from the Terrace."

" I think mine was a special case."

" Oh ? "

" What did you do before—? " Dodge changed the subject.

Harp smiled crookedly. " Underwater flying instructor. Ironic, isn't it ? Out on a little deep-sea instruction, and up pops a sub, snatches me, class and all." His voice was bitter. " I should have known better. Me, Harp, being press-ganged right into my own element. Sucker."

" I'd no idea this went on— "

" Not many people do, there lies the tragedy and the strength of the system. Oh, it's a system all right. The Wilkins Corps have all the answers taped. You recall we were stuffed into a sub-tow balloon a while back and stifled in there for six hours. That was the U.O.P."

" U.O.P.? "

" Under Ocean Patrol. They're the supervising body for all underwater development. Had a pal with them once. Pierre thought he'd go his way, I'd go mine. I don't suppose he's rotting in an undersea tomb like this now."

" You mean an inspection was on ? "

" Right. If we could make a break from that balloon the next time round . . ."

That had been the beginning of a friendship that had outlasted many moments of mutual danger. But they'd played it carefully, steal a scrap of steel here, snatch a loose screw there. Hoard air-tanks that were ostensibly empty, and return them in order when they were changed, so that gradually they built up a store of fully-charged tanks. Try to get two of the new facepieces. That had been impossible.

" Refraction index of water is different from that of air," Harp said once. " That's why you can't see much under. Apart from the salt. And ordinary glass goggles and facemasks give you an impression that everything is a third larger than it really is. That's the refraction index being changed in the plane of glass between water and air. These new masks have vision corrected facepieces." But they hadn't secured any, and had perforce to make do with the old.

Harp warned Dodge that not all the sudden activity which flurried the farm was caused by raids of the U.O.P. They were working around a group of clumsy underwater barges, bringing

fresh soil from the land to create further areas of controlled cultivation and extend man's aquiculture deeper into the sea, when they were swept up and thrust into the stuffiness of a sub-tow balloon.

Inside, the rumours went round.

" Big raid by another Bishop Wilkins mob. Saw tiger sharks attacking—manta rays and riders—harpoons—anto-personnel depth charges—cut to pieces— "

Dodge looked at Harp.

" We don't escape from this lot only to be swept up by another just as bad. Sweat it out. This internecine warfare goes on all the time. Recruits for the working staff, they probably call it." Harp licked his lips. " This life we can take—just. We might jump straight out into something a long sight worse."

When the excitement died down and the slaves went back to work, Dodge and Harp felt they had been spared to escape another day. They began working hard, became model labourers, threw off the suspicion engendered by their earlier attempts to escape. Their hoarding of air tanks, both helium and oxygen, went on.

Events had moved swiftly for them then. They'd had their first real slice of luck when they'd been assigned to the sprat's cages—sprats being baby sardines—for nursery work. Sprats had to be hand-fed vitamin-rich food in a carefully controlled explosion of growth so that they could be rapidly converted into mature animals ; that entailed almost individual feeding, usually carried out in quarter-mile wide cages only a few feet below the surface. It was a boring, monotonous job—but then, all jobs were monotonous in the blue monotony of the underseas—and they'd had time, snatched in furitive half minutes, to cut out a section of wire and plan how they would bend it back at the moment of escape.

And that moment was almost here.

Down below cruising subs distributed food, allowing it to fall freely through the superimposed layers of cages ; up here it had to be processed in the tanks, moored on their cables, around the edges of the cage. The black bulk of one loomed up now, with the agile figures of workers around it ; then the pinging signal ceased, all the sprats fluttered like a darting cloud of birds, all in the same instant, all turning with a flash of silver, and came sweeping back like wind-driven leaves.

The electric currents affecting the fishes' spinal cords had no power over men, but Dodge had the usual feeling that it was easier to turn and fly back the way he had come. He did so. But this time he felt a mounting excitement in him. This time would be the last. This time they would not respond to the warning ping from the far tower.

When the opposite haze of wire loomed up at them from the limpid water they had angled off sufficiently to be out of sight of the control tower. Beyond their undulating flippers the swarming cloud of sprats advanced, like smoke rolling over downland. Ahead, the wire.

Harp suddenly raced forward, his fins pumping, his hands outstretched. In a matter of moments he had found the pre-cut opening and was bending back the tough wire. Dodge flew up and helped. He could hear Harp's grunts of effort. Bubbles rose and burst above. The ceiling was quite near, a shimmering chiaroscura of mercury and ebony. The sun must be quite low now. The wire gave. They slipped through.

Their first action was to jettison the fish-food packs, after withdrawing the spare air-tanks concealed in them.

They had no idea in which part of the world they were in ; they might have been in Chinese or Australian or Carribbean waters ; all they knew for certain was that they were near the tropical seas of food in plenty. They flew forward, fast but cautiously.

This time they'd make it ! This time they could not fail. They'd both eaten well at the prescribed time before emerging from their bubble to go on shift, the extra vitamins and fatty foods, part of all undersea diet, would give them a long immunity to the extra conductivity of the water, draining off their body heat. After that, hunt for fishy food. They'd live, of that, Dodge felt supremely confident.

He was checking his water bottle when the first shapes flitted through the water towards them. He knew at once that these sharks were the watchdogs, harmless unless roused by the scent of blood ; and they'd planned to push on through them, unmindful of their sharp noses herding them into the centre of a narrowing circle.

Harp thrust forward confidently. Dodge, bolstering his courage, followed. The sharks, puzzled, fell in behind. Whatever eerie control was exercised over them, they could not think coherently like a man, and Dodge was conscious of a wave of

triumph, of contempt for the killers. The procession flew through the depths.

Dodge saw Harp gesture. He flew alongside. The harpooner pointed, his facemask showing his eyes, large and round. Dodge looked.

Bulking like a whale the flank of a sub-tow balloon drifted slowly towards them. Finned figures boiled around it. Slaves, being herded through the airlocks. Dodge surmised wildly that the U.O.P. must be making a snap inspection, and all slaves were being rounded up. This had fouled up their plans. Unless they could slip away unseen they stood no chance against the weapons of the overseers.

Let there be no panic, Dodge thought, unconsciously repeating an old motto. He sprang with a single powerful lunge of his flippers, followed Harp away from the menace of the balloon. It dropped back into the blueish obscurity.

VI

The water was like soup. Steadily, darkness increased. In front, like beckoning will o' the wisps tiny lights began to glow, dancing, throwing erratic streaks of radiance through the waters. The lights approached. Harp moved his arm ; they struck off towards one side. More lights glowed. Harp threw a quick glance over his shoulder, assured himself that Dodge was closed up, and dived. They flew down, feeling the coldness seeping into their flesh, trying to circumvent the onrushing lights.

The sensation was like trying to reach the moon at the bottom of a well. They descended for what seemed ages, and still the lights paced them. Dodge knew what they were all right. Hunting beasts. Phosphorescent or electric-powered lights, strapped to the backs of sharp, fast fish, with ultra-sonic transmitters and echo-sounders, spreading out to detect and report any movement beneath the sea. The Wilkins Corporation was expecting company, all right.

And Dodge and Harp had got themselves caught on the inside of the barrier. Angry, futile resentment burned in Dodge. All their scheming, all their planning, to come to naught because their so-called saviours had chosen this very moment to carry out another abortive inspection.

Presently Harp touched Dodge. He shook his head, pointed up. They were as deep as they dared go with their equipment ;

their buoyancy was seriously impaired, they had to rise. Fuming, impotent, they soared upwards, retreating always before the cold hostility of the lights.

In the balloon, Dodge thought. *Maybe that's our best chance.*

He gestured to Harp—the incommunicability of undersea life always filled him with a wrenching sense of incompleteness, of foetal helplessness. He shaped with his hands, pointed back, shrugged his shoulders.

Harp caught on.

Tiredly, they flew back to the balloon. Before they reached it the sentinel sharks caught up with them again, sniffed around, and then, because the men were going the right way, left them for other duties. Harp and Dodge ploughed on.

Radiance grew in the sea. Flippered foremen flew here and there, harpoons bristling, contagious in their excitement. A free shoal of fish gyrated crazily across their field of vision. A sub prowled below, its wash forcing them upwards, throwing them too close to the watchful overseers.

Too quickly for Dodge to follow, they were included in a frightened batch of slaves, hustled towards the balloon. Its sheet metal sides gleamed in green lighting, black airlocks gaped. They went through. Standing awkwardly on the gratings, with the valves closing, Dodge thought : *This is the end. We'll never get away now.* He wished, savagely, that they had thrust through the ring of watchful guardians—then knew at once that the only result would have been death. Immediate, unpleasant death at the fangs of the outer guardians, triggered by the impulse from the guardian fish and their electronic relays.

Lights blazed down outside the lock as the valves closed slowly. Into that haze of brilliance Dodge saw men rising from the deeps. Men who wore narrow, curved facemasks, men who had no breathing equipment—men who breathed water.

His breath caught raggedly in his throat.

He stared, fascinated. They swarmed upwards, forming a chain, and the manacles on their wrists and the short lengths of steel wire that joined their legs gleamed as links of fire between the human links of flesh. Men, breathing water !

Their faces were dull, sagging. They moved sluggishly, foolishly, almost, with dazed, uncaring motions that jerked them cruelly against the tethers.

The lock valves shut. Water began to run from the gratings.

Dodge turned to Harp, ripping his mouthpiece out as soon as the water dropped below his chin.

" Those men. Breathing water ! Was I dreaming ?"

Harp's eyes blazed the self-same queries.

A dry, mirthless chuckle sounded. They whirled.

A bent, withered, dried-up oldster, in the full meaning of the term in undersea life, was looking at them derisively. His green eyes gleamed madly.

Others in the lock were clustering round. Questions spurted like undersea volcanos. The oldster chuckled again, and silenced the babble immediately.

" Menfish ! They've been at work again. Catastrophe and destruction. I see it ! "

Harp shook the old man's thin shoulder savagely.

" Who were they, pop ? Do you know ?"

" Menfish. Men, breathing water, like fish. They get—made over—like that."

It was betrayingly warm in the lock. Smell was coming back into the world as the men removed their masks. Smell of warm rubber, and fishy, salty odour of bleached bodies, oil from mechanisms—Dodge stared at the old man.

" Who makes them over ?"

" The Wilkins Corps, who else ?" The old man's face was lined with the worries of years. He must have been under-ocean for quite a while. He knew about menfish—no-one else seemed to. Harp asked a sharp question.

" Use 'em out on the precipice. Deep. They can fly down a thousand feet or more."

" I just don't believe it," Dodge breathed. And yet he had to. Because he now knew he hadn't been dreaming when he'd had that split-second vision of the men breathing water, when Elise Tarrant laughed and goaded them on.

" You'll all end up like that." The oldster's voice wheezed. " I wasn't tough enough ; but you'll all get changed. Turned into fish."

On that shrill, amused cackle in the dotard's voice the inner valves opened and they all spewed out into the sub-tow balloon. Dodge climbed mechanically, clawing his way up the interminable ladders and edging out along the lattice-work of girders, like a chicken battery, until he and Harp wedged themselves into a cross-piece corner. Harp had a good grip on the oldster's shoulder.

" Now, Pop," he began seriously. " Tell us all about these menfish."

" Nothing to say, son." The cracked voice was sane now, sane and level, filled with a fullness startling to Dodge. " Name's Eli, son. Wait." Eli put his hand into his mouth, gave a convulsive jerk, and then beamed at them in the full glory of a full set of plastics. " Daren't wear me teeth flying, might lose me mouthpiece. Got a special grip."

" What do you mean, nothing to say ?" Dodge said impatiently. Around them the balloon was filling with the frightened whimper of cowed slaves, and Dodge caught faintly the shrill scream as women were herded in.

" The Wilkins Corps who farm out near the Edge use menfish. Have to. Depth. Once they finish that surgical treatment on you—son, you stay in the sea for the rest of your life."

" You mean—you can't breathe air ?"

" Precisely."

Eli shifted around on the metal slats. He was wearing a water-soaked singlet which left his arms free, and even though those of the slaves who bothered with clothing had removed it and were attempting to dry it, with little success. Eli seemed to hug his singlet all the more closely to him. There were bulges beneath, showing clearly through the clinging wet material.

" Menfish," said Harp, dazed. " Under the water for the rest of your life. My God, Jerry—someone ought to do something about all this !"

" What ?" Old Eli said grimly. He was not so old, nor so decrepit, they saw now. " The government is powerless beyond the immediate area of their undersea forts. Like now, by the time a patrol is anywhere near, the watcher fish with Asdic have them spotted, the slaves are rounded up. Easy enough to lose sub-tow balloons down under." He stretched. " Me for some food. There, round the fires."

Electric fires were burning on low power, and the slaves clustered around, shivering, steaming. Food was passed round. Time passed. Noises had an odd effect of diminishing in the vast balloon and then returning in a crescendoing circle. Dodge was thinking of the menfish and of escaping. A tension built up in him, so that his hands were all a-tremble. He felt very alone.

" We've got to get away, Harp," Dodge said desperately. " We can't have that happen to us."

Screams and cries floated up to them. Harp put his head over the edge of the metal slat, stared down. His body tensed. Dodge shoved his head out and looked down.

Overseers, not brutal, just callous and beyond any understanding of human suffering, were herding a huddled group of women along the dizzying lattice of metal slats. One fell to her knees and a woman bent quickly and helped her to her feet. Dodge stared, a sick, hot, choking feeling boiling into his stomach and throat, making his eyes blur.

The girl standing proudly erect down there had three scraps of defiant scarlet attached to her naked body. She had weals across her back. She was a slave.

Elise Tarrant was a slave, just like Dodge.

Then—she hadn't engineered his kidnapping !

He leaned over to shout to her, and her face lifted, met his. No expression marred the blank beauty of that icy mask. She stared, for a long moment their eyes clung, then she turned away, stumbled off with the others. Dodge realised that he was gripping the metal slats so tightly his hands were numb. Elise Tarrant a slave. *Elise.*

He said : " I'm getting out of here, Harp. Now. I'm taking that girl. Coming ?"

Roland Benedek, Lieutenant, U.O.P., was an embittered man. He pushed his tall conical casque up, automatically opening the slats, and stared narrow-eyed as the sub-tow balloon disappeared into the dim blue distance. No hope of catching that. His seven-man patrol closed up. They knew, as well as he, the futility of all this. The veering shadow of a sub moved across their field of vision, spotted them, and sheered away. No markings, of course. This Barny McCracken Wilkins Corps was clever—he could have sworn he'd actually seen men—slaves—being bundled into the balloon. The cameras would tell if they had ; but that wasn't evidence ; the corp would counter with : "Just workers, that's all." He pulled his mouthpiece free and spat. Then he replaced the tube and called base on the ultra-sound set.

Report — nil.

The submarine that Benedek had seen prowled on. She closed the wallowing sub-tow balloon fast, her asdic vectoring her up with the precision of a turret-lathe. Now, thought Danny Agostini, now was the best time of all. The same thrill shot through him ; hunting fish was a sport—hi-jacking men was

something indescribable. He pulled his lower lip down, unconsciously strengthening his weasel look, his pointed nose almost quivering at the target ahead.

" Hold her," he said unpleasantly to the helmsmen.

The sub was on railway tracks. The forward screen showed the nearing flank of the balloon, studded with airlocks. It was like puncturing a boil—almost. The thought of ramming into that putrescent sausage, spilling out screaming people—screaming in water—filled Agostini with an indescribable glee. But the boss wouldn't like it. Men were needed—his lower lip sucked in behind the yellow, uneven teeth.

An airlock was opening. Figures slid through, flippers blurring as they shot away in a steep dive. Sport !

Agostini leant forward eagerly, gave explicit directions. The submarine rushed down, like a huge grey sea-wolf, on the flying mites of humans. Agostini quite failed to see the second sub swinging round to bring him directly into her sights.

The balloon was filled with the sigh and murmur of hundreds of people perched, damp and uncomfortable, on the lattice work of metal girders. The air was foul. Condensation splashed everywhere. Some, weaker than others, were breathing from their air-tanks, reckless of the consequences.

Harp said slowly ; " All right, Jerry. I'm with you."

Dodge nodded confidently. He jerked his head down. They went down the ladder swiftly, moving with almost floating ease in air, dropped to the gangway. Dodge ran lightly in the direction taken by Elise and the other women. He found them laying exhausted on bare metal, their limp bodies as bare and sexlessly uninteresting as the steel.

" All right, Romeo. That's far enough."

The guard, his bare chest a mat of heavy hair, stepped forward arrogantly. He lifted the short-barrelled undersea harpoon gun. That thing could disembowel in air.

Dodge hit him once, quite scientifically, surprised that the pure hate foaming in his mind allowed of competent level action. He did kick the fellow as he went down, though, and that surprised him in its sheer uncharacteristic bombshell-like quality. It showed what was happening to his mind.

" We've little chance as it is," he said in a detached tone. " We can only take Elise—there." He pointed and Harp swivelled to look.

Elise's face still wore that mask of chiselled horror. She stared at Dodge as though he were a tree. He took her arm, unconscious of the way his fingers bit into her biceps. A slim, tigrish figure uncoiled from the mass of apathetic women, launched itself at Dodge.

Harp shuffled forward, caught the squirming body of a girl who breathed quick hissing spurts of hatred at him, lifting her sweet, heart-shaped face in blind panic.

" Hold it, sister," Harp rumbled. " I'm not gonna hurt you."

Dazedly, Dodge recognised the Siamese girl who had tumbled off the aquaplane—oh, years ago.

Elise said : " Stop it, Lura. We can't do anything."

" All right." Dodge notched off another chance of their escaping. " We'll take your girl friend. Harp can look after her."

" Hey— " Harp said.

Dodge silenced him with a quick, impatient cut of his hand. He hauled Elise after him along the gangway, saw that Harp, after an explosive monosyllable, was following with the girl, who was disdainfully shaking off Harp's big fingers. Harp had the harpoon gun and that was quite obviously far more important to him than the indignant Siamese girl. From some impossible well of strength deep within him, Dodge drew a smile of amusement ; it lasted a bare half-second, frightening him with its incongruity. Perhaps, Elise . . .

There was no trouble reaching the air lock by which they had entered the balloon and Dodge had a flicker of hope riding him until the three guards came running, their *totschlager* swinging up on cords to smack into their palms. The four slaves had their plastic flippers slung on a cord round their necks, standard procedure when walking in air spaces, and the movement of Harp's harpoon gun must have been partially masked by his flippers, hanging over his chest.

He fired three times. The Siamese girl's face went grey and her mouth opened. Dodge cut the scream off. Elise's expression had not changed. Dodge wasn't feeling too steady round the stomach either. The valves opened and they moved forward. Elise said : " I'm sorry, Commander. My fault, Mr. Grosvenor — " Her face was pleading with him ; then it went stiff, Elise said, sharply : " Commander ! Guard— "

Dodge whirled. Elise's voice was cut off by a flat crack, magnified into booming echoes in the metal box of the balloon. A guard who had run up and levelled his harpoon gun sagged at

the knees, a shocked look of surprise on his face. Blood stained his uniform tunic. Without thinking, Dodge hurled the others into the lock, thumbed the valves closed. The lock cycled water as they adjusted their undersea equipment. Even then, no-one said anything.

Who had fired the shot, killing the guard who had them dead in the sights of his harpoon gun ?

He was still mulling that over in his mind as the outer valves opened and they thrust forward, flippers blurring in speed, heading out and away from this macabre world of the undersea.

They saw the stalking shadow when it was far too late. From the side of the sub, under Agostini's personal and gloating direction, a filament net jetted. The cloud of hair-fine wires exploded, formed a net, circled and englobed the flyers. Dodge tried to rip the net strands—once.

After that, he relaxed, or tried to, despair and anger and self-contempt and blazing hatred for this murky watery life of the deep sea eating his vitals. Space . . .

They were hauled in, squirming and struggling, trying to prevent themselves from being squashed against each other. For a single pitiful second Dodge had the flaring hope that this was an U.O.P. ship. Then sanity caught up with him and he recognised that there was no hope for him—or his comrades—now. The lock of the submarine led to a decompression chamber ; they had to be staged down to one atmosphere carefully, helium or no helium, after their long immersion in the waters and the compensated pressure of the balloon. It was going to be a long process, making sure the bubbles came out of their blood and sinew quietly, without fuss and the crippling bends.

Without quite realising how it had happened, Dodge and Harp were alone in a partitioned decompression chamber. Elise and her Siamese friend had vanished behind metal walls.

He was exhausted and desperately hungry. Undersea life demanded enormous quantities of vitamins and fatty foods ; his skin was white and puckered, like the dead belly of a shark. Looking at things dispassionately, Dodge came to grips with the knowledge that he had made a hash of everything—and tried to lie to himself, to tell himself that even now he would come out all right—with Elise.

In his mind, it rang hollow, like the infuriatingly insane laughter of a hyena.

Some twenty five feet forward and above him, Danny Agostini drove his sub headlong towards the bloated balloon. His warped mind sang with excitement, a drool of saliva escaped from the corner of his mouth. And then the asdic lookout screamed a warning. Agostini took in the situation at a glance, his weasel brain answered the problem quicker than a nuclear-reaction, and the sub veered, almost waggled her hips away from the path of the torpedoes. They drummed off somewhere astern, trimmed and armed, heading out into the blue. The other sub swung her bows, lining up a fresh shot.

Agostini made his decision, cursed the luck that had stolen a fat, slave-filled balloon from under his eyes, and sent his sub burrowing through the water back to his base. The boss could be very rough on an inefficient sub captain, and even rougher on Agostini, his personal executioner.

The sub crashed through three fish pens, trailing the nets from her schnorkel gear until the net-cutters sawed through. Then Agostini chanced using an open-water lane and settled down to crusing speed. He had had the idea that one of his captives had been a woman—life might be interesting, yet. He decided to find out.

Dodge did not know of the men who came for Elise and Lura. He heard sharp sounds through the metal partition and guessed that pressure must be down to one atmosphere by now. The sub's manoeuvrings he had taken and forgotten. He could not feel anything about the future, anything at all.

Harp sat crouched on the damp metal, cold and hungry and miserable.

" I might have known getting that harpoon was too good to last," he mumbled through shivering lips.

" What's happened to us ?" Dodge asked without great interest.

" Just another Bishop Wilkins Corp. They fight each other all the time. Hi-jacking. God, I'm hungry !"

Dodge felt too dispirited to answer. When at last high-calorific food was brought by close-mouthed crewmen he ate ravenously, his questions unanswered, and then they were hustled along to a cramped metal walled space that contained just three inflated mattresses. They were asleep before the guards had locked the doors.

Their natural sleep passed into a drugged coma as the gas flooded silently and invisibly into the cell.

Back in U.O.P. Base Trident, Simon Hardy was reading Lieutenant Benedek's report, too disillusioned to curse.

At UN Headquarters, Secretary Henderson was girding his loins to outsmart Toxter at the coming fiscal enquiry.

A certain Mr. Grosvenor was an extremely worried man.

And, under the Moon's scoured surface a group of high ranking Space Force officers were deciding upon a course of action.

Dodge, when he was taken through into the undersea world of domes and caves perched on the edge of the escarpment, knew nothing of these moves in the wider world. His first awareness of himself was awakening to a pattern of pain filamenting his body. His throat hurt. He breathed deeply, trying to clear the kelp clogging his brain. He was not wearing a face mask or oxygen cylinders.

He was lying on a rough mattress that felt as though it had been stuffed with coral, with stone walls surrounding him on three sides and a metal wall on the fourth. The walls and floor were completely bare. A light fixture was embedded in heavy glass in the centre of the ceiling. A grating, high up on the door, was barred with inch thick steel rods.

Raising his hand to his aching head was an effort requiring immense concentration. For a long moment he did not know what had happened, where he was—he had an insane idea that his spaceship had been petrified—or of what he was doing. He stared dazedly at the grating.

Something came through the grating that told him everything he wanted to know—everything—and more. It told him that he was doomed. It told him that he must fight if he wanted to preserve his sanity—and he wasn't sure that he wanted to remain sane. It was a simple, pleasant little thing.

It was a fish that swam lazily in through the grating of his room.

To be continued

BEAUTIFUL WEED

Heredity is not the only tool biologists use. Sometimes quite sensational results can be obtained if a plant which is accustomed to difficult conditions is transferred to a place where all its needs are plentifully supplied. We may find out more than we want to when the first spaceship lands on Mars, for instance.

By E. R. James

Garish sunlight through the east window warmed the back of Gerry's head, wakening him. As he lifted his face from the warm pillow, he realised that he was embracing one end of it.

Still in between dreams and actuality, he found himself breathing hard. In the dreams, free from the limitations of time and space, an extraordinary host of scientists and spacemen and politicians had been begging him to remain on Mars as ecologist extraordinary, while a perfect girl—with all the good points, and none of the bad, of all the girls he had ever known—was imploring him to stay with her on Earth . . .

Reality closed abruptly around him. It was years ago and millions of miles away when he had studied to be a biologist on Earth. Sitting up, he looked around the untidy living quarters of his one man station, his gaze halting on the comparative calendar on the naked concrete wall above his littered desk.

Three Earth-years ago, he had discovered he had developed an incurable disease. Grimly deaf to the arguments and pleadings of friends, he had sold everything he had, and had come here to study the meagre life species of Mars, hoping to add something to the total of man's knowledge before he died. Instead of dying, however, his health had returned. But the Spartan, lonely life he had chosen sometimes seemed completely wasted.

Mars was so different from Earth. During the one and a half Mars-years that he had been on her arid surface, he had collected a great mass of information about her alien chemistry without discovering anything that seemed important. Unless . . .

He slid out of bed and, with his shirt tail flapping behind him, padded past the shorts draped over a chair back, through into the scrupulous cleanliness and order of his laboratory. Beside a glass panel let into the wall at floor level, he knelt, peering into the little greenhouse which he had built on to the outside of the station.

In it he had planted three separate cuttings of the single species of vegetable life still extant on Mars. He had isolated each piece of weed from the others, had fertilized each differently and had blown warmed, moistened Martian air through a system of his own devising to maintain the greenhouse at the conditions of a Martian day.

He stared at them dully. The three plants had all grown during the night, but . . . Sighing, he took hold of the tongs which went through rubber seals from the pressurized conditions of the station into the thin gases of the greenhouse. Expertly lifting the measuring stick—it was rimed with frost at one end where it had rested near the ventilation screen—he set it across the leaves of each piece of weed in turn. The thick, spongy leaves had developed at varying rates, but the average rate of growth in each plant was the same, and each plant had begun to grow a fourth leaf, and was putting up a central head which was already showing the rudiments of the same sort of flower as it would have done outside. By no stretch of imagination could he even hope that such a grotesque parody of perfection would go to seed—any more than its fellows would outside on the dust.

Aware of another failure he sat back on his heels. The dreams of the night still strong in his mind, he found himself thinking of the unlikely girl of his dreams. He sighed. He had studied the Marsweed for so long, and tried not to think of human companionship so much, that the black of his imaginary girl's hair and the vivid glow of her complexion and the pristine

whiteness of her shoulders did tend to become confused with the ebony, carmine and white of how he felt sure the weed ought to be flowering . . .

He stood up and was slowly walking over to the glass and plastic tangle of yesterday's chemical fertilizer mixing, when a high pitched, very remote sound disturbed the silence to which he was so accustomed.

Beep, beeb ! *Beep, beeb* !

He halted, lifting his head. As the klaxon sounds were repeated, he ran through into the living room and stared from the east window across the great, green carpet of Marsweed that covered the desert and here and there had already put up its horridly beautiful flowers like patches of blood staining the green.

From over the horizon, below the deep blue-ink sky, to the north of the small rising sun, he saw the track of crushed weed left by the big tractor of Pete the Carrier.

Experiments forgotten, he ran to his little stove, switched it on ; then to the larder for coffee and bacon and dried egg. For the coming of Old Pete was an event to him as much as to any other lonely outpost.

Breakfast for two was ready behind him and he was wearing his atmosphere suit and mask, standing at the station entrance waiting as Pete trundled his big machine to a halt.

When Pete emerged from beneath the dust screens to wave, he waved back and bounded across the weed towards the machine. Something crunched beneath one of his hurrying feet and he went back.

Lifting the dry leaves of a plant he saw that he had trodden on one of the locust-like insects which were the only living things in existence able to stomach the weed. He grimaced. Small things assumed giant proportions in his dedicated isolation. Pete had stopped before reaching the station to save disturbing the partitioned areas in which he, Gerry, could study the balance of life on Mars—but he, the scientist, had to lose his head and crush one of the slow-moving insects—thus introducing an unnatural variant.

He went on more slowly. " Hi, doc !" called Pete through his mask, and Gerry answered with a return of high spirits at his first human contact in three months. They worked hard together, taking stores to the station and salvage back, and carrying run-down batteries to be recharged by the Station's sun-power engines, and replacing them with charged batteries.

Then they took off their outside clothes in the station and had breakfast.

"Now, that was something!" Pete rubbed the grizzled stubble of his chin free of bacon fat. "You ought to have seen the warmed-up rubbish served up for supper at my last call yesterday."

He felt in his tunic. "Ah, here's your mail. It'd be just like me to have gone on without giving it to you." He passed it over but, while Gerry shuffled through the wad of communications from scientific colleagues, he felt in other pockets. "Look at this, doc."

It was a pair of weed crowns, still joined together with a runner, and crushed from being in his pocket, but—the flowers they bore were different. They were . . . just as perfectly formed and gloriously beautiful as Gerry had imagined they ought to be. He looked up excitedly. "Where did you get these?"

"You'd never guess," chuckled Pete, lighting his pipe and sending out clouds of pungent smoke to foul the atmosphere of the little station. "Some lengths of weed must have got dragged into the tractor with one of the despatches from Mars City. I remember water being spilt yesterday morning, and this morning I found the weed wet through—and like that. D'you think the water could have made it bloom overnight?" He peered through the wreathing smoke at Gerry with narrowed, watchful eyes.

Gerry held his breath. "Just water . . . And—the air and temperature in your tractor would be Earth-like . . . I wonder—Can I keep these bits?"

"Sure. I meant to give you a sample, since you're a good guy. I got plenty more."

"Thanks," said Gerry, "thanks a lot, Pete."

They chatted for a while, mutually thrilled. Pete was always a good listener, but this time he had a personal interest.

Water and Earth-like conditions— Gerry felt sure that was a combination nobody had tried!

Before Pete's tractor had rumbled off more than a few yards, Gerry's fingers were digging up three fresh crowns of Marsweed from the dust. He hurried back towards the station.

A creature similar to a lobster was tearing apart the insect which he had crushed underfoot earlier that morning and, even in his excitement, he paused for a moment. This third and last of the species of life remaining on Mars was the only living thing

he had found able to eat the insects. Once he had thought it might be some use, since it was itself edible to Earth stomachs —but, although he had suffered no ill effects when he had cooked and eaten some of its meat, the pungent taste was not pleasant.

In the station, his preparations were soon finished. When he stared at the three plants floating on two gallons of his precious water in three bowls from his household stores, however, he felt ridiculous. Of course he had tried every other way of improving the Marsweed that had come into his mind—but to put it on water as though it were a subject for hydroponics, and within the Earth-like conditions of the station too—well, it did seem crazy.

Anyway, there it was. He had to try it after what Pete had said.

He went to his mail on the living room table. Picking up a long envelope from amongst the half a dozen others, he stared at the official seal.

His own money had almost gone and he had applied to the Foundation at Mars City for a grant to continue working. This might be the verdict. He tore it open.

Dear Sir,

We appreciate your unselfish motives and the years of painstaking study which you have spent on Mars, and, although we regret that so many other more pressing calls are continually being made on Foundation funds that it is impossible to grant your request, we would be pleased to help you find a position either here or on Earth suited to your undoubted talents . . .

He grimaced, and wondered if he could raise some money as a loan on security of the station gear . . . But — suddenly he grinned wryly at himself. If Pete had not produced those pieces of weed, this letter would have been read before the old man left. Then there would have been time to write a request for such a loan, and perhaps there would have been money coming on the carrier's next visit in three month's time.

What a mockery of events ! His grin faded and his shoulders bowed as he covered his face with his hands. His radio had gone to buy the supplies Pete had just brought. He had no transport, and it was too far to walk to the nearest neighbour. Nobody had found anything to interest themselves in upon the lowlands here—except himself. He was isolated.

The following morning he awoke with the knowledge that he had only three more months left before having either to beg

supplies off old Pete, or to admit failure by going back to take a job on someone else's project.

As he closed the laboratory door behind him, his unlikely experiment came back into his mind as he caught sight of the bowls.

Failure of a score of other, carefully worked out experiments haunted him while he approached the bench beside the outer wall and leaned across it to the makeshift platform against the high window.

He started so violently that the bowls wobbled and water slopped from around the thick, spongy leaves.

The leaves themselves had swollen—no, that was the wrong word—they had grown sensationally—they must be quite six inches across instead of the usual three! All three plants had put out runners besides bursting into flower. And—such flowers! Magnificent, perfect flowers—

His breath caught in his throat. Incredible though it seemed, even now he was face to face with evidence, the plants of the arid Martian lowlands must be *water plants*.

Blood was drumming in his ears. Days after the first of man's landings on Mars, a Spaceforce biologist named Hardy had confirmed the plants to be green with an alien, semi-poisonous substance different from chlorophyll; while interest in Mars had still been at its height, a famous scientist called Sievelt had shown that it could continue to exist in an astonishing variety of conditions; but he, Dr. Gerald Sanger, was the first researcher to show that it could make itself so much at home in Earth air and on ordinary H_2O that it could mature from cuttings and put up truly gorgeous flowers in a single night.

Triumph warmed him with its inner glow. It was not surprising that the old-time workers had missed the truth. Almost the only water now on Mars was airborne, coming from the melting poles each summer to wake the slumbering weed to stunted life.

He lifted his head. Over the lowlands stretching beyond the glass, the close-packed, predominantly red flowers now in full but deformed bloom, merged with distance into an ocean of blood, rippling in the northerly wind that brought their elixir of life—the elixir of all known life, everywhere . . .-

Water plants! He chuckled to himself.

There was no money in that as far as he could see; only the merit of being first: so that it would not postpone the end of his studies, but it was an end in itself.

Before a paper could be published to make a gratifying little splash in scientific circles, however, the experiment would have to be carried to its logical conclusion.

He stood quite still while his mind's eye pictured the long ages taken by the decline of living conditions on Mars. No creature as high in the scale of evolution as man had ever had time to appear—so far as anyone could tell ; but fossil records did show there had once been an abundance of species. In imagination, Gerry saw the gradual disappearance of this alien life. One by one the plant types would be squeezed out as fertility was replaced by desert, and with each plant would go the insects, crustacea and animals which had depended on it for food. And at last there would only be the weed left . . . and only the single kind of insect which could stomach the weed, and the single kind of crustacea which could eat that insect . . .

Surely if the basic food was aquatic, then the creatures depending directly and indirectly on it for food must also have been aquatic or amphibious.

He could scarcely wait to find out. He turned and ran through the living room into the stores.

His thoughts raced ahead of him as he dressed himself. He had the experiment all planned by the time he let himself out through the airlock.

Heat from the rising sun settled against the side he presented to it and chill of the departed night hazed his facepiece with frost as he closed the lock after him.

Lifting his head he saw the lines of crushed weed left from horizon to horizon. Long before the tractor came to renew these, the weed would have covered them up—but, if that had been water out there, or even wet ground, he knew that such scars would heal in forty-eight hours or so.

For some reason, that reminded him of the life left behind him on Earth. Of green fields, beer and cigarettes and good talk . . . and a woman's warmth and softness . . .

He turned away sharply. His feet pushed through the alien carpet of gorgeous but deformed red flowers taking him back to the reality of his study of the life cycle of Mars as he examined the traps he maintained.

He chose twelve insects in one trap, shook his head over another insect trap which had been torn to pieces by crab-like claws, and released all the other insects before resetting the traps. One specimen of crustacea would suffice . . . since it weighed

two pounds and the trap which had caught it over twenty because of improvised materials.

As he returned, thus laden, he thought of Old Pete. Inside, as he stripped off his clothing down to his usual shirt and shorts, he wished more than ever that he still had radio communication with Mars City. The tractor driver ought to be sharing these moments of triumph . . . yet on second thoughts he doubted whether the old man would have understood the excitement of this little extension of man's knowledge into the unknown.

In the laboratory, he unfastened the insect trap and held its opening over the middle-sized bowl. It would have been so much better if he had had proper equipment for this. But to wait was unthinkable—even if circumstances did not prevent him from indenting for glass aquariums.

The insects, still sleepy from the cold of the night, began to move. Their antennae waved in what seemed great agitation. They began to drag themselves with unaccustomed haste around the bars of the cage. One blundered through the opening and—

Plop. It was in the water. Gerry watched it sink. It landed on its long, locust-like legs and reached up as though instinctively towards the " roots " trailing from the weed to rest upon, but not enter the Martian sand covering the bottom of the bowl. It disappeared under the thick leaves. Another insect went plop, and another, and they seemed at home. Gerry tilted the cage and the others slid out into the water that he had drained from his recycling unit.

The leaves of the weed bobbed.

He reached for the other trap, opened its lid, and only just managed to hoist it up in time to get the flat, segmented creature into the water and not loose on the bench. It sank with little bubbles of air clinging to the fuzz of hairs at the back of its armoured head. It seemed at home. Gerry watched its slow movements around the bottom of the polythene bowl. It reached one side and reared up, trying to get out, but this bowl had been his " bath " and the segmented legs scratched their sharp ends upon the high smooth sides to no avail. Its claws snapped as though in rage.

He turned to the other bowl. One leaf had gone, and another was going. Not even the plants' new rate of growth could replace such rapid loss. Amazing ! Under " natural " Martian conditions the insects seemed barely able to support themselves and ate so slowly that the plants regained leaves as fast as they lost them.

He caught hold of a flower stem and lifted the plant out of the water. One insect fell off but another clung and nibbled. He held it over the big bowl and shook. It fell off. A claw caught it before it touched the bottom of the bowl. Smaller claws seized it and tore it limb from limb and held these, one at a time, still wriggling, to the ready jaws, until they were all gone.

Gerry swallowed. To see these alien plants, insects and crustacea in the water which he now felt sure their forebears must have lived in was fascinating.

He watched the crustacea come swimming to the surface. It seemed satisfied now. It floated a while with its fuzz of hairs clear of the surface and then sank slowly to rest motionless on the bottom—facing the middle-sized bowl containing the insects.

Further watching, however, began to seem pointless. He retired to his desk in the other room to make notes of what he had so far done. While he wrote, his thoughts kept leaping ahead and soon he put pen and paper aside.

A driving need to continue the experiment drew him back into the laboratory. Having established the basic theory, he would study each of the Martian species in turn.

He cleared all three bowls and fetched in fresh weed crowns from outside. He mixed up two fertilizers and added one pinch of each to two of the bowls, leaving the other as a control. He had a meal and brought his notes up to date and began a rough draft of the monograph that he would take with him to Mars City.

During the evening, he discovered he could already detect growth in the plants and that decided him to improve his technique still further. He fetched in another batch of weed and threw out the old. He rigged up a cinecamera exposing film at the rate of a frame a minute to record the weed's development in the differently charged waters of the three bowls and, before the sunlight faded, added lamps to provide a substitute for that.

Then he went to bed. In the morning he found all three plants with a perfect flower and runners with new crowns around each. He did little beyond watching them that day. The next morning, however, he noted the difference. Although all the original plants were still in flower, the weed on the plain recycled water was beginning to rot as though it had outgrown its strength, while on the fertilized waters the runners were in flower as well as the original plants and fresh runners had com-

pletely matted the surfaces and, in the case of the smaller bowl, actually begun to spread over the bench.

By the third morning, the rotting weed appeared dead on the recycled water ; but the petals had fallen off the other two first flowers and they were plainly seeding. Before nightfall the seed heads had dried out and he removed them, counting seventy-five seeds on each, so light and tiny that they moved on the bench with his breathing.

Reading through the notes he made, they worried him a little because he felt sure that even his colleagues would think he exaggerated.

On the fourth morning the two fertilized bowls were so tight with plants that he cleared them out. When he dropped seed on the cleared surface, it burst into tiny plants within an hour, and these grew so swiftly that they put up their first flowers forty-eight hours later.

Beautiful flowers . . . gorgeously beautiful.

As time went on he noted that the weed he took out of the bowls did not rot, but reverted to the seedless, imperfect state of slow growth, evidently getting enough moisture and nourishment from the air of the station to keep going. He found that the plants would flower properly and grow swiftly on an extraordinary variety of fertilizers in even the most dilute solution. They would tolerate mild poisons and thrive under conditions which would have killed anything he knew of amongst the non-microscopic plants of Earth.

When at the end of just over three weeks he felt he had completed his trials with the plants, he wrote up his notes, and sat planning two fresh series of experiments with the insects and crustacea.

Presently, however, he remembered Pete the Carrier—who had begun all this by discovering, by accident, what so many others had failed to find by patient study. For a scientist the knowledge was the important thing ; but it was a shame there was no money in it for the old man.

Gerry knew how much the Carrier prized money. Like most ordinary folk on Mars, he worked only for the time when he would have enough laid by to retire to Earth.

What Gerry had no means of knowing was that, during the days taken up by the rest of Pete's long, lonely round of isolated miners and surveyors, the old man had been experimenting on his own account.

Old Pete was no fool. Scientific facts did not interest him, but he knew that exorbitant prices were paid so that rich women on Mars might have flowers—even though Earth plants grew with such difficulty on a cold, alien world.

Therefore, about the time Dr. Gerald Sanger finished his trials with the weed, Pete took specimens of his own rougher culture to a business man in Mars City—and struck a bargain for the secret of their fascinating beauty.

While the business man was setting up an organisation to produce and market the flowers on Mars, however, the tractor's miscellany of cargo was unloaded and, after the usual careful check by customs authorities—who were not in the habit of going so far as to study dust particles clinging to crates—it was transferred to an Earth-bound rocket.

Ten days later this rocket landed on Earth and, after another customs check, the cargo was moved on to other forms of transport. Within a matter of hours, parts of it were being man-handled in industrial areas all over the home planet.

Industry is usually sited where there is a plentiful supply of water.

The first recorded patch of the new water plants was discovered near Melbourne. As a botanical novelty they caused quite a sensation. Not until several days later was it realised that they were alien. By that time, experimental plants had produced seed under laboratory conditions and there were 547 other *widely-scattered* discoveries of weed patches, including one sighted in the Tasman Sea mid-way between Australia and New Zealand.

From the experiments on Earth and the condition of the Melbourne weed patch it was estimated that this single patch had, *before discovery*, produced 525 seeds. The thought of 547 such patches all busily producing seeds made the tone of news reports change drastically overnight. A company which had been formed to exploit the attraction of the flowers folded up without waiting for police action to be taken against it.

Before long streams and ponds were being found choked with the ubiquitous menace. It appeared in all manner of places on dry land where, however, it failed to seed and was more easily dealt with.

Methods of dealing with the weed were openly discussed in the popular press and radio programmes. Suddenly, as the likelihood of famine became all too apparent, governments

started programmes of clearance and humanity everywhere was conscripted into armies of agricultural labourers.

Soon the overall picture was that of man fighting for the right to exist against the alien invader, and seeming to win. A censorship held from the general public the knowledge that uncountable patches of weed were spreading like red sores of some contagious disease over the oceans of the world.

Amongst everything else, however, painstaking investigation actually succeeded in tracking down the means by which the weed had reached Earth. A few of the original tiny seeds were found on a stored packing case in Glasgow, after Old Pete's connection with the Martian " Orchid " Company was discovered.

Thus, seventy-two hours before Gerry was expecting the Carrier's tractor to *beep, beep* at him from the skyline, the thunder of rocketfire screamed into his little outpost of science, startling him.

The windows rattled and he crouched down within the frail shell of his lonely dwelling as a spaceship scorched a circle of weed from the lowland dangerously close outside. He stood staring in amazement at the great, tall ship as its rolling thunder died away to the familiar silence.

Three figures, muffled in atmosphere suits, came down a ladder while the ground was still smoking, and soon they emerged out of the rolling dust coming towards him.

Unable to imagine what had caused such a visit, he stood waiting, his breath quick and his heart throbbing.

Only one man came in through the airlock, and he closed its inner door after him before unzipping his masking hood.

Gerry gaped at the square, grey-haired, distinguished and unmistakeable head of the Governor of Mars.

" Dr. Sanger ? "

" Yes ? " Gerry managed to reply.

The Governor was breathing hard from his unwonted exertions in a confining suit. He glanced around the untidy room and his face tightened. He strode through into the laboratory and came back with more respect in his white face.

" Dr. Sanger, I understand you have been completely isolated for the last three months. This is not the time for explanations and—" the Governor's wide mouth thinned as he drew his lips back against his large white teeth, "—for the present, we want to know one thing of you. Supposing Mars was a watery planet

and the Marsweed covered it entirely, how would you suggest we set about clearing it ? "

" What ? " Gerry stood numbed by astonishment. " Whatever do you mean ? "

" I mean that seeds of the Marsweed have reached Earth. Strenuous efforts by every man and woman who can be conscripted are keeping the stuff under some sort of control on land. But patches of it are growing over every large expanse of water so that rainfall is being affected. The sun will soon be unable to draw up any water at all. Every plant will shrivel unless something is done. How can vast floating islands of the stuff be cleared so that our home planet—" He swallowed hard, his head on one side and his eyes agonised. " Good God, Sanger, if you can't tell us the answer, Earth as we know her will no longer exist ! "

" Oh !" breathed Gerry. In his imagination the plants, which he had seen spread over the bowls of water in his laboratory to seed with such unnatural speed, were transferred to the lush streams, rivers, ponds, lakes, seas and even oceans of Earth. His head reeled.

The Governor was speaking, so wildly that he was almost babbling. " I don't care what your connection may be with the weed's arrival on Earth. Like the Carrier, you may claim you are only guilty of negligence in not reporting that the weed seeded under favourable conditions, or you may be completely innocent because of your isolation. It's a terrible business altogether. I'll do what I can to protect you. Scapegoats will do Earth no good if they are lynched. I've even left my men outside. The Mars Foundation informs me that you are the only active researcher on the flora and fauna of this damned planet. I'm begging you to give us your advice. Nobody else seems to have taken any interest in the hellish stuff, until now—Can it be destroyed—or stopped ? "

" I think so . . ." Gerry did not realise that he was in fact speaking until he heard the words coming out of him and saw the dawn of hope in the Governor's drawn face. " Yes, but as far as I know there is only one way. You'll have to take to Earth the one living thing that can eat the weed. I have no exact figures but my experiments with the Martian insects do seem to show that they'll multiply fast enough to keep pace with their food supply."

The Governor's face showed that he did not like the idea, yet was willing to agree to anything.

Gerry continued grimly. " But—I warn you—if you let loose these alien insects on Earth, you'll have to sanction the import of the Martian crustacea as well. Everything has to be controlled and nothing on Earth so far as I know can eat those insects."

The Governor looked even more horrified, but he stood with his wide chin down on his chest, saying nothing at all.

Gerry moistened his lips. " I'm an ecologist," he said soberly. " It's my job to study the interaction of living things with each other and with their environment. The crustacea at the top of the Martian table of evolution somehow convert the insects into flesh which Earth creatures can eat without bad effects. Their thick shell armour suggests that they had enemies of their own in the ancient oceans that once rolled over the lowlands of Mars.

" But in any case," he ended slowly, " it is a calculated risk that we must take in the circumstances. A sudden biological danger like this can only be fought with the weapons which Nature herself has provided for us."

" Right." The Governor drew a long, deep breath of resignation. " I shall back you with every resource I have."

" Yes . . ." Gerry suddenly felt weak with the after effects of too much sudden emotion.

Once the flora and fauna of one planet were touched by those of another, neither could ever hope to be quite the same again.

E. R. James

Request from Cambridge

English readers living in or near the Cambridge area who would be interested in discussing science fiction in general and possibly writing short science fiction stories are asked to contact John F. Barrie, c/o Kruerzer, 55 Victoria Road, Cambridge. Mr. Barrie is desirous of starting a discussion group on the subject providing that he obtains sufficient response.

This month Kenneth Johns takes the simple question "Why is the sky dark at night?" and proceeds to inform us that the answer is nowhere as simple as it would at first appear. In fact it is doubtful whether we shall ever be sure of the correct one.

THE UNKNOWN UNIVERSE

By Kenneth Johns

From the time of the Babylonian temple-observatories Man has kept a scientific watch on the lights in the sky. Gradually, through the accumulation of observatories and the creation of new concepts, astronomy has grown and flourished, and the vast complex plan of the Universe has begun to unfold before searching minds and instruments.

Reluctantly, the Earth, the Sun, then our star cluster and most recently our Galaxy, have been accorded decreasing importance in the scheme of the Cosmos. From being the Centre of All, our place in the Universe has shrunk to an infinitesimal speck amidst the wonders of worlds without end.

There is a simple little question—so simple that the answer is immediately obvious to a tiny child—that only now are astronomers beginning to wonder where lies the snag. The question? "*Why is the sky dark at night?*"

The furthest man-made measurement across the Universe was reported in September, 1956. Light from a cluster of galaxies known as Cluster 1448, 1,800 million light years away was concentrated by the Palomar Mountain 200-inch telescope with new

supersensitive photoelectric equipment. Calculations by William Baum showed that the usual spectrum lines from stars in the cluster were shifted well towards the red end of the spectrum. This, the largest red shift ever measured, is taken to mean that this group of galaxies is receding from us at 40 per cent of the speed of light.

So our knowledge of the whole Universe has to come from an investigation and extrapolation of data measured within this 1,800 million light year sphere.

It was in 1826 that philosopher Olber asked the awkward question, one of those questions to which there appears to be no satisfactorily obvious answer. Known since as Olber's Paradox, it has recently been revived by H. Bondi and F. Hoyle. It asks, merely, " Why is the sky dark at night ?"

The question brings to a head a whole series of problems that have bedevilled cosmologists for a century and a half and are still not resolved, as can be seen by reading the correspondence in *Nature*.

A few statements show why the question is not answered, simply, by saying : " Because the sun goes down." Dr. E. P. Hubble showed that galaxies are distributed remarkably uniformly throughout space, right out to the limits of the giant telescopes —and most astronomers assume that the distribution is the same further out. But if galaxies are distributed uniformly and the Universe does extend infinitely in all directions we can think of it as a large number of equally thick concentric layers, like the skins of an onion, around the Earth. The further out we go the number of galaxies in each skin *increases* as the square of the radius, whilst the amount of light and heat we receive from each galaxy *decreases* as the square of the radius. The increase and decrease exactly balance out so we should receive identical amounts of radiation from each layer.

If space is infinite, we can then have an infinite number of such layers, and so we should be receiving infinitely more times the amount of light than we are—up to a maximum when stars block out the light of others. The sky should be a blaze of light, night and day, and Earth should receive 6,000 million times the present amount of sunlight as starlight.

But this is not so. Why ?

There are two answers, depending on which cosmological pattern is preferred. If we make the assumption that the galaxies are finite in time ; that is, they came into being at some definite

time in the past, then obviously the light from the further stars and galaxies had not yet had time to reach us. We can only hope to see galaxies as many light years away as there are years in their lives—round about 6 to 7,000 million years according to one school of cosmic evolution.

The alternative answer is based on the red-shift, the most basic tool we have of determining the history of the Universe. The fact that light from stars moving away from us is made redder was discovered in 1888 by Vogel—a change in wavelength similar to the lowering of pitch of a train's whistle as it passes and goes away from us.

Stars fingerprint themselves by their spectra. Characteristic light from the hot surface passes through the cooler, gaseous stellar atmosphere and so has part of its radiation chopped out by absorbtion. With the Sun, these are known as the Fraunhofer lines.

The usual lines measured in other stars are the K and H lines of calcium, and these can be clearly detected in the outflung societies of stars, the galaxies. If a star or a group of stars is receding from us, then the K and H lines are shifted towards the red end of the spectrum and the amount of shift immediately tells us the speed.

At the beginning of the 1920's, V. Slipher in the U.S.A., discovered that galaxies showed this shift and that all were receding from us, some at fantastic speeds. Dr. Edwin Hubble took up the work and, by estimating the distance of the galaxies, reached the astounding conclusion that the speeds of the galaxies were directly proportional to their distance from us. Dr. Hubbles estimates of distance were based on the brightness of the brightest stars in these galaxies up to 20 million light years away.

From his calculations, Dr. Hubble went on to suggest that the whole of the Universe was expanding. The largest telescopes in the world were brought to bear on the problem, measuring the brightness and speed of recession of far distant galaxies. Humason measured the red shift from photographs of each spectrum and Hubble estimated the distances. By 1936 the 100-inch telescope had probed out to its limit of 500 million light years, and still the Universe appeared to be expanding and following Hubble's theory. These further galaxies were so distant that the individual stars' brightness could not be measured only the brightness of the whole galaxy could be estimated and their distances calculated by assuming that, statistically, their brightness would be similar to nearer ones able to be measured.

Herein lay the seed of an error that was to achieve more importance later on.

The 200-inch telescope was the only hope of extending the search, looking for some point in space where the galaxies begin to deviate from the straight line relationship.

In 1951 Humason resumed work on the red-shift, using the 200-inch telescope and a new precision spectroscope, probing out to over 1,000 million light years away. In the summer of 1956 he thought that the last eighteen measurements made showed that there was a change, that the more distant galaxies were travelling faster than the speed-distance relationship would indicate. This was taken to mean that these galaxies were moving faster 1,000 million years ago, when the light left them, than now. In other words, the Universe was then expanding faster than at present—and the Universe really is evolving instead of being in Hoyle's steady state through the continuous creation of matter.

But there are snags in Humason's calculations. If all galaxies were created roughly about the same time they are all evolving as they recede, ageing and becoming dimmer as they use up their interstellar fuel and their brightest stars dull down to dead hulks afloat in the galactic ocean. We see these further galaxies as they were 1 to 2,000 million years ago, when they were younger and brighter—so when their distance is estimated from apparent brightness, they appear nearer than they really are and thus they seem to deviate from the straight line relationship. Or, galaxies may be continually being formed, the Universe expanding as they are, so that all space is populated by a mixture of old and new galaxies and the statistical brightness of galaxies remains constant.

Unfortunately, it is still impossible to gauge accurately the age of galaxies by their colour, so the problem remains unsolved.

The latest results of astronomer William Baum, also, out to a distance of 1,800 million light years, show that there is *no* trend away from the direct proportionality of speed recession and distance. This data gives the speed of recession as two-fifths of the speed of light and, extrapolating outward, galaxies 6,600 million light years away should be travelling at the speed of light. (It must be stated here that some cosmologists claim that this is not so). Any galaxies at or beyond this critical distance will have their light so weakened by the red-shift that it will never reach us.

So, returning to Olber's Paradox, even if the Universe is infinite, we can only receive light from radiators within a sphere with a radius of 6,600 million light years—any system that spills out beyond is forever lost to us. Therefore the second answer to Olber's Paradox is that the night is dark because the Universe is expanding.

Fred Hoyle compares the expansion of the Universe to that of a raisin pudding. As the pudding swells each raisin moves away from every other raisin, although the size of each fruit remains the same. If the pudding swells uniformly then, in any direction, the speed at which raisins move away from any one raisin increases with their distance away.

The red-shift probably does indicate an expansion of the Universe in spite of claims that light becomes 'tired' and slows down after travelling the inconceivable distances of the cosmos. Recently, an analogous shift in the spectra of radio waves from the Coma Cluster of galaxies has been measured by David Heeschern at the Harvard College Observatory using a 24-foot diameter radio telescope. His figures agree to within one part in three hundred with the visual spectrum figures.

In 1922 mathematician Friedman corrected and extended some of Einstein's work on the evolutionary theory of the Universe, and produced an equation to describe an expanding Universe. Two possible types of Universe fit the solution of the equation. One is the hyperbolic Universe in which all matter contracts from infinity and then expands to infinity. The other is the pulsating Universe, where there is enough mass in the Universe to halt the fleeing galaxies, pull them back so that they contract, and then expand again. This pulse continues for as long as only gravitational forces act on the units.

The difference between the two states depends on whether or not there is enough mass in intergalactic space to change the hyperbolic type into the pulsating, for the mass of all the galaxies is only about a seventh of that needed to prevent the galaxies from leaving one another for ever.

An attempt by Dr. Hubble to find out if the further galaxies are closer in space than our nearer ones failed, because his distances and brightness scales contained so many unknown quantities that his results were meaningless. If such a concentration of galaxies could be proved, it would show that the galaxies were closer together long ago when their light left them than they are at present—thus supporting the evolutionary theory.

Another attack on the problem has recently been made by Cambridge radio astronomers in a survey completed in 1955. Assuming that 1,906 radio sources they found were colliding galaxies, mostly beyond the range of the 200-inch telescope, an analysis of their intensity and distribution in space showed that their density tended to increase with distance—apparently strong evidence in favour of the evolving Universe idea. If the density of colliding galaxies is greater a long way off, it must mean that the galaxies were *then* much closer—otherwise they would not have had the increased chances of colliding. However, these results have been questioned by Australian radio astronomer B. Mills.

In November, 1956, a new theory was brought forward, which, in a spectacular fashion attempted to show that the Universe was not expanding at all, that it was a kind of colossal optic illusion. Dr. E. R. R. Holmberg, chief superintendent of the Army Operational Research Unit, read a paper at the Royal Astronomical Society meeting which threatens to become as revolutionary as Einstein's first work. He postulates that time is not the fourth dimension, as defined by Einstein and leading to most of our current theory on space-time ; but that space is three-dimensional, with velocity as an extra dimension, independent of the space-time continuum.

One result of this would be that distance and velocity would become inter-related, much as time and distance are in current Einsteinian theories. Thus, if two stars carry observers, their distance carries a component of speed, proportional to their distance.

The Universe could be a stable entity ; but the vast distances involved, all with their own speed proportional to the distances, would give the effect that we in fact observe, that of all the galaxies streaming away from us into the outer darkness. Euclidean geometry is a special case, in one sense, of Projective geometry —which is a basic four-dimensional geometry, and a knowledge of Projective geometry, which has been neglected in recent years, is necessary before a full understanding can be reached of much of Dr. Holmberg's work.

Whatever the future results of this startling new theory may be, it is certain that it will stimulate new thoughts on the problem of the expanding Universe.

Astronomers are extremely interested in the apparently random pattern of the galaxies and one group is attempting to create a

mechanism based on the laws of chance, to explain the observed distribution of the galaxies.

Just as physicists and chemists explain the behaviour of gases as a statistical pattern, so astronomers would like to fit the statistics of galaxies into a simple random space-pattern. But it is not as simple as it might at first appear. No less than four random features are required, and each must tie up, randomly, with the others.

Using a computer to eliminate the laborious spinning of a roulette wheel to achieve uninfluenced answers, the astronomers found that they needed four random numbers : one to fix the centres of clusters of galaxies, a second to fix the number of galaxies in each cluster, a third to give the distances apart of galaxies, and a fourth to determine the clustering of clusters.

Like some omnipotent lord of creation, the computer disgorged its random placings for star clusters, completely without any guidance or prior plan. Only in this way were the astronomers able to produce a galactic pattern with general features similar to the pattern revealed by their telescopes.

But we see only a microscopic fraction of the great beyond. The making of the Universe, its shape, size, movement, all are as nebulous and full of mystery as the galactic clouds of stars just beyond the range of our most powerful telescopes.

Kenneth Johns

Just to complicate the paradox of Time Travel Bertram Chandler this month introduces a further innovation—whose past is the one most affected by the introduction of the Time traveller.

TIME TO CHANGE

By Bertram Chandler

Jones took his time in making his way to the address that Wilberforce had given him. He took a deliberately roundabout route, using all the usual tricks—and a few that weren't quite so usual—to shake off any possible followers. Not that Jones thought that he was being followed but, having once been a member of the Force himself, he possessed a healthy respect for the methods and capabilities of the Police.

It had been, of course, his dismissal from the Force that had turned him against the System. The rank injustice of it all still rankled ; he still did not see how the Inspector could have considered himself entitled to half the bribe that he, Jones—then a Constable First Class—had received for conniving at the escape of the little black marketeer on his way to jail. The Inspector, of course, was a full member of the Party and Jones was only a Probationer. He would never be a Party Member now.

It was Wilberforce—he, like Jones, was a tank cleaner in the employ of the Sewerage Conversion Commission—who had first

put Jones in touch with the Underground. Jones, naturally, had thought at first of turning informer, of selling his information at a price that would include re-instatement, promotion and full Party membership. Wilberforce—who had long, and sometimes hazardous, years as a recruiting officer behind him had foreseen this reaction. He reminded Jones that the arm of the Underground was long, that informers almost invariably came to bad ends, to spectacularly bad ends. Jones, the ex-Policeman, knew this. He himself had heard a man scream, had seen him fall to the Station floor writhing in agony while his dissolving entrails poured from his mouth in a sickening flood. He did not know how it was done, nobody in the Force knew how it was done. The most widely accepted theory was that the informer had been given some poison that, somehow, was harmless until bombarded with radiation at a certain frequency. And Jones, never a man to turn down anything that was free, had often accepted both food and drink from Wilberforce's lunch pail.

There had been meetings, of course, which Jones had attended. Masks had been worn by all those present and, in other ways, the strictest secrecy had been observed. There had been speeches —and it had been the speeches that had aroused Jones' contempt. He could understand revenge as a motivation—it was the lust for revenge that had brought him into the Underground. But all the talk of the happier days of the Past, all the talk of the possibility of happier days in the future, was, to Jones, mere fantasy and not very entertaining fantasy at that.

There had always been a Party. There had always been The Boss. There had always been an Underground and, too, there was always the chance that the Underground might one day defeat the Party—why, else, should the Force maintain its unceasing vigilance ? And, if the Underground should, at last, be victorious then it, in its turn, would be the Party, and there was at least a fair chance that one Jones would be the new Chief of Police.

It was after one of these meetings that Wilberforce—who, throughout, had acted as Jones' sponsor—had asked Jones to stay behind. The two men sat on their hard bench, watching the others leave the drab room by ones and twos and threes. Jones—once a policeman, always a policeman—studied them as they walked by, trying hard to memorise any clues to identity although, masked and cloaked as the Underground members were, there was little to memorise but stature and peculiarities of gait.

Wilberforce laughed.

" It's no good, Jones. Even if you knew that the tall man who's just gone out was, say, John Smith, a comptometer operator for the Astronautics Commission—(he's not, of course, even I don't know who he is)—the knowledge would be of no use to you, or to your late employers. We've taken more trouble with you than with the average recruit—and you'd be dead, painfully, before you got to within a hundred yards of a telephone booth, let alone a Police Station . . ."

" Why should I be important ?" asked Jones, feeling a little flattered.

" That you'll be finding out shortly," replied the other. "But we're alone now. Come through to the back room."

There were three people in the back room—two men and a woman. They were wearing neither masks nor cloaks. Their clothing was plain, but not cheap. They were, decided, Jones, members of the dwindling class of non-Party technicians.

" You can remove your masks," said the woman, in a high, clear voice.

She was young, in her early thirties apparently, although there were strands of grey in her close-cropped black hair. Her face had a hard handsomeness. Her mouth was wide and mobile, but her lips were thin.

" So this is the famous Mr. Jones," said the fat, bald man on her right. " Even though he looks and smells like a sewage worker he still carries the Police College stamp. Height—a little above average. Hair—mousy. Eyes—could be grey, could be brown. Face—strong, but not too strong; intelligent, but not too intelligent. I often wonder if they breed these policemen especially for the job . . ."

" Cut out the theorising, Bill," said the other man, who was tall and grey haired and was so thin as to suggest malnutrition. " Here's the tool that Wilberforce has found for us. He passed through the Police College, so has all the qualities we need. He hates the System. We needn't worry about his motives."

" I *do*," said the fat man. " I *do*. There's one tenet I never accept—that the end justifies the means . . ."

" Shut up!" snapped the woman. "William Jones," she went on, " you have seen our faces. We know that you will sell us if you think that there is the slightest chance of your getting away with it. Let me assure you, now, that there is not. Let me

assure you, too, that your knowledge of our physical appearance is quite valueless. Look !"

She got to her feet. There was a slight clumsiness, an almost unnoticeable stiffness in her emotions that did not escape Jones, the trained observer. She put one long fingered hand on either side of the fat man's head. She twisted it. It turned, unscrewing. She stood facing Jones across the wide table, the head in her hands.

" You are privileged, Jones," said the fat man. " Not many members of the Underground are privileged to witness this demonstration. Usually new members never know that they are being interviewed by three remotely controlled robots—which robots, I need hardly tell you, bear not the slightest resemblance to us. This, usually, is our way of weeding out potential informers. They rush to the nearest Police Station to blab out a full description of the mysterious Triumvirate. The description they give is, of course, useless ; the Police arrive at the house where the interview has been held just too late to put out the fire—and the informer is . . . eliminated. But we don't want *you* eliminated. As you know, Wilberforce has taken great pains throughout to prevent you from turning informer."

" That is so," said Jones, addressing the fat man's head.

He was relieved when the woman screwed it back on to the body.

" You can be of great assistance to us," said the woman. "You can overthrow the System. I need hardly say that you will be suitably rewarded."

" You will want a Chief of Police," said Jones.

" Shall we ?" Thin eyebrows flickered upwards in a gesture of interrogation. " Shall we ? But never mind—we have a job for you to do—a job for which you will be, as we said, suitably rewarded."

" What is it ?" asked Jones.

" To kill the Boss," said the thin man.

Jones swallowed.

" You might as well kill *me* now," he said, a little wildly. " It'll be faster—and far less painful. You picked the right man for the job all right—you picked a man who knows how utterly impossible it is."

" We don't want you to kill him *now*," said the woman.

" It makes no difference," said Jones. " I'm telling you—and I should know—that it's impossible. Furthermore—just suppose that I do get through the Outer Guards and the Inner

Guards, through the network of defensive devices . . . What then ! I shoot a man, or I stab him, or I strangle him. He *looks* like the Boss. But is he ? How many doubles has he got ? You don't know, even the Police don't know. And even if I get the right one—I haven't killed the Party."

" We know that," said the woman patiently. " We're prepared to admit, Jones, that you, as a Police College graduate, have made a study of the art of putting down revolution. We, of the Underground, have made a study of the art of revolution itself. We know that *at this stage* the destruction of a figurehead would be worse than useless, would, in all probability, lead to an intensified effort on the part of the Police that would stamp out the Underground for all time. After all—an Underground existing only on paper, only in the minds of the masses, would be just as useful to the Authorities as one existing in actuality —and far less dangerous.

" Anyhow—*we* have decided when the Boss is to be killed. You will be able to do it with no danger to yourself whatsoever —well, there will be danger, but it will be slight. You must have been exposed to far greater danger many a time when you were a Policeman."

It's only a robot talking, thought Jones, but there is a real woman behind the scenes somewhere. It may be her real voice that I am hearing. If it is, then I'm fairly certain that she is speaking the truth.

He said aloud, " All right. You've almost convinced me. But you'll have to tell me more—much more . . ."

" Later," said the fat man. " You will share Wilberforce's lunch, as usual, tomorrow. He will tell you a time, and an address. That is all."

There was an audible click, and all semblance of life left the three robots. Quietly Wilberforce and Jones left the room, left the house, made their way out into the dark, dreary street. Silently a monocar swept towards them, the blinding beam of its searchlight lingering over the two men. It was a police car, and Jones felt the urge to hail it, to demand to be taken to the nearest Station where he could tell his story.

" You'd better not," said Wilberforce quietly.

The car passed and hummed away into the distance. Jones and Wilberforce walked half a mile through the thin drizzle to the nearest bus stop.

Jones took a roundabout route to the address that Wilberforce had given him. It was in a street just inside the Inner City limits, but he took a helicopter bus to one of the outer suburbs, then a train to another suburb, walked a mile to a bus stop and so made his way back to the city. There was the business of a change of clothing in a public toilet and the insertion of a tiny pebble into his right shoe to produce a convincing limp, there was the putting on of a pair of heavily rimmed spectacles with plain lenses. There was—but this was elemental—the deliberate mingling with crowds and the equally deliberate walking along interminable straight stretches of empty street.

The shop for which he was looking was in a street of shops. It was sandwiched between a branch of the People's Bank and Lottery and a branch of the People's Pearl Emporium. Jones spent a little time studying the lists of winning numbers in the last lottery, then transferred his attention to the show of cultured pearls on their dusty black velvet backings, reflecting that the pearl was, after all, the least interesting of precious stones, even though only the wives and mistresses of Party Members could ever wear them. He wondered how big a reward he would get for the job . . . Marie, he remembered, had wanted pearls and had transferred her affection to the Sergeant who could buy them for her.

The clock over the watchmaker's shop a few doors down told him the time—17.45 hours, time for the rendezvous.

And not before time, thought Jones. In spite of the importance of his task he was more than a little inclined to resent the waste of his free afternoon.

He glanced up and down the street—it was one that he had known well enough in his more affluent days, before his discharge from the Force. He was glad that he had had the forethought to change into a tan tunic and slacks, and was not wearing the dungarees that were almost a compulsory uniform for members of the labouring classes whether on or off duty. Two girls were looking into the window of the Pearl Emporium, now, and an elderly man was studying the lottery results. Jones knew none of them, not even by sight.

Casually he entered the door of the shop.

It was, as he had known, a radio dealer's establishment. It was owned by a member of the still-existing class of small shop keepers and artisans, one of the people who functioned more efficiently as free individuals than as employers of one of the huge

Commissions. Jones knew the man, had often collected "protection money" from him. As he studied a display of wall television units, trying to assume the air of a possible purchaser, he wondered if the man would recognise him.

The shopkeeper came, walking silently, from somewhere at the back. Recognition flickered in his eyes, but he said nothing to indicate that he knew Jones.

"Can I help you, sir?" he asked.

"I'm interested in historical films," said Jones. "A Mr. Trenton said that you might be able to help me."

"Historical films . . ." said the shopkeeper. "We have none out here, sir. If you would step round to the back . . ."

"Certainly," said Jones. "I have the time."

He followed the shopkeeper, along a passage, down a flight of stairs, into a cellar. When he saw the mass of complex apparatus—the coils and the vacuum tubes, the meters and the heavy chair with its straps and electrodes—he almost recoiled in horror, reached for the pistol that he no longer carried. It was all far too much like something in the cellars of Police Headquarters.

"Don't worry, Jones," said the shopkeeper, departing from the ritual of word and counterword that, up till now, the two of them had been observing. "Don't worry—there's nothing lethal or, even painful here. Not that I wouldn't enjoy doing to you what you've done to some of my friends."

"Don't waste any time," said Jones virtuously. "I'm here to do a job for your bosses—and you're supposed to help me."

"There's no rush, Jones," replied the shopkeeper. "You have to be put into the picture before you can do anything. Sit on that box—a little oil on your trousers won't matter—and I'll tell you what this is all about." He waited until Jones, having spread a handkerchief over the not very clean top of the box, was seated, then went on. "What do you know of history, Jones?"

"What everybody knows. Almost since Man first appeared on this world the Party has governed. Of the Party only the Boss is immortal. All good comes from the Boss. As he sees fit he presents mankind with new machines—just as, some time in the remote past, he presented them with radio, television, the cinema, the aeroplane . . ."

"You really believe that?" asked the shopkeeper.

"Of course. Everybody does."

"What year is this?" asked the shopkeeper.

" 2123," answered Jones. " Two thousand, one hundred and twenty-three years since the Boss appeared to lead men upward from savagery."

" And yet," said the other, " you think that you can kill the Boss . . ."

" Of course. I used to be in the Force—don't forget that. I know the lengths that are gone to to protect the Boss from his enemies. He must be mortal—at least insofar as violence is concerned. And he must be old. He must be—otherwise he would not let injustice flourish the way that it does . . ."

" You must miss your cut of the protection money," said the shopkeeper.

" I do," said Jones, then realised that he did not like, had never liked, the little, dried-up, white haired man. He lapsed into sullen silence.

" So you think that if we had a change of Bosses you might better yourself," suggested the old man.

" Yes," said Jones sullenly.

" We must use such tools as come to hand," said the shopkeeper. " We've used other tools before you, Jones—but they . . . vanished. They were members of the criminal classes and, doubtless, they are doing quite nicely for themselves where we sent them. What we really wanted for the job was somebody like yourself—somebody versed in criminal procedure and with a strong motive for revenge . . ."

" Revenge *and* reward," said Jones.

" All right, if you want it that way. Now, Jones, I'm going to give you a history lesson. What I tell you you won't believe —but you'll have the proof of it soon enough. First of all—the Boss is not the Boss ; not the original Boss, I mean. The first one, after he rose to power, had his doubles. The Party has seen to it that there is always a double to take over, to make the necessary public appearances. When necessary, plastic surgery has been used. But—there is always a man with the Boss's face, figure and manner, always apparently in his middle forties, to act as a figurehead."

" Rubbish," said Jones. " The Party scientists could confer immortality on anybody—that is if the Boss let them have the secret."

" Have it your own way—but let me carry on with the history lesson. It was in 1973 that the first Boss came to power. There had been a war in which atomic weapons had been used and,

furthermore, hostilities had been followed by widespread economic collapse. Conditions were ripe for any demagogue who could promise peace and plenty. The Boss—Howard Pendexter was his name—was such a demagogue."

"I can't believe it," said Jones.

"Here's proof," said the old man. He got up from the box on which he was sitting, walked to a cupboard against the wall. He opened it, took out a bundle of yellowed paper. "Newspapers," he said. "At one time news was disseminated by the printed word as well as by radio. It was, in its way, inconvenient—a record existed of any mis-statement, any broken promise made by any politician. Once the People's Party rose to power newspapers were suppressed. The rewriting of the history books soon followed. The People's Party started by controlling the present—then they turned their attention to the past. Every record giving the lie to their official histories has been destroyed. Well—not *every* record. We've saved some."

Jones took the flimsy sheets that the old man had called newspapers. He looked at the date on one of them—March 5, 1973. He read the big black type : PEOPLE'S PARTY SWEEP TO POWER IN SOUTH. POINDEXTER PROMISES PEACE AND PLENTY. There was a photograph there, blurred and faded by time. It showed a man standing on some sort of platform addressing a huge crowd. The man was the Boss.

"You could have printed these yesterday," said Jones.

"I suppose we could. But look at the age of the paper. See how brittle it is."

"Chemicals, radiation . . . I don't know. I'm a Policeman, not a chemist."

"You *were* a Policeman. And you want to murder the Boss. You'll have to put yourself in my hands if you want to do it. Sit there and read these books and newspapers while I get things ready. It's essential that you have a clear picture of the time to which you're going."

"*Time* ?" demanded Jones. "*Place*, you mean."

He read the newspapers. They were, he had to admit, masterly jobs of faking. They told him of some mythical age in which men had possessed the unheard of power of electing their governors. They hinted at a standard of living for the labouring classes that was, by Jones' standards, utterly fantastic—and this in a world that had been devastated by war and brought to ruin by economic collapse. Jones turned to the books. There was

one, by an author named Wells, called THE OUTLINE OF HISTORY. Jones skimmed through the yellowed pages, read a paragraph here and there, looked at the illustrations. The whole thing was utterly fantastic. It could not be fact. It could not possibly be fact. It must be some ancient imaginative novel written in the form of a history book.

" Are you ready ?" asked the old man.

Jones started.

" I suppose so. Where are you sending me ?"

" I'm not sending you *anywhere*. You've heard of Time Travel ?"

" Yes," said Jones. " Gossip gets around. Some of the scientists working for the Commission of Physics claim to have sent a mouse back three seconds in time . . ."

" The Party doesn't have all the scientists," said the shopkeeper. " The Underground has them too. I'm one of them. This shop gives me the excuse to buy and to make all sorts of apparatus. *I* sent a mouse back in time *five* seconds thirty years ago. Now, I can send a man back one hundred and fifty years.

" Take this thing like a wristwatch. Strap it on—either wrist will do. When you wish to return to the here and now, press the knob at the side. Take this pistol—it's a Schultzer automatic, fully loaded. I needn't tell you what *that* can do. Now, listen carefully. I am going to send you back in time. You will find yourself in this cellar—the building is over one hundred and fifty years old. Make your way out into the street as unobtrusively as possible. It shouldn't be hard—clothing styles have changed hardly at all since the Party came to power. There was rather more colour in those days, I think. Don't be in a hurry—loaf around and get the feel of things. There's some money here . . ." the shopkeeper handed Jones some filthy, unfamiliar looking bills—they did not bear the likeness of the Boss " . . . that will suffice for your immediate needs.

" Howard Poindexter—the Boss—will be in the city. He will have his bodyguards, but they will not be very efficient. He will not, yet, have any doubles. Wait for a good chance—then shoot him with as little compunction as you would use in shooting any other criminal—although his major crimes will yet have to be committed. Press the button, and return."

" There's something I don't quite understand," said Jones. " There's a . . . a paradox somewhere . . ."

" No doubt, no doubt. You can tell me all about it when you get back. Now, sit in the chair . . ."

"No!" shouted Jones. "I see what's wrong! If your story is true, by changing the past I shall change the present! I might even wipe myself out of existence."

"You couldn't do that," said the old man. "In order for you to change the past you *must* exist in the present. Even so—I think a little persuasion might help . . ."

The two men who appeared suddenly had their pistols already drawn. Jones knew that he could never pull his from his pocket, and cock it, in time.

He sat in the chair.

As much as he expected anything, he expected pain. He had seen chairs of similar outward appearance in the cellars of Police Headquarters, and had seen them used. But there was no pain. There was no . . . anything.

He had shut his eyes when the old man had pulled the switch. He opened them again as he found himself sprawling on a hard floor. He was in darkness.

There was a moment or so of panic, then Jones saw a rectangle of dim yellow light. It must be, he reasoned, a door—and the light switch must be just inside the door. Cautiously he edged forward, barking his shins on something hard and sharp. Cautiously he negotiated the obstacle. His groping fingers found the switch, depressed it.

He was, as he had been told that he would be, still in the cellar. There was no apparatus in it, merely a few packing cases. On one of them was a large sheet of printed paper. Jones picked it up. Headlines—black and clear against the whiteness of the paper—stared at him. PEOPLE'S PARTY SWEEPS TO POWER IN SOUTH. POINDEXTER PROMISES PEACE AND PLENTY.

So the Underground was right. So their fantastic history was not a tissue of lies. Yet—"I can't believe it," whispered Jones. "I won't believe it."

Carefully he opened the cellar door, carefully he made his way up the steps. He walked softly along the corridor, found himself in the shop. It was not now a radio shop—it was a grocery. Stacked high were cans of food—more food, and in greater variety, than he had seen even in the luxury Free Market shops of the Inner City. The tiers of cans afforded him cover—through a gap he could see a whitecoated salesman talking to a woman customer. Jones patted his pocket to assure himself

that his automatic was still there, then strode boldly into the shop, towards the door.

The salesman turned towards him.

" I'll not keep you waiting long, sir."

" Sorry," said Jones. " No time."

He walked out into the street. It was familiar, yet unfamiliar. Most of the buildings were the same, most of the shops—but they had different names, sold different commodities. Too, it had been early evening when he had been sent on his voyage through Time—now, judging by the position of the sun, it lacked only a few minutes of Noon.

The people were different, too. There were more of them and, as he had been told they would be, they were more brightly dressed. Their manner was different, too. They walked and talked with what seemed to Jones to be an insolent carelessness. There was a policeman standing at a corner—the uniform had changed very little—and citizens passed him by without, so far as Jones could see, any qualms whatsoever, no evidence of fear. It seemed terribly wrong.

In spite of what he had seen, Jones could not bring himself to approach the police officer. He accosted a portly, middle aged man.

" Excuse me," he said. " I'm looking for a Mr. Howard Poindexter—the . . . politician. I have a message for him. Do you know where I might find him ?"

" From out of town, are you ?" asked the man. " One of the Boss's mob, huh ? You're on the right side, young feller ! The Boss is the only man who can bring law and order back to this country. You'll find him at the Grafton . . ."

" The Grafton ? Where . . . ? "

" On the corner of Smith and Delamaire Streets. You can't miss it. And tell the Boss that one citizen of this town—Wilbur Spratt's the name, sonny—wishes him well ! "

" I'll do that," said Jones. " Thanks, Mr. Spratt."

The Grafton, he thought. What *is* a Grafton ? But it must be the building of the Education and Culture Commission.

He found the Grafton without any trouble. He read the unfamiliar words, *Grafton Hotel*, sprawled across the facade of the familiar building. He walked boldly into the lobby, decided that it must be an unusually luxurious lodging house, the sort of place that in his day would be reserved for Party Members only. He strode up to the desk.

" Mr. Poindexter," he said to the bored blonde on duty. " I have a message for him."

" You can't ring," she said. " The telephone's broken down. You'll have to go up. You'll have to climb—the elevator's not working. Room 519—fifth floor."

It was strange to be climbing those familiar stairs again. He had climbed (would climb ?) them many a time when he was attending Police College. Little had changed (would change). Things were newer and cleaner, but that was only to be expected.

After he reached the fifth floor Jones paused to recover his breath. He walked slowly and silently to the door numbered 519. He heard voices inside. One of them was familiar. Carefully, Jones tried the door handle. It was not locked. He paused, then removed his right hand from the handle, substituting his left. With his right hand he drew his pistol, slid back the safety catch.

The enormity of what he was about to do weighed ever more heavily upon him. The rumbling voice that he could hear was the Boss's voice, the accent, the tricks of phrase, were the Boss's.

" . . . . we must grasp the nettle firmly. There must be no turning back now that we have set our shoulders to the wheel . . ."

The Boss had used these very words when addressing the Police Cadets at the passing out ceremony.

This was the Boss. All that the Boss said was true, all that the Party said was true. There had always been a Boss, there always would be a Boss. The Underground had tricked him with their forged scraps of paper, their cleverly faked books, had almost persuaded him to believe in a world that never was, never could have been. They had used some sort of hypnotic technique on him to make him believe their lies.

But the hypnosis wasn't necessary. He had his grievance. He had sworn revenge. He intended to claim the reward—and intended to rise to the top in whatever upheaval followed the overthrow of the System. He would grasp the nettle. (He smiled thinly). He had set his shoulders to the wheel. There was no turning back.

He stiffened. Somebody was coming along the corridor—it was two uniformed Police Cadets.

" There shouldn't be any trouble about *my* Party Membership," one of them was saying. " After all—my old man's mistress is secretary to the Commissioner for Internal Affairs. You're just unlucky, Bill—you should have chosen parents with some influence . .. Hello ! Who's that ? What do you want?"

Jones had no compunction about firing upon the uniform. He had learned the lesson of dog eat dog very early in his Police career. His pistol coughed twice, very quietly. He had aimed for the throat—and he was a crack shot—so the cadets died quietly.

Jones flung open the door. It no longer, he noticed, bore the numerals 519 ; it carried the sign, in large letters, DIRECTOR OF POLICE STUDIES. There were four men in the room. One wore the uniform of a Police Commissioner, two—the inevitable guards—were in plain clothes—the fourth was the Boss. The guards were quick—but Jones' gun was already out and ready to fire.

The second bodyguard's pistol was out of its holster when Jones shot him down. The Commissioner had time to loose off one round from his own weapon, but it was wild. Then, over the dead men, Jones faced the Boss. He sneered as the Boss begged for his life. He aimed carefully, deliberately, for the stout man's belly. He pulled the trigger.

Would that thing on his wrist work ? He transferred his pistol to his left hand, felt for the little knob with his right index finger. Something smashed with sickening violence against his left wrist, smashing the instrument and knocking his pistol from his grasp. Strong hands pinioned his arms to his side.

He heard a voice say, " What a mess ! Well—it all means promotion !"

Another voice said, " Quiet, you fool ! The Boss is coming !"

" There is the Boss !" screamed Jones, jerking his head towards the bleeding, still twitching figure on the floor. " There is the Boss !"

" You murdering swine !" snarled the first voice. " Haven't you ever heard of doubles ? "

The Boss stepped into Jones' range of vision. He glanced at the bodies of the two guards, of the Police Commissioner, of his double. He looked at Jones as though trying to identify him. At last he shook his head.

" Take him to the cellars," he ordered at last. " We will leave no stone unturned until we find out who is responsible for this dastardly crime !"

" How did we fail ?" asked the plump, middle aged woman.

" Carruthers will be able to tell us," answered the mild, clerkish man.

"We hope," added the man who looked like a professional weight lifter.

The door opened and the shopkeeper came into the room.

"Well—what happened?" asked the woman.

"Just this. The Party *has* changed the past."

"Rubbish!" said the mild man.

"It's not rubbish. I had a spy beam on him all the time. At first the past was as our hoarded records show it to have been—and then, as soon as Jones heard Poindexter's voice, it . . . changed. Poindexter was no longer a demagogue who had yet to achieve power, he was already the Boss, and had been for . . . for . . . I don't know for how long. And the old Grafton Hotel, where he was staying, was quite suddenly the headquarters of the Education and Culture Commission, and crawling with Police Cadets. Oh—it was still the past; but the past as believed in by Jones. Not *our* past."

"What then?" asked the woman.

"Jones shot the Boss. And then he was seized by a squad of Police Cadets, and disarmed, and the Return Control broken—although that was accidental. They took him to the cellars. When I left the shop they were still trying to make him talk. Trying? They were making him talk."

"We're safe enough," said the big man. "After all—it was a hundred and fifty years ago."

"Are we safe?" asked the woman. "You're the scientist, Carruthers. Are we safe?"

"I don't know, Mary. They might believe him. If they do—they might take a careful note of dates and times and places. Then it might well be that we shall be stopped before we can start, and that we shall find ourselves in the cells—if we are still alive, that is—with no memories of this conversation, but a perfectly good set of memories covering our arrest, torture and imprisonment . . ."

"If it were going to happen it would have happened already," said the mild man. "Furthermore—the past that Jones is in is the Party's, not ours . . ."

"Suppose there's a fire in my shop?" asked the scientist. "Suppose the books and papers are destroyed? What then? Will *our* past still exist when the last records are gone?"

"Then we'd better *do* something about it," said the giant. "Where we've gone wrong with each attempt is in sending a professional killer to do our dirty work for us. We've made the mistake of assuming that Poindexter, in his early beginnings,

was as well defended as the Boss is now. One of us will have to go. Somebody will have to go to whom the real past is *real*, not just a convincing piece of propaganda put out by the Underground . . ."

"Somebody," said the woman, "who will be tempted to steer the ship of history on to what he thinks is the right course. Tell me, Carruthers, in some parallel world that was snuffed out like a candle flame, did we, or four people like us, make a similar decision, and was the name of our emissary Howard Poindexter ?"

Bertram Chandler

THE LITERARY LINE-UP

Next month's issue is another of those all-star British efforts which you will find packs a powerful literary punch throughout. Right from the outstanding cover painting by artist Terry to the end of Part II of Kenneth Bulmer's exceptionally fine serial "Green Destiny." The lead-off novelette "To Kill Or Cure" by James White is another of his powerful collisions between Earthmen and aliens ; John Brunner returns with "Out Of Order," a brief but explosive story of a computer-technology going mad ; "Oh, Ishrael !" another gem of a story by Brian W. Aldiss ; plus stories by Dan Morgan and John Kippax.

Frankly, the calibre of some of our recent issues has resulted in several of our regular contributors receiving tempting offers from American editors to write for their market !

Story ratings for No. 54 were :

1.	The Executioner - - - - -	Alan Barclay
2.	Escapement - - - - - -	J. G. Ballard
3.	Tourist Planet (conclusion) - -	James White
4.	The Whole Armour - - - -	Dan Morgan
5.	Double Take - - - - -	Richard Wilson
6.	The Message - - - - -	Isaac Asimov

THE TOOLS

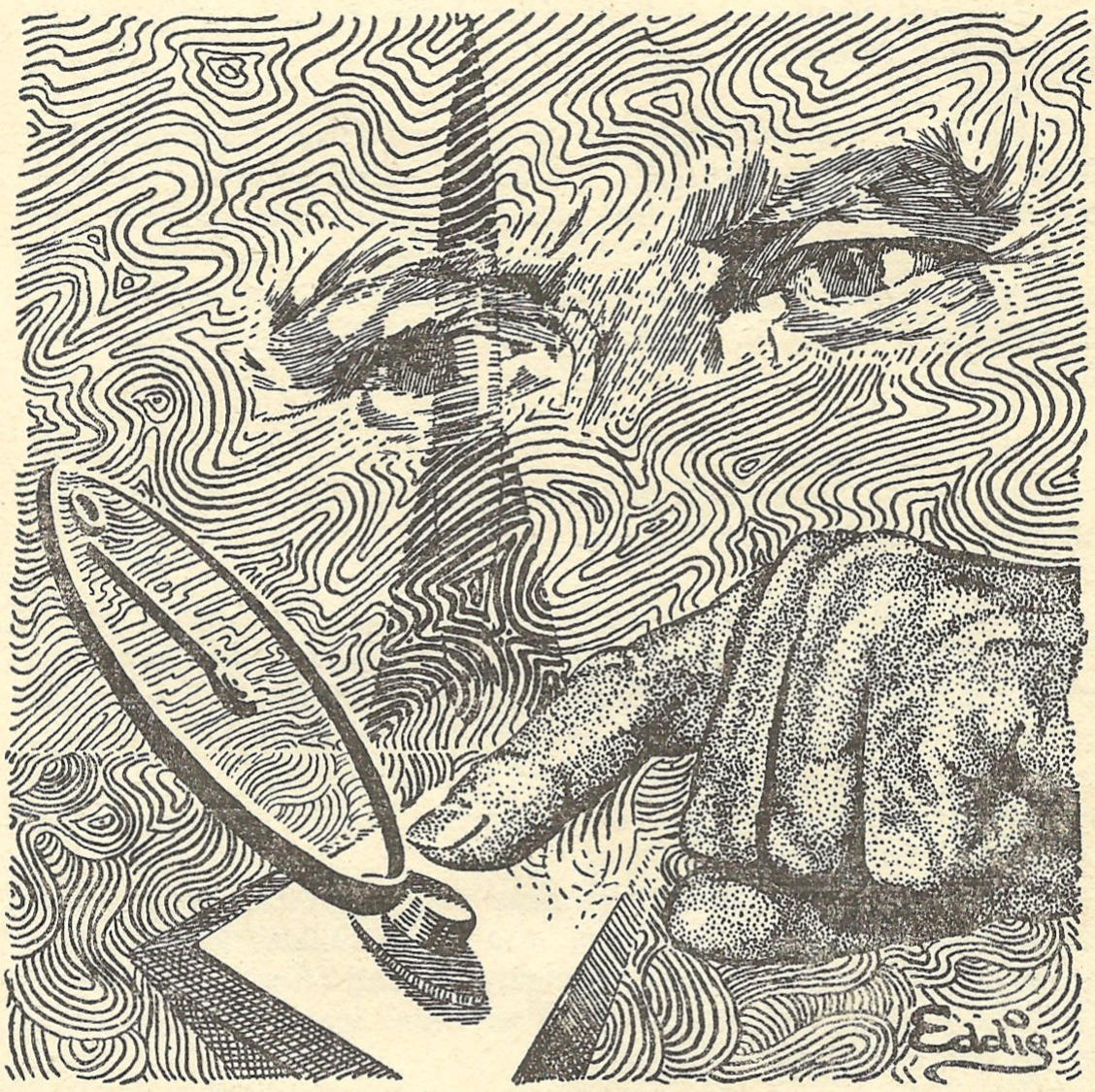
It is two and a half years since Peter Hawkins' last published story in our pages—the memorable "Ship From The Stars." His absence has been mainly caused by settling down to married life and now he returns with a truly magnificent story.

OF ORLAS BOYN

By Peter Hawkins

Illustrated by EDDIE

Matt Drecklan permitted his eyes to wander as soon as Skipper Russell Horne turned the first page of Matt's service record. The papery-faced, balding skipper had seen distinguished service in the Lyran war ; the multi-coloured blaze of medal ribbons on his chest proved it and two wound-stripes on his left sleeve gave corroboration. From the white cross enclosing a red sword above the wound-stripes Matt saw that Horne had once been a Space Navy psychologist, although why he had given up that to rise through the Engineer ranks in the merchant service to become the captain of a star-hauling tramp there was no indication. Matt's eyes flicked over the bare, rust-streaked metal bulkheads, observing that the Space Navy's passionate fondness for personal tidiness had remained with Horne. In a little rack over the skipper's bunk was a row of books and tapes



about Salvernians ; well, a psychologist who had served in the Lyran war could be permitted some unusual bedtime reading material.

Matt returned his gaze to Horne knowing the sense, if not the precise mental wording, of the thoughts passing through the skipper's mind as he read the service record.

Here's a man, Horne was thinking, *with whom there's nothing wrong basically. He attracts trouble. He's cursed with a quick temper and he's only ever shipped as a third engineer despite having his second's ticket. He seems to have no ambition, or if he has it's been set at nought by reason of his temper but, on the other hand, he's survived Mitchell's disease and will provide serum if anyone goes down with it.*

Skipper Horne raised his eyes from Matt's service record.

" Do you want to star-haul aboard the *Eldrake* with me ?" he snapped coldly.

" Yes, sir."

" Right. Chief will sign you on. From this," Horne handed Matt's service record to him, " I don't expect too much of you but I will tell you this : my previous Third was nothing less than a genius and the men almost worshipped him. My First and Second Engineers couldn't hold a candle to him and furthermore they'll admit it." He paused. " Still want to star-haul with me ?"

" Yes, sir."

" No other questions ? "

Matt would have liked to have been told his destination but he doubted if that were known.

" No, sir."

" Very well. Get along and see the Chief ; he'll brief you."

Matt picked up his service record and placed it in its plastic envelope, shoving the envelope and its contents into a jacket pocket. He straightened up and saluted. Captain Horne dismissed him with a nod and reached out fingers for the intercom switches. As Matt slid the door shut he heard Horne speaking to the Chief Officer.

The signing took little enough time ; when Matt had registered his name on the final document the Chief Officer leaned back in his seat, took out a packet of cigarettes and offered it to Matt. Gratefully Matt accepted one. The Chief leaned back further in his chair and said :

" You'll find me pretty easy to get on with—bit different from the skipper." He exhaled smoke. " My name's Wardline ; just keep things shipshape, do your job and everything will be O.K. Ship's meals while we're down are at eight, twelve-thirty, five-thirty and eight. We've a good cook but by and large an unpleasant collection of officers—as persons." Mentally, Matt agreed with Wardline, including the Chief in the collection without meeting the remainder. " You'll meet 'em, dislike 'em, quarrel with 'em and then ignore 'em," continued Wardline. " After a few days you'll do your job and in your off-duty time keep to your cabin with your tapes and your ultrawave and your books. Then the *Eldrake's* a very happy ship." He smiled a little sourly and straightened in his chair, his expression trying to give the impression that his shipmates were to blame for his own abruptness.

" Get your gear and come back as soon as you like ; there's plenty to be done." Unlike Skipper Horne, Wardline had the grace to rise from his chair and shake hands with Matt. " See you back here in . . . ?" His eyebrows raised in enquiry.

" Half an hour," finished Matt. " I'm at the YM."

" One of the good boys, eg ?" grinned Wardline.

" No, broke," admitted Matt.

" That bad, was it ?" sympathised Wardline. " Ring for me at the airlock when you get back and I'll show you around."

Matt still had twelve minutes to spare when he arrived back at the spaceport from the YM with his two holdalls. While he waited for a port runabout he purchased a few books and some tapes from the kiosk, bearing in mind what Wardline had told him. His selection made he waited less patiently for a runabout, beginning to sweat a little in the increasing heat of Elva IV and wishing he possessed a wearable tropical uniform.

Out on the concrete apron which stretched to the horizon were eight ships, tall, slim, needle-like vessels, all starships, the light of Elva glistening from their long, silvery flanks in dazzling sunbursts which hurt his eyes. Matt added a pair of sunglasses to his wants list, in addition promising himself that if the *Eldrake* were the unhappy ship Wardline indicated he would certainly spend a considerable portion of his spare time studying for his First Engineer's ticket.

The runabout pulled up before him at last and sped him towards the tall, shining needle which would be his home for, perhaps, a long time and which might also be his coffin. He crossed and uncrossed his fingers, a swift mental prayer passing through his mind that the voyage would be, if not uneventful, no more damaging to his character.

Wardline was waiting for him, leaning negligently against the open lift in one of the tail fins.

" All set ?" he asked, swiftly glancing at Matt's small amount of gear.

Matt nodded and climbed into the lift ; the doors closed and the lift swooped upwards.

" I want to tell you a few things about your predecessor, Matt," began Wardline apologetically. " You'll find things a little difficult on account of it but we had to have a Third Engineer. You see . . ."

" I see," admitted Matt. This possibility hadn't occurred to him, despite the Captain's reading material. No wonder Skipper

Horne had been unable to find a young, keen, eager Third for the *Eldrake*. " The previous third was a Salvernian ?" he asked bitterly.

" Yes. We'd only had him six months so he hasn't messed up your tools badly, not like some of them do . . ."

That was, presumably the reason for Skipper Horne's ill-temper. He'd possessed a superb engineer who, for all his many shortcomings, would be extremely hard to replace, mainly because he worked for next to nothing.

" What happened to him ?" asked Matt.

" He was killed in a bar brawl. It was nothing to do with him and Salvernians aren't fighters anyway. It was just unfortunate that he was where he was when a heat beam passed that way." Wardline raised his hands, palms uppermost, to indicate lack of responsibility for the affair.

Matt nodded understandingly, cursing his own stupidity. He was, according to his record, not a good engineer, but a great deal of that could be counted as hard luck. Given a chance such as shipping aboard the *Eldrake* offered, in normal circumstances, he could perhaps have made good and been signed up on a contract basis. He admitted Skipper Horne had told him someone pretty good had been his predecessor, but hadn't mentioned anything personal about the man. Matt hadn't thought to ask and Horne's unpleasant attitude, contrasting with his acceptance of Matt should really have placed him on guard instead of giving him a false sense of security. He took a tighter grasp on the handles of his holdalls and followed Wardline out of the lift along a dingy, rust-specked corridor. The Chief slid back a door and flicked up a switch inside the tiny room.

" This is yours. We've cleared it out, cleaned it out and it's as sterile as Luna." Wardline waved a negligent hand. " There's a list of everybody's number beneath the 'phone and . . ."

The clangour of a mellow gong interrupted him. By habit Matt and Wardline studied their watches and exchanged glances.

" Lunch," confirmed Wardline. A tiger's smile spread over his face. " Come and meet your fellow officers. They're a wonderful bunch of lice."

Matt dropped his holdalls and followed Wardline along narrow corridors and down the lift to the officer's diner. Four men, sitting in two pairs of two at different tables designed to take four, turned surlily to survey the new arrivals. Wardline introduced Matt to his shipmates.

" Our new Third, Matt Drecklan," he announced. For a moment or two there was silence, no welcoming, no rising with hand extended, nothing to show that the famous courtesy of the spaceways had ever existed, until one of the men pushed back his chair and half stood. He caressed his adam's apple as he said tonelessly, in a thin, pitched voice, " I'm Mack Pentha, Chief Engineer. Pleased to have you aboard." He indicated his tall, red-haired, unshaven eating partner. " This is Wal Perrett, communications." Perrett and Matt exchanged nods.

" They always eat together," informed Wardline. " Now over here we have the ship's second, Ken Harlow," the beefy, fair-haired one nodded, " and the second engineer, Bart Ascray." Ascray, small and with greying hair, blinked dull eyes behind rimless glasses and essayed a diffident, " Pleased to meet you."

Matt understood exactly what Wardline had meant when he had called his shipmates a wonderful bunch of lice. By comparison, if only because they exhibited some signs of life and interest, Skipper Horne and Wardline, for all their immediately obvious unpleasantness, were infinitely preferable as human beings.

Wardline was correct about the cook ; he was wonderful. The meal was delicious, incorporating delicacies from a dozen worlds which must have cost a great deal to purchase here on Elva IV and one which Matt appreciated fully, having existed on the very plain, though good, YM food for the last three weeks. Matt and Wardline sat with Harlow and Ascray ; between them they managed to keep a desultory conversation going which just lasted out the meal. Immediately they had downed their coffee Harlow and Ascray left, pleading work as the excuse for their hurried departure.

" You see," observed Wardline, lighting a cigarette.

Matt nodded, stirring a second cup of coffee.

" It wouldn't be such a bad idea if I followed their example," he suggested. " I gather there's rather a lot for me to do, even without the handicap of what the Salvernian did to the tools. What was his name, by the way ? "

" Orlas Boyn," said Wardline. " A good, undoubted Salvernian name and, as you say, there's plenty for you to do."

He rose from the table, obviously waiting while Matt hurriedly downed his coffee. Together they left the diner and walked purposefully through the *Eldrake's* corridors to the lift. Wardline poked the button which lowered the lift to the engine room, a room the whole diameter of the ship on whose floor squatted

a dozen snail-like Horsch generator-convertors surrounded by subsidiary equipment. In the low ceiling a lighting tube flickered intermittently. Wardline pointed a finger at it.

" That would be a good place to start," he said. " Your tools are over there, in the cupboard . . ."

" Marked ' Three '," interrupted Matt, adding, " I'll be back as soon as I've changed and start working."

" Find your way back ?" asked Wardline.

" Yes, thanks."

" Good. Be seeing you." Wardline turned his back on Matt and walked out without waiting for an answer. Matt glanced at the faulty tube again and then at the cupboards containing his tools, lately the property of a Salvernian. He suppressed an urge to look in the grey-painted cupboards, deciding he'd know as soon as he'd changed and returned what sort of horrors the Salvernian had left for his successor.

Matt took off ten minutes to arrange his few belongings in the lockers of his tiny cabin ; he didn't know how long it would be before the *Eldrake* blasted off and debated for a moment or two whether or not he should hang up his best suit for it to shake off the long-packed look and decided he might as well. Wardline could perhaps be approached for an advance if the ship were staying down for a long while and the next voyage would be of reasonable length. He slipped off his second best, hung it beside his best and pulled a suit of coveralls from one holdall.

A few more seconds and he'd finished laying out his own personal things. He pulled a pair of plastic gloves, two small test-meters and an insulated screwdriver from the depths of one of his holdalls and gently footed both of them beneath the bunk. He swallowed and made his way back to the engine-room, hoping and praying that Orlas Boyn hadn't been as big a hog for work as were most of his fellow Salvernians.

Without difficulty he located the spare lighting tubes, replaced the faulty one and propped it in a corner. Keeping his nerves from jangling by an immense effort of will, despite the fact that he knew the tools would look perfectly normal, Matt opened the first of the grey-painted cupboard doors. Inside all the tools were clamped in their particular sockets, spring or plastic clips holding them firmly in place in tiny, individual acceleration couches. In one non-regulation drawer lay a sinister reminder of the previous Third, a pair of the thick, dull maroon gloves which Salvernians always wore when working. Matt stretched

out a hand to touch them ; when his fingers were six inches away from the gloves they began to wriggle and tried to curl up small in the corner of the box furthest from him. A nervous, shuddering laugh trickled from Matt's lips as he withdrew his fingers. As if regaining confidence the gloves resumed their previous position.

One by one Matt picked up the tools and held them for a few brief seconds. Some felt awkward in his grasp, particularly those which Orlas Boyn had used most and which had had most time to absorb the commands and instructions which the Salvernian had managed to implant in the senseless wood, metal and plastic of the tools. All of them recognised Matt as a stranger, none of them liked him and made no bones about it yet, despite the number of times which Orlas Boyn must have used the screwdriver, it reacted far less offensively in proportion than did some of the other items.

The power-tool was particularly nasty for some unknowable reason. The butt writhed and struggled in a desperate attempt to escape Matt's grasp. Firmly and he hoped, gently, Matt hung on to the power tool, right hand clasped around the butt, left hand cradling the chuck. He recalled all the superstitions connected with the Salvernians, dismissed them and admitted warmly to himself as he firmly believed that they had some most unusual talents which, while Earthmen disliked them intensely, were unique and useful .

For a moment or two the power tool stayed quiescent in Matt's hands before renewing its struggles to escape with such ferocity that Matt almost dropped it. The lead flicked and writhed like a frantic snake until Matt hurriedly replaced the tool in its box, winding the lead around on top of it. He released a long, shuddering breath and wiped cold sweat from his forehead with the back of his hand.

Matt knew to a cent just how much money he had ; he knew, quite by chance, that there was a good tape detailing the problems and suggesting answers in the use of tools impregnated with Salvernian thought patterns retailing at five stellors twenty-five available at one of the shops in town. Could he afford to pay out the five twenty-five, bearing in mind that he had no knowledge of the length of the voyage ahead of him ? He decided he would because, if he could master the tools, he would certainly be able to purchase them from Skipper Horne when the *Eldrake* grounded at her destination. He laughed a little at his notion of adapting

himself to the Salvernian tools ; only six men had ever done it and lived and, although none of them was in any way exceptional, their capabilities seemed greater. Here Matt called short his musings ; comparison of his own with other peoples' achievements always depressed him.

" How's it going, Matt ?" Wardline's voice from the door sealed the stop he had put on his musings.

" Not too bad," he replied. " I may have to ask to borrow some tools now and again if the other men won't mind."

" They will," informed Wardline grimly. " You know that people who handle Salvernian's tools are supposed to poison other tools . . ."

" That's plain, rank superstition . . ." began Matt angrily.

" You tell that to the men you're going to borrow from," interrupted Wardline. " You've met 'em ; do you think any one of them would help anybody ?" He leaned in the corner, alongside the lighting strip Matt had propped against the wall. " Look, we've got our final cargo and the skipper is a lot happier about life because it means a good long haul to Aldebaran. Take us six months, near enough. We're leaving in three days time."

" Good," said Matt happily. That was what he wanted to know. " Do you think . . ."

" Yes, I'll advance you something . . ."

Matt glanced away from Wardline, looking towards the door. The Captain entered ; a slight smile on his pale, papery features. His eyes flicked around the room, seeing the open tool cupboards, the replaced lighting strip, Wardline and Matt.

" You know your destination, Drecklan ?" he asked.

" Yes, sir."

" I see you've replaced that strip. Good. Wardline," Skipper Horne's voice hardened, " make sure it's a regulation advance you give Drecklan, and not one of your personal loans at fancy interest rates."

" Yes, sir." He moved a fraction of an inch, as if easing his shoulders against the wall. His arm touched the faulty lighting strip ; it slipped and began to fall. Wardline stretched out a hand to catch it and fumbled ; the light strip crashed to the floor, glass fragments spraying in all directions.

" You should have serviced that tube immediately, Drecklan," snapped Horne, " and put it in store. How are the tools ?"

" I think I'll be able to manage, sir."

" Don't be afraid to come to me if you have trouble. It's a long haul to Aldebaran."

With another quick glance around the engine room he turned around smartly and left.

"When will you be in your office for me to have that advance?" asked Matt.

"Think you ought to apply?" asked Wardline. "You've just broken a lighting strip. Cost of replacement—forty stellors; cost of rejuvenating it—twenty cents. Look, you've been long enough to know star-hauling costs money and you know your record didn't impress the skipper. You've got your Second's ticket so you know the drill about lighting tubes. Remove, replace, service—without taking a breath between the actions . . ."

A blinding, incredible burst of crimson flashed before Matt's eyes. His temper had brought him trouble many times and while the red mist of rage obscured the cause of his anger Matt couldn't control himself. He grabbed the Chief's shirt in two bundles of cloth with his fists and shouted:

"You knocked down that tube deliberately when the skipper told you to make a regulation advance and not a personal . . . uh!" The haze of red dissolved and Matt crumpled up as Wardline's fist caught him in the stomach. Matt's hands released their grip on the Chief's shirt.

"Careful," said Wardline as Matt struggled to regain his breath. "Assaulting a superior officer, accusing him of . . . oh, it doesn't matter. You got a bit het up; I'll let it pass this time."

Wardline started to whistle and left the engine room as Matt gulped in deep breaths of air. Gradually the pain eased and he walked to the tool cupboard. He stretched out a hand to the gloves; as his fingers neared them they shivered and tried to curl up small in their own little acceleration couch. Matt picked up the screwdriver, mind almost blank, with just a little trickle of thought running through his mind that it would be nice to come to terms, to understand the patterns Orlas Boyn had planted in the tools. No reasons, no ideas of financial gain obscured the one pure thread of thought; just that it would be nice to understand. For some five seconds, until Matt became aware of it, the screwdriver lay utterly still and in some indefinable manner, companionable, in his grasp. Then, as Matt became aware of the situation, it started to writhe and wriggle like a snake. Matt made no attempt to hold it; he replaced it gently in its padded bracket.

Without studying the tools any further Matt pulled a broom from the general cupboard and swept up the pieces of the lighting strip. The pieces disposed of in the converter he went to the service charts and work schedule drawer in the desk beside number one engine. Of one thing he was certain ; as Orlas Boyn was a Salvernian everything would be up to date almost to the moment he died and some items could justifiably be left even if they did happen to be below standard. Matt pulled out the file with his rank on it and started reading. Suddenly he felt rather desperate. For a year before Orlas Boyn had been signed on Skipper Horne had been without a Third Engineer, sculling around little-visited and poorly-organised systems, peopled by individuals only too pleased to accept whatever the *Eldrake* had in her holds and prepared to ignore any Interstellar safety regulation which suited them.

From the time Orlas Boyn's small, neat writing appeared on the charts and logs much had been done. Like all his race Orlas Boyn had worked like a fury ; he loved engineering, worked day and night over his sections of the ship, counting it a privilege to do so, patching, repairing, making good, manufacturing new parts and, from the precision and minuteness of his reports, at times almost remaking whole sections of the *Eldrake*. Even granted he was engineering crazy, Matt doubted whether Orlas Boyn had settled down to one good meal in all his six months aboard, or slept more than six hours in any period of twenty-four and for all his good work his only reward was to be burned down by a heat-beam intended for somebody else.

Matt pulled a scratch-pad and pencil from the drawer and started planning a rough schedule of work. Three days more on Elva IV and six months to Aldebaran. From Aldebaran—that was anybody's guess. He thumbed through Orlas Boyn's notes, making notes of his own as he turned the pages. The feeling of desperation recurred again after half an hour of planning when he realised that to get his sections of the ship one hundred percent in order he would need to work with Orlas Boyn's intensity for nearly all the six month voyage to Aldebaran. In fact, it occurred to him that the state of the *Eldrake* was Skipper Horne's reason for making a long haul. That gave him a certain feeling of pleasure ; in a way it implied Horne was giving him a back-handed compliment in recognising, Matt hoped, a certain latent ability in him.

" Making out all right ?" asked a diffident voice from the door. Matt spun around in his chair. Bart Ascray walked in and without waiting for an answer to his first question added, " How are the tools ?"

" A bit jumpy," admitted Matt.

" Yes, I thought so. Captain tried a couple of port mechanics on them who fancied their chances as trainee Thirds. They didn't like 'em much."

Matt nodded. He looked over Ascray carefully. The Second Engineer's grey hair was plastered down with grease, his shiny eyeballs betrayed the detail that contact lenses had replaced his specs, he was wearing his best grey tropical uniform ; obviously he was going to town on a spree tonight.

" Going out for the evening ?"

" Yes."

" I've got quite a lot to catch up on. Could you lend me your power tool while you're out ?"

Ascray's head began moving in a negative gesture as soon as Matt uttered the word ' lend.'

" Sorry. The Chief said you handled Boyn's tools . . ."

" Dammit," interrupted Matt, " you're not from one of those half-stellor systems you've been visiting lately. You know that story's all slop . . ."

" I don't intend to find out at the expense of my tools."

" Look, Bart, you seem to be a reasonable man. What's happened to the companionship and the good will of the spaceways aboard this ship . . ."

" Drecklan," said Ascray, lifting his left hand, " I don't like being called by the name Bart." He placed the forefinger of his right hand against the little finger of his left. " I'm a most unreasonable person. The laws concerning companionship of the spaceways are in obeyance aboard this ship. I don't lend my tools under *any* circumstances. I am from one of the half-stellor systems the *Eldrake* has just visited." One by one he had ticked off the items on his extended fingers. " That lot makes me as friendly towards you as Wardline is at the moment."

" All right," snapped Matt. " Have a damn' bad time this evening." He swung his chair around and bent over his paper work, listening to the faint slap of the Second's retiring footsteps, cursing his own temper and lack of care. It wasn't his fault that people were sensitive, but he had to live with them for the next six months. As Ascray reached the door he said, " I was going to give you a bit of help but I think you can do without it." Matt ignored him.

The intercom buzzed before the soft slap-slap of Ascray's shoes died away. Matt flicked on the speaker.

" Engine room," he said, " Third speaking."

" Captain here " came the reply. " I'm going into town now, and I've got to ask you to stay aboard as Ascray and Pentha are both off ship at present. I'm sorry I can't allow you off before we lift but I promised Ascray leave to visit relatives as soon as I signed on a Third. I've made a list of jobs which need immediate attention which I'll have dropped in to you. I know there's a lot to be done but give these precedence, will you ? Anything you want from town ?"

Matt felt anger rising in him again; he'd made no arrangements yet for an advance of pay, he wanted the tape on Salvernian-influenced tools. There was the new tropical rig and . . . He grunted.

" There's a tape on Salvernian . . ."

" Don't worry about that side of things. I've been studying Salvernians for years and I've collected everything I can find on the subject. Any time you want anything just come and see me."

" Thank you." The surprise and gratitude must have been apparent in Matt's voice, because Horne chuckled lightly.

" You're going to have a rough enough passage as it is, so I reckoned that was the least I could do. Nothing else you want?"

Matt decided the tropical suit and the other odds and ends could wait until Aldebaran.

" No, thanks."

" The Chief'll be aboard if you want anything." A click told Matt the Captain had disconnected.

Methodically, bearing in mind the fact that a list of necessary work was on the way to him Matt started preparing a schedule for himself, working from the top downwards which, in addition to putting many things in order, would give him a chance to look over the ship thoroughly. He suffered no illusions about her state ; the rust, the work Orlas Boyn had put in proved she was in no good shape and if Pentha and Ascray were as lax in their duties as their attitude indicated, there would be a great deal of deep testing which approached ship-yard maintenance rather than ordinary flight work.

A crewman, the first Matt had encountered of the dozen or so there would be aboard the *Eldrake*, brought down Skipper Horne's list to Matt; he looked it over, pleased to find it wasn't very terrible. He gathered up his notes, checked that his own

personal tools were in his pocket and took the lift to the tip of the *Eldrake*. It was very pleasant up there ; the control room was devoid of human occupants, a cool breeze blew in through the open ports and, from this remote height and despite the scarcity of greenery Elva IV looked a quite pleasant planet. The grey concerte road from the spaceport slashed across the dull orange desert to Elva City, a collection of white concrete towers on the horizon. A shimmering heat haze placed mirages of water pools at odd places across the desert ; an occasional dust-devil whirled crazily over the sand, born of the capricious wind and collapsing when the wind died.

One by one Matt checked the lighting strips and indicator lamps on the control panels. He swung out the panels, inspected them, making notes in his scratch pad of items for attention. The condition of much of the wiring disturbed Matt, but he would be unable to touch that until after take-off and after he had joined forces with Ascray. It was safe enough but certainly due for renewal as soon as possible. Doors opened and closed easily. The escape hatch was in perfect order. The superficial tests Matt made on the navigator's computer proved that to be perfect also. He took the lift a floor down, to look at the escape boats ; half a dozen of them lay in their launching tubes, pointing radially outwards. After looking hurriedly at the first one Matt felt a little sick ; it was utterly unspaceworthy and inspection of the other five proved none of them to be in any better state. In none of them was there power from the main generators. The *Eldrake*, for all the good her escape boats were, might just as well not lift the deadweight they constituted.

Depression settled heavily on him Matt continued his way down through the ship, at tea-time eating a hurried solitary meal and afterwards continuing his inspection. No wonder Captain Horne had been pleased when he had managed to sign on a Salvernian as the ship needed so much attention ; equally, no wonder he had been annoyed when Orlas Boyn unobligingly took a heat-beam intended for another target.

That recalled another unpleasant reality which had been at the back of Matt's mind during his inspection. The tools ; he still had to master them, or come to terms with them. It didn't matter which, but he had to do one or the other.

Just before dinner Matt finished his inspection ; it hadn't been as thorough as he had wished because there was so much to be surveyed. As with his tea Matt ate dinner in solitude, hurriedly,

his mind taken from his problems only momentarily by the truly excellent efforts of the *Eldrake's* cook. As soon as he had finished Matt hurried back to the engine room. He placed his notes in one of the desk drawers, pulled a plastic holdall from another and went to his tool cupboard. His first job was to open the power conduits above floor level of the engine room which supplied power to the lifeboats. That done he intended to make the lifeboats barely serviceable.

The tools in the cupboard recognised Matt as he opened the door. They recognised him as the stranger who had handled them earlier on, and as not being their master. They squirmed uncomfortably in their couches ; the gloves wriggled into the farthest corner of their box. Matt picked up the screwdriver, which in contrast to its previous docility wriggled like a snake in his grasp. The power tool was as aggressive as before ; a pair of plastic handled pliers appeared normal, and so was the molecular magnet.

Matt clutched at the two straws the pliers and the molecular magnet provided. Both were very useful ; would a plastic envelope around the tool handles render the strange powers of Orlas Boyn impotent ? Matt doubted it ; the solution was too simple and would doubtless have been tried. Possibly whatever forces the Salvernians used on tools were at variance with the forces used by the molecular magnet, but the pliers were clean for some other unknown reason. That seemed possible and worth investigating. Matt withdrew his mind from speculations which were certainly covered in detail in the skipper's Salvernian library. Right now he had some practical work to do.

He dropped his plastic bag to the floor by the conduits, plugged in the molecular magnet to a convenient jack and stroked a hole out of the metal conduit. A dozen cables, the powerline to the lifeboats a conspicuous flourescent red, lay before him. Matt broke open the covering, bared the triple cores inside and tested the kickback to the Horsch generator, hearing it turn over once or twice with a dull rumble and watching his test meter flick over.

By ten o'clock Matt was very tired. He'd followed the lifeboat cable through the ship, testing it a dozen times both at junction boxes and at odd places along the conduit. Eventually he established that the fault was in twelve feet of cable in the only place it went outside the ship's inner hull. Wearily he sought the nearest manhole to the dimly-lighted 'tween hulls, clambering among supporting struts to the brightly coloured

skein of cables. Once by it he had no need to look further for the fault. At a junction box the thick red cable had been displaced for the Second Engineer to reach some of his cables. Two of the thinner ones, the ice-blue cable of the refrigeration system and the dark blue of the general lighting system were both replaced.

General lighting was Matt's province ; refrigeration was Ascray's. The Second had repaired a fault in his own line and then replaced the one in general use ; the third he'd postponed, anticipating the engaging of a Third Engineer. Matt cursed Ascray from Elva to Sol and back, reminding himself that Ascray had said, as he left the engine room that afternoon on leave, that he'd got some information that Matt could go without. This, presumably, was it.

Waves of weariness flooded over Matt. He'd done no work for several months ; since he's been aboard the *Eldrake* he'd been permanently on the go, his mind occupied with the not easy task of taking over a new ship, attempting to evaluate the unusual circumstances of an unfriendly crew, and obsessed with the problem of the Salvernian tools. He could find no room in his thoughts for bitterness against Ascray ; all he wanted was to fix the cable and get to bed.

Recalling grimly that prolonged strain and tension were prime breeding grounds for a recurrence of Mitchell's disease he delved into the plastic holdall and pulled out a screwdriver, Orlas Boyn's screwdriver. He lifted it to the disconnected screws in the junction box, poked the wires behind them and tightened up. The screwdriver obeyed, without a single squirm of protest. Matt placed the screwdriver in his pocket and tested across the connections he had made. Only when he replaced the meter and pulled the screwdriver from his pocket to replace it in the holdall did he realise it was Orlas Boyn's screwdriver.

For almost a minute, his tiredness forgotten, Matt hung monkeylike to the struts. Suddenly the screwdriver started to wriggle, not viciously, but with more than sufficient energy to prove to Matt that his brief period of successful handling was over. He replaced the tool in the holdall, checked his simple job again and retired to his cabin. Body tired, but brain active, he threw himself on his bunk, intending to defy sleep until he had deduced some information from the screwdriver's behaviour. Weariness overcame him quickly and with his clothes still on and his mind still furiously thinking about the screwdriver he began to doze. The pace of his thoughts slowed, fading eventually into deep, untroubled slumber.

Several notes of tone over the ship's PA awoke Matt. He'd been in enough ships not to wake up wondering where he was ; with a swift movement he flung himself off his bunk, looked distastefully at his wrinkled clothes and stripped them off. He washed and shaved and, feeling much fresher, donned clean clothes. In ten minutes he was the sole occupant of the officers' diner ; in another ten he had eaten a solitary breakfast and had made his way down to the engine room. Mack Pentha, the First Engineer, and Bart Ascray were leaning over the desk discussing a working schedule. They straightened up as Matt entered. Both of them nodded and Pentha's adam's apple bobbed up and down his throat a couple of times. Matt decided to ignore yesterday's unpleasantness with Ascray.

" Good morning," he said cheerfully. He received grunts in reply, rather puzzled by the curious glances both of them bestowed on him. Pentha's adam's apple jumped up and down again.

" Any luck with those tools ?" the First enquired.

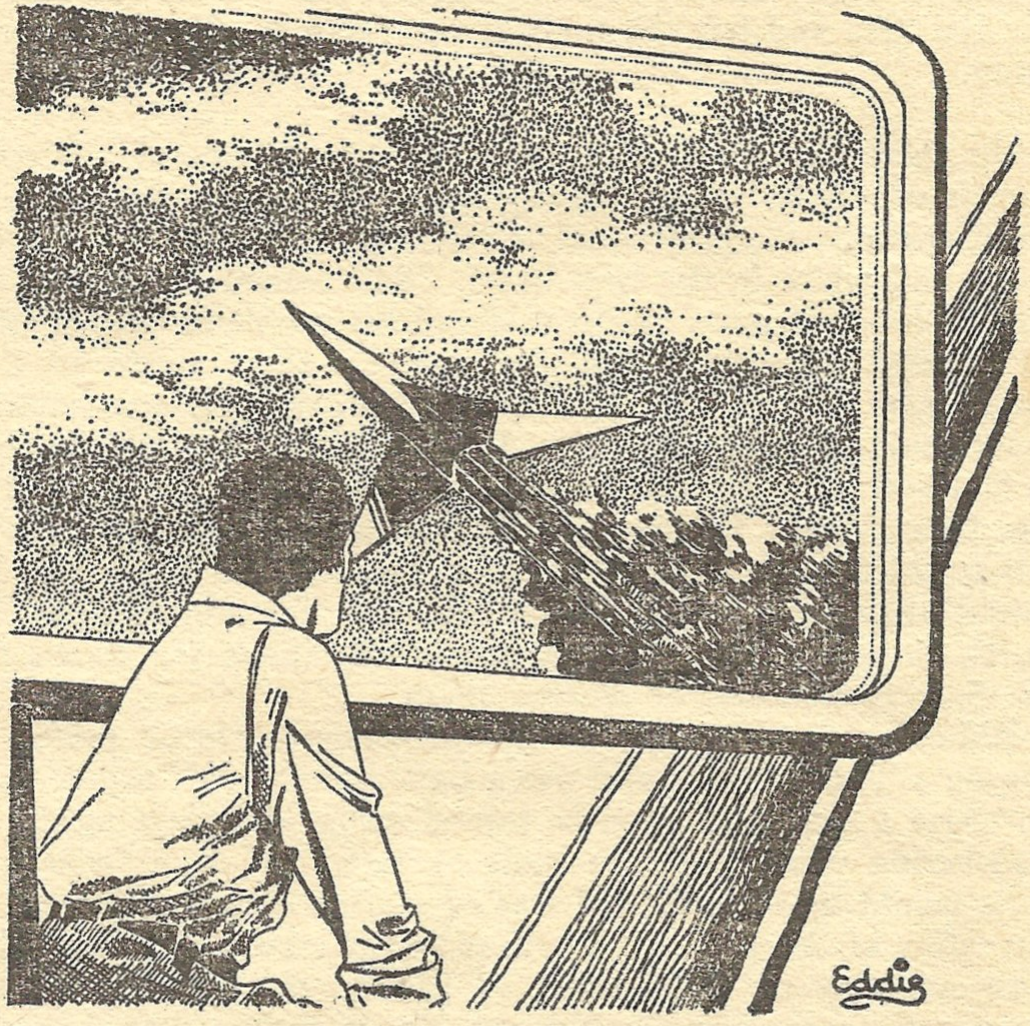
" A little," replied Matt cheerfully. Ascray's eyes flickered uncertainly between Matt and the Third Engineer's cupboard.

" Good," he said softly. " Hope you make it all the way with them."

" Thanks," acknowledged Matt. He turned to his cupboards, acutely conscious of the two pairs of eyes watching him. He opened the door. The now familiar wrigglings and rustlings greeted him. Matt selected a few tools, put them in a holdall and paused at his cabin to collect the tools he'd used the previous night. Then he continued his journey to the lifeboat compartment.

The servicing of a lifeboat was an automatic chore ; as Third he had very little pattern to follow ; it just was that he had to do everything possible to each of the little ships. He laid out his tools on the control desk and switched in the power. A strip glowed on the low ceiling of the tiny control room, illuminating everything with something approaching the misleading light of full moon on Earth. Bent almost double, Matt started his rounds with his meter and the tools.

They fought him ; fought him bitterly. Each one he attempted to use, except the pliers and the molecular magnet, twisted and struggled in his grip, foiling all his efforts to carry out his work. For a second, third and fourth time he vainly endeavoured to force the unwilling screwdriver to unfasten screws. Suddenly the same red rage which had enveloped him during the dis-



agreement with Wardline flooded over him again. The mood vanished in an instant but in that microsecond of time the screwdriver became subservient to the direction of Matt's hand. The little screw he was attacking came out without trouble. Rapidly Matt unfastened the other five screws holding down the face of the instrument panel, the screwdriver behaving normally. He unfastened more screws, prodded, probed and still the screwdriver remained obedient to his wishes.

An unpleasant thought struck Matt. He laid the screwdriver on the control panel, a sensation of something approaching misery clouding his mind. Only time would tell, of course, but suppose, instead of mastering the screwdriver even by accident, he had killed the pseudo-life Salvernians induced into their tools? To someone like Matt, to whom loss of temper was a wonderful safety valve, the occurrence was a bitter blow. If he had killed the pseudo-life within the screwdriver with sheer

ill-temper then he could never again loose his temper. He didn't like the idea and left the lifeboat compartment for the control room.

Up there the ports were open and a suspicion of a breeze blew in off the hot desert. Away in the distance, connected with the *Eldrake* by the grey concerte highway, Elva City shimmered green and white in the heat haze. Matt leaned his elbows on one of the open ports and considered his problem. Eventually he decided there were two alternatives. If he threw in this commission it would be tantamount to throwing in star-hauling —something he didn't want to do. Certainly he would be able to find and train for another job, especially on an opening world like Elva IV, but he knew that every time he looked up at the star-studded night sky, however well-placed he might be, he would have the sense of having lost the thing which made life worth living for him. His alternative of course, was to master the Salvernian tools, or destroy them.

Ridiculous as it seemed, why did Skipper Horne prefer to engage a Third who would use a Salvernian's tools rather than purchase a new set ? Did he intend using Matt as a means of discovering what made the tools operate ? If so it looked as if he would be unlucky and was to a great degree endangering the safety of the ship and the lives of the crew. Was that why everyone was so ill-disposed to him ? Surely they should reserve their temper for Skipper Horne rather than himself. Matt shook his head, conscious of the fact that something in the situation was quite wrong, but totally unable to see it.

Another unpleasant thought occurred to him. He recalled the story of the sorcerer's apprentice. Suppose he managed to discover, by chance, just what made a Salvernian's tools what they were and set them to work, how would it be if he couldn't stop them ? A nightmare vision of the tools, working at top speed, without a mind to guide or control them, flashed through his mind. Better, far better, he thought, to kill off each one of them with anger, than to run such a risk. Except, of course, that he would far rather have a constructive instead of a destructive solution.

"Hi !"

Matt turned away from the port, feeling none too pleased when he saw Wal Perrett. The communications officer looked no tidier and no less untidy than he had done the previous day. He took a flask from his pocket and said,

"Care for some?"

"Thanks," said Mike appreciatively. He took the flask, unstoppered it and sniffed the contents.

"Jiuvil," he murmured, "and very nice too." He tilted the flask against his lips and allowed the warm, rather sticky liquid to fill his mouth. He swallowed and felt something like a glowing sword reach down into his stomach. . .

"Hey, remember the women and children," chuckled Perrett. Matt returned the flask to him, quietly pleased that some hospitality had been shown to him.

The next thing Matt knew was he was in his cabin, strapped to his bunk and the *Eldrake* was vibrating with the characteristic, singing-saw whine peculiar to ships propelled by Horsch generators. He recalled Perrett giving him a drink of juivil and after that—nothing. In the meantime the ship had taken off and entered hyperspace. He hated to think how many crimes he had committed and cursed himself for taking the drink. He knew the jiuvil had been drugged, although why was a distinct mystery. He snapped off his safety belt and hurtled along to Wardline's office. The chief looked up, startled, from a pile of papers on which he was working.

"I want to see Skipper Horne," shouted Matt.

"And does he want to see you, too," whispered Wardline. He flicked on the intercom. The captain's voice snapped out of the speaker, identifying himself.

"Third Engineer Drecklan wishes to see you," informed Wardline.

"Let him come up," said the skipper.

"You heard the skipper," said Wardline, switching off the intercom.

Matt nodded and darted out of the room, into the lift and up to the captain's cabin. He knocked on the door and entered, uncaring of what happened. If he spent the rest of the voyage in solitary confinement it could be no worse than sharing it with a crew as impossible as the *Eldrake's*.

Skipper Horne lay on his bunk. He indicated a relaxer suspended from the wall.

"Sit in that, Drecklan, and keep cool. I've a lot to tell you."

His words puzzled Matt; no charges of drunk and incapable while on duty, no recriminations . . .

"I know you saw the badges and medals on my uniform when you came aboard to sign on. They told you I'd served in the

Lyran war and that while I came to be captain of a star-hauler through the engine room I was previously a fully qualified psychologist. What the Lyrans did to humans cured me of wanting to have anything more to do, full-time, with minds. So I became a deep-space man and retained my previous profession purely as an interest. Gradually I felt my own mind become strong enough to cope with practical problems once more and began, when I took my own ship, to signing on unsociables and misfits, in the hope of curing them. You see ?"

Matt nodded. He understood why he had been taken on ; his record had intrigued the skipper.

" I didn't sign you on because you seemed constitutionally unable to hold down a Third's job, although your record would have warranted me doing so." Matt looked at the skipper, puzzled. " I have a deeper plan for you." Matt's anger began to rise, with it a suspicion that the ex-psychologist engineer-Skipper was in need of some treatment himself. Matt began to sweat slightly, realising he was locked up in an iron bottle six months from its destination with a crew of unbalanced officers under a skipper who seemed to have some unlikely ideas. He licked his lips.

Horne left his bunk and went to the tray containing the books and tapes he had collected on Salvernians' unusual powers. He took an envelope from one of the tape-containers and passed it to Matt.

" Take a look at the photos in there."

There were seven, each was a different man who might have been a brother to the others. The last photo in the series was of Matt. He looked through them again, observing that while there was a distinct facial resemblance between each of them, numbers one and six—Matt was number seven—were quite different and without the links provided by the other photos would never have been taken as related.

" First time I knew I had six brothers," observed Matt.

" I hope you might become their brother," said Horne, his eyes fixed on Matt's. " Those are photos of the six men who have mastered Salvernian tools who weren't driven insane doing so."

" I see," Matt nodded. " You want me to try the Salvernian's tools because I look like the others. Some psychologist you are, thinking that because people look alike they act alike, and have the same capabilities . . ."

" It's all I have to go on," interrupted Horne. " Look at it this way, Matt. You could justifiably say—and most certainly have, to yourself—that one way and another you never had a chance to make good, despite your willingness to do so. I give you this chance, Matt. You have a six-month voyage ahead of you during which time you can unlock the secret of the Salvernian tools for me. You appear to be of the physical type who can do this sort of thing ; you can come to me, any time you like, because I'm an engineer and a psychologist—which means we shan't get our terminology or our concepts at cross purposes and if you show no signs of solving the problem of the Salvernian tools I have a complete set of brand new tools aboard which you can have. Either way you can't loose ; you solve the problem Orlas Boyn left behind or you become a good Third by the time we reach Aldebaran. What do you say ? "

He knew now why Perrett had drugged him—to prevent him contacting the Port authorities when they came aboard immediately prior to take-off.

" To help you make up your mind, Matt," Horne felt in a trouser pocket and dangled a key on a loop of luminescent green wire before him. " This is the key to number nine hold. In there is a crate containing a complete, brand new set of tools for a Third Engineer on this class of ship. Want it ? "

Thoughts milled around in Matt's head for thirty seconds. He knew Horne was being cunning, had gauged his vanity to a thousandth of a millimeter. Even so Matt remained himself ; he couldn't resist the challenge provided by the Salvernian tools.

" Thanks, I don't want it," he said.

" Good," breathed Horne. " I'm glad. There's just one other thing I'd like. Casts of your hands, to compare them with Orlas Boyn's."

Matt nodded agreement and watched while the skipper prepared a plastic mass on the table. He suffered Horne to take the casts and left, a little bewildered but in possession of the reasons why the *Eldrake* was a queer ship. Also, he minded himself, he'd taken a course of action he might well regret later.

The mood of grimness passed, being replaced by a sensation of immense well-being. Matt took the lift to his cabin and sought out the plastic holdall of tools he'd been using. He picked up the screwdriver, overjoyed to find that it wriggled and squirmed in his grasp. At worst, then, he'd neutralised the pseudo-life only temporarily.

Why, he asked himself, *had the skipper taken a cast of his hands* ?

In that action, perhaps, lay a clue to the mystery. Orlas Boyn's hands, by the laws of nature, were different in shape as well as quality from any Earthmen's. Suppose the wriggling and squirming of the tools, so offensive to Earthmen, was not desire on the part of the tools to escape from an unknown grasp but merely a seeking of some nerve endings which corresponded with similar—nerve-endings—in the handle ? And the gloves —what of them ? Were they amplifiers, nullifiers or something quite different ? Salvernians always wore them when working ; Matt singled out ' always ' as the operative word and decided they were an important link in the chain.

He made his way to the engine room, finding it empty of humanity. A work-schedule was spread on the desk ; the Horsch generators whined their peculiar singing-saw sound, pumping the ship through hyperspace. Matt lowered his plastic holdall to the floor beside his cupboards and opened the doors.

There came the expected rustlings and movements. Cunningly Matt picked out his pliers and hoisted the shivering maroon gloves from their resting place to the deck. No sensation, nothing, passed the pliers insulation. As soon as he touched the gloves a sensation similar to weak electric shocks ran along his nerves. The gloves suddenly felt slippery and slimy, like the slug into which he had poked a finger when he was a child. Then tiny multi-legged insects seemed to run up his nerves and begin gnawing at his brain. With nothing other than desire for knowledge in his mind he drew the gloves over his fingers and up over his wrists.

While he did so, fevers enveloped him, heating and cooling him, his whole body shaking as if he were sitting in a vibrating seat. He felt ill, well, and all shades of health between, while tiny things, wet things, dry rustling things, loathesome things crawled along his nerves and tortured them. With no means of controlling himself he loped around the snail-like humps of the Horsch generators in a grotesque dance, stumbling and tripping as the influence in the gloves altered his perceptions and pulled his nerves like the strings of a marionette. He heard a distant shouting and realised he himself was calling. Then he slumped to the deck, limbs twitching rhythmically as with St. Vitus Dance. Amorphous blotches of incredible colours flickered behind his closed eyelids like alien savages celebrating incomprehensible rites.

Suddenly his hands felt slimy and then they felt normal. The twitching ceased and Matt's head began to clear. He pulled himself into a sitting position, leaned his back against the cool, comforting metal of one of the Horsch generators and wiped the sweat from his forehead with a shaking forearm already damp with perspiration. His breath came in short, irregular gasps. Beside him on the floor, having worked themselves off his hands and twitching in an agony of their own, were the maroon gloves. Matt hauled himself to his feet and picked up the pliers. Gently he fastened the jaws on the gloves and laid them in their little couch in the cupboard. Wearily he fastened the doors, asking himself where he went next.

Matt stretched himself out on the bunk in his cabin. He realised he was tired and hungry and that he didn't know which day it was, nor the time of day because his watch had stopped. He felt his chin and decided Wal Perrett's drug had laid him out for at least two days. Impatiently and a little irritably he got up from his bunk, washed and shaved, changed his clothes. He returned to the engine room and set his watch to ship-time by its chronometer, pleased to find there was only just over an hour to dinner-time. He opened the cupboard doors and contemplated the tools; they rustled and squirmed. Matt closed the doors sadly and called up Skipper Horne on the intercom, asking him for his books on Salvernian influenced tools. Horne said he would send them down.

Matt had only been in his cabin a matter of seconds before a crewman brought down the books and laid them on Matt's bunk. Matt thanked him and sampled the books and tapes at random. He ate a hurried, unsociable meal with Pentha and Ascray and returned to his study of the library. After a week has passed he went to Skipper Horne with a sheaf of paper reporting his experiments and experiences, together with the same results achieved with each idea. He had no concrete statement to make.

Without question Horne handed over the key to number nine hold and Matt took out the tools and devoted an entire week to reducing the rapidly increasing ship-maintenance. The *Eldrake* skipped through hyperspace to the song of her Horsch generators like many a better-ordered ship, quite oblivious of the fact that the crew who ran her were misfits and that she herself was falling apart at the seams. After the week was up Matt devoted an hour a day and some spare time to Orlas Boyn's tools. He submitted

himself to experiments, comparing his experiences with those who had solved the problem but had been unable to pass on their knowledge. He deduced, after a consultation with Horne, that his pattern of conspicuous failure was the norm ; none of the men ever recalled the precise moment the tools began to respond to his command.

He experimented with himself and the gloves, with himself drunk, sober, tired and under the influence of various sedatives and stimulants he found in the ship's medicine chest. Results showed no consistency but after a month had gone by he was able to report to Skipper Horne that, with no factor introduced to cause deviation from his norm, he could wear the gloves for three minutes without experiencing any ill effects or unpleasant sensations. When he handled the tools, other than the pliers and the molecular magnet, it was still the same old story of wriggling and squirming and the recurrence of the nightmare episodes of the first time he had donned the gloves.

Without due regard for his health Matt spent more and more time in experiment. The highly artificial life aboard a star-hauler drew its toll in nervous strain. Suddenly lassitude overtook him without his really being aware of it. After four days he noticed it and discovered the schedule he'd set out for himself, his engineer's work and his study of the Salvernian tools had begun to suffer. He would lay on his bunk, his mind blank while he chewed a pencil. Then he became aware of a sore throat.

He leapt from his bunk, swearing, and studied his throat as best he could with the mirror. It seemed to be a little inflamed but nothing to cause worry, except that this was how an attack of Mitchell's disease began. Matt had survived the disease ; several other attacks had followed but only the first one had ever been fatal for anybody and although recurrences were just as painful as the original attack they were considered merely unfortunate. In five days or so it would all be over but in those five days Matt knew he would go through hell. He wrote a quick note to Skipper Horne and then decided to advise him personally of the impending attack.

Matt never reached the skipper's cabin. He stepped from the lift and felt dizzy. The rust-flaked bulkheads of the *Eldrake*, with their single strip of lighting along the ceiling began to spin. The light strip dissolved into a decreasing pinkish spiral that eddied and bobbed as if torn by a dozen conflicting breezes.

Then darkness enveloped Matt's mind ; for a second he was aware of it and his next conscious thought was that some time had elapsed and he was feeling very, very ill.

His throat was on fire, his extremities were swollen and aching, his head throbbed and the tiny glimmer of light he permitted his eyelids to allow to his eyes thumped against them like a trip-hammer. At the moment he felt cold ; any succeeding moment he could expect to feel unbearably hot. A hand clasped his and Matt clung to it eagerly, seeking to draw warmth from it.

" Can you hear me, Matt ?" It was Skipper Horne's voice, soft and anxious. Matt tried to nod, aware that something wasn't quite right with the *Eldrake*. He tried to sit up when he realised what it was ; there was no longer the singing-saw whine of the Horsch generators echoing about him. Skipper Horne's hand planted itself firmly on Matt's chest and with the slightest of pressures forced him on to his back.

" Matt, can you hear me ?" repeated the skipper desperately.

Matt must have made some gesture Horne was able to interpret as an affirmative because he started to speak, still softly, and very slowly.

" Matt, the christmas tree in the master generator has blown on us. Ascray and Pentha went looking for the fault and found it, but both of them caught an almighty jolt when the generators half-turned over. They'll be out for hours and not fit to crawl, let alone work, for a day. Do you think you could help me put things right ? "

Matt had listened patiently to Horne, weighing each word individually and then trying to make sense from the whole. The christmas tree was the inducer and if that had gone the *Eldrake* was in a bad way, especially if it were in as bad a condition as the remainder of the ship. Well, he had to do something about that, because he must solve the problem posed by the Salvernian tools and Horsch generators weren't all that hard to fix. He'd do it solo, with the Salvernian tools. No need for Skipper Horne to do anything.

" Matt !" Through a haze of pain that pressed his nerves and pulled his muscles Matt realised he'd been talking light-headedly. He felt Horne's hand on his chest again and heard him say,

" There's nothing you can do yet. Batteries will last a couple of days."

Periods of semi-consciousness followed, during which he knew that Horne visited him at least twice more and that a crewman had fed him. On one occasion there were several faces hovering over his bunk and once he awoke, crying that he had gone blind. Some spark of reason not dulled by the disease forced him to stretch out an aching, reluctant arm. His fingers brushed a switch and the cabin was flooded with light. He laughed, happy. From somewhere he found strength to force himself from his bunk and stand upright on the deck. He swayed from side to side and staggered to the lift. He knew what he had to do ; repair the generators.

He stumbled out of the lift and wandered vacantly to the engine room. The skipper was on his hands and knees, peering into the vitals of one of the snail-like humps. Four crewmen stood around ready to give him any assistance. The sound of Matt opening his tool-cupboard doors drew their attention to him.

" I'm quite all right," insisted Matt hazily, as he pulled on the maroon gloves. Even in his dizzy state he saw the looks of surprise and admiration on the crewmen's faces. " Everything will soon be working again."

He heaved all the Third's tools into a holdall and permitted a crewman to support him to the master generator. The skipper had just pulled out the inducer itself, a silvery cylinder some six inches in diameter and nearly two feet long. He unfastened the caps at either end and extracted a nightmare cluster of components sprouting from a single hairfine strip.

Matt delved into his holdall and laid half a dozen tools, a meter and test-prods on it. Out of the corner of his eye he saw Skipper Horne wave back the crewmen. Matt started humming softly to himself. He pressed the hairfine strip at either end and twisted ; the inducer fell into its regulation eighteen pieces. A whisper of admiration floated up from the crewmen. Matt didn't quite know how he'd done it ; never before had he managed to get out any more than eight pieces at one twist. Still humming, he worked away, now and then asking for something extra ; within seconds it was in his hand. He replaced components using almost exclusively Orlas Boyn's tools ; never once did they give him any trouble. Indeed he began to feel exhilarated using them ; he felt as if he wanted to go on using them. In eight minutes under par he had stripped and reassembled the christmas tree, friendly little whispers in his mind helping him ; the tool he was using told him when to push, how hard to push, used its own powers a little . . .

Suddenly sickness overwhelmed Matt ; the gloves began to crawl off his fingers.

" I . . . I don't think . . . " he whispered harshly.

He rolled on to his side, one hand touching the re-assembled christmas tree. The engine room began to spiral about him and at the top of the spiral was the face of Skipper Horne, looking like a pale, anxious moon. Matt started to laugh.

When Matt awoke once more he was desperately cold and frightfully hungry. His throat was dry but with the arid harshness of prolonged thirst rather than fever. His head was a little unsteady but clear and the pains in his extremities had subsided. He crawled limply from his bunk, ear pleased to hear the saw-song of the Horsch generators, and looked at his white, drawn face in the cabin mirror. He washed and shaved away some four days of stubble, dressed and took himself to the engine-room. No one was there.

Heart beating fast Matt opened the cupboard doors. For a second he stared at the tools, waiting. They started to rustle and wriggle. The gloves inched towards him, not away from him. He picked them up, pulled them on. He picked up the power-tool. It lay quiescent in his hands for a full minute while a terrific sensation built up in Matt of confidence, stamina and ability. He replaced the power tool and handled the others, gently, one by one. He unscrewed a few screws with the screw-driver ; it seemed all he needed to do was hold the tool and let it do its own work.

Matt removed the gloves and made his way to Horne's cabin ; the skipper was asleep. Matt hesitated and then shook him into wakefulness.

" What the . . . ? What are you doing here, Matt ?" Horne blinked in the strong light. " You're sick . . ."

" It's over, until I have the next attack," exulted Matt. "And, Skipper, I can still use the tools ! "

" You can ?" He seemed to be uncertain of what Matt was saying. Suddenly his eyes widened. He sat bolt upright in his bunk.

" You can still handle the tools ?" he demanded incredulously.

" Yes," grinned Matt.

" How do you do it ? How, man, how ? "

" I've done it four times. Once just after I came aboard and thought how fine it would be to understand the tools. Once

when I was so dog-tired I hardly knew what I was doing. Once I blasted the screwdriver into unconsciousness," Matt laughed at the expression, " and the fourth time I repaired the christmas tree. It seems to happen this way. On each of those occasions the conscious *me* was out of the way. You understand, the inhibitions, quirks of personality, my inbuilt distrust of something I don't understand, they weren't operating. Now, over that long spell of work when I was only barely aware of what I was doing the tools picked up sufficient knowledge of the basic me—" Matt hesitated, seeking a suitable phrase, "—to work on my frequency."

Horne nodded slowly, as if his mind were digesting what Matt had told him. He said, " I saw you, with my own eyes, using the tools," he said, " and you've told me you can still use them, but I ask you *how* you did it."

" I don't know," admitted Matt, " but I'll experiment, think about it . . ."

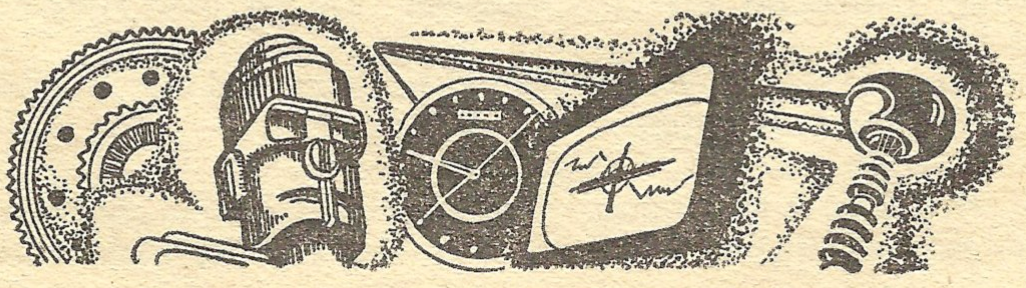
" Would you consent to being a guinea pig aboard a ship full of social misfits ?"

Matt recalled the tremendous sense of rightness, confidence, stamina and ability he had felt a few minutes ago while handling the power tool. With that zest in him, the feeling of being, at long last, a square peg in a square hole, he said, grinning :

" If I didn't consent you'd only dope me every time we reached port."

Skipper Horne laughed and extended his hand. Gravely Matt took it in his, humbly recalling that a meek, timid little alien whom he had never met had died, light-years away from his home, to give Matt an aim in a thousand. He'd find that answer.

Peter Hawkins



THE LONG HAUL

Most science fiction readers are quite conversant with the general science of astronautics, but although our authors assume that the problems of propulsion will finally be overcome, we are in fact still a long way from a satisfactory solution.

By John Newman

The moment the count-down is finished—the five . . . four . . . three . . . two . . . one . . . zero and the first interplanetary ship heads out to the planets—the worst of the trip will already be over.

Technically, that is. For the most difficult part is the first five hundred miles ; five hundred miles straight up, fighting gravity and the restraining claws of air resistance by sheer brute power.

No-one these days seriously dreams of blasting a ship straight up from the surface of Earth to conquer outer space. If we put a space station in an orbit five hundred miles up there is no need to worry about the crushing load of high g flight beyond there. We can gently, almost unobtrusively, reach out to the planets.

American, British and Russian rocket experts have, on paper, thoroughly explored the technique of building space stations and stockpiling fuel and prefabricated sections high above the greater part of the atmosphere. Yet the general picture of methods of attaining interplanetary flight is still overshadowed by the thought of the tremendous effort necessary in fuel and machines required by three step rockets to reach a stable orbit.

Admittedly, rocket engineers are still worried about putting a 21½ pound artificial satellite up to a height of 300 miles, and dreams of 1,000 ton ships plying between the planets on strict

schedules seem to be as far beyond reality as practical interstellar flight.

One of the clearest analogies of the problem facing astronauts-to-be is to conceive an endless flat plain, wherein are sunk deep pits at the bottom of which lie mass concentrates exerting a gravitic force. Earth lies at the bottom of one such pit and the other planets and stars lie in shallower or deeper pits depending on their size and mass.

Earth's gravity pit is 4,000 miles deep ; the distance against a force of one gravity that a ship must, in theory, climb to be forever free of Earth's pull. To blast free explosively, in one gigantic bound right out of the pit and onto the plain would, from all the basic principles of rocketry, be a fantastically difficult procedure. It would be far simpler to climb a little of the slope at a time, resting, regrouping, renewing supplies, establishing a beach-head—all of which can be done by establishing stable orbits.

The first rung of the ladder is, unfortunately, the hardest. It is equivalent to five-sevenths of the way onto the plain—into space. By boosting ferry and cargo ships to a horizontal speed of five miles a second, after kicking them to a height of 500 miles we can put them into an orbit where air resistance is almost negligible. From that point on it is simple sailing.

But the first rung must be climbed quickly, using the concentrated energy of chemical fuels. So far chemical fuels are the sole source of controlled, concentrated rocket thrust. They are cranky, explosive, expensive, difficult to store, and the pounds of payload to the ton of fuel make a poor sort of ratio for star-aspiring astronauts ; but they have one great merit. They do work.

We can assume that it will not be insuperably difficult to build a space station at 500 miles, and use it as a refuelling depot and shipyard. If necessary, other refuelling depots may be set up in even further extended orbits. Ships will be built out there that will never feel more than a tenth of gravity ; ships that will slide smoothly around and over the rim of the gravity pit and start on the long haul to he planets. But what will these ships be like ? They will need to accelerate only slowly parallel to the Earth's surface ; as their speed climbs so their orbits will automatically expand and Earth recede as they spiral outwards. When the basic orbital speed is boosted from 5 miles a second to 7 miles a second, they will no longer be bound to Earth.

But whilst their speed is 7 miles a second, it is zero relative to other planets. However, continued slow acceleration will power them anywhere in the Universe.

Yet the planets will still be many millions of miles distant and to prevent the crew dying of old age on the flight, high speeds are needed. A short, vicious burst of acceleration would be sufficient to set them coasting along in time-consuming free-fall from one planet to another ; but this need not be the best method.

So far, there is no alternative to some form of rocket drive for space transport. Warp drives, magnetic tractors, gravity screens and teleportation exist only in the imagination of writers.

A tiny rocket motor could apply a small steady thrust capable of giving high speeds over periods of weeks and months ; but that is an inefficient way of making use of the *mass* of the gas ejected from the rocket—the fuel load carries both the mass and the energy. The speed of the hot exhaust gas is only a tiny fraction of the speed of light, the ultimate limit.

Interplanetary ships will be able to carry a strictly limited mass of fuel, but if each atom of it could be boosted to a very much higher speed before being ejected into space, a given *mass* of fuel will have that much more recoil effect on the ship.

We may well look upon 250 days as a reasonable time for a ship to reach Mars following the most economical free fall orbit of 248 million miles ; but when this time factor is extended to reach the outer planets it becomes so vast that it is time seriously to think of the alternatives. Human endurance, both physical and mental, can be stretched just so far. Mechanical problems of food, heat, light and air become far more complex ; by doubling the trip time you more than double the problems of stores and design, and every pound of mass taken up by some item of equipment could go towards increased fuel capacity and thus contribute to still higher speeds and shorter transit times. So the interplanetary liners will balance on a razor edge of time and distance, equipment and fuel, and the faster the fuel can be ejected, the more efficient it becomes.

Where low thrust over long periods is satisfactory, there exist alternatives to chemical powered rockets.

The idea of thin, enormous wings to be extended when a ship is in space has long been suggested as a means of utilising the pressure of light radiation from the Sun. Ships would spread their huge clouds of plastic sails, trimmed to catch the last ounce of pressure from the Sun, as the tall clipper ships drove before

the Trade winds. But the method is clumsy, is limited to a volume of space fairly close to the Sun and can only be used for outward bound ships.

At first glance it would appear that some form of nuclear pile rocket unit would be satisfactory, using nuclear energy to heat a gas until its temperature, and thus its speed, is greater than that from a chemical reaction. After all, the energy available from one pound of uranium 235 is equivalent to burning 1,700,000 pounds of petrol without taking into account the mass of oxygen needed in the combustion.

It appears wonderful ; the snag lies in the temperatures required.

To equal the thrust obtained from chemically reacted fuels, the exhaust gas from the nuclear pile must be at least at 3,000 degrees Kelvin, and significantly higher if an overall saving of mass is to be made. To achieve this, the pile must be hotter than the issuing gas—and we just do not have the refractory materials with which to build a pile operating at 3,000 degrees K, let alone above.

In spite of these present difficulties, it does seem as though a satisfactory drive will ultimately depend on the use of nuclear energy—the problem is how to harness and use that energy.

Nuclear energy will give astronauts the chance of grasping the advantages of long haul flights. With continuous, or almost continuous acceleration and deceleration, the longer the thrust is imparted, the farther you can go. But the balance on the razor edge swings down in favour of the spaceman—if you double the time of the trip in going further out, you quadruple the distance covered. This is a most important law, resulting from steady acceleration involving a time-squared factor when calculating distances, and will be carefully considered when designing the time of thrust and distance to be covered of every long voyage interplanetary ship.

Shepherd and Cleaver have published plans for an ion drive in which the motive force is derived from a nuclear pile. Certainly, this is one of the most encouraging ideas.

The basic concept is that a stream of gas is ionised, one or more electrons being knocked off each molecule so that every molecule is positively charged. Then the molecules are injected into a long tube along which they are accelerated by a varying electronic potential. This is the idea behind the atom smashing linear accelerators used in nuclear energy studies. Voltages of between 100,000 and 1 million volts, well within modern engi-

neering techniques, would be required, and the power for the whole unit would come from a conventional nuclear pile running a turbine and dynamo.

For trips within the orbit of Mars, the pile could be replaced by a Solar energy collector, using solar batteries or a turbine-dynamo with mercury as the working fluid. The thrust would be of the order of 1/100th of a g, the ions streaming out with a speed of 24 miles a second, with a voltage differential of 100,000 volts. Compare this with the highest theoretical figure for chemical propellants of $4\frac{1}{2}$ miles a second, and the 3 miles a second for exhaust velocities actually obtained in practice.

More recently, Dr. Romick of Goodyear Aircraft, has designed an ion rocket operating on similar principles to Shepherd's and Cleaver's, each ion being given a push as it speeds through the tube round which is the battery of voltage rings. In his design the negative space charge which builds up on the ship is neutralised by incorporating a small electron gun to squirt excess electrons rearwards.

Such ion drives would work well in the vacuum of space, far better than the high vacuum tubes laboriously pumped out on Earth. And practically any gas or liquid can be used, so that refuelling on planets, satellites or asteroids presents little difficulty. Romick calculates that a 1,000 ton ship would use only 280 pounds of propellant fluid a day to give a 200 pound thrust. This would be sufficient to increase the speed by 4,540 miles a day.

Accelerating for 200 days and then decelerating for another 200 days would enable a ship with this performance to cover 726,400,000 miles, even making allowance for the gradually decreasing mass of the ship. For comparison—and future targets—Jupiter's orbit lies at 390,621,000 miles from Earth's; whilst Saturn's is 794,263,000 miles away. With these long distances, the quadrupling effect on the time scale would show up well, giving added advantage to the spacemen.

It's still going to take well over a year to sail out to Saturn, though.

Another alternative is to use a giant disc at the stern of the spaceship, a disc thousands of square feet in extent, covered with a thin film of an electron-emitting radio active material such as are formed in nuclear piles. Positive ions squirted through a hole in the centre of the disc would meet the negative

field due to all the electrons, and this would automatically accelerate the ions and so apply thrust to the ship.

Once the space stations are built and men venture across the wastes between the planets it seems as if the gadget-minded will be in great demand. Designers will put all manner of strange shapes into space and as their freaks lumber across the space lanes the streams of ions pouring from their sterns will be met with disapproval from at least one type of scientist—the cosmic ray experts. Their measurements are going to be wrecked. But progress will continue.

The men of Earth will be off on a new adventure, riding their ion drives, spreading their sails into the uncharted wastes of the void.

John Newman

Walt Disney's Science-Factual Featurette

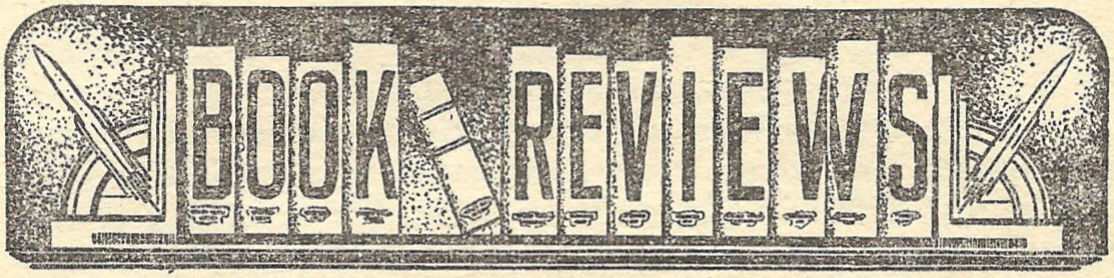
MAN IN SPACE

Once again, in that delightful combination of live film and animation, Disney has produced a highly intelligible educational film which will do a great deal to dispel the remnants of doubt and incredulity still attached to space travel. Step by step, from the early beginnings of the Chinese rocket up to the launching of a manned satellite encircling the Earth, he takes his audience through all the known facts of astronautics.

Pictorial interviews with both Dr. Heinz Haber and Dr. Werner von Braun include live-action film of firing experiments at White Sands, while with animation Disney presents his experimental man " Homo-Sapiens Extra-Terrestrial," to show the varying effects upon the human body when thrust into the abnormal conditions of airlessness and weightlessness.

Due for general release now, you will find that it is like a technical book come to life, but with many humourous moments to break up the scientific fact. Indirectly, too, it will undoubtedly do our science fiction magazines a great deal of good.

J.C.



Since the emergence of science-fiction in the past few decades as a popular literary form, the activities of its attracted coterie of authors, magazine editors, publishers, critics and readers have been remarkable for the amount of self-criticism, expressive assertion, vehement denunciation, and general evaluation, greatly out of proportion to the extent of the genre. This may indicate a greater stimulation among its readership compared with, say, the other sub-divisions of " mainstream " writing such as the westerns, detectives and thrillers, and romances, but it is probably the indifference on the part of the general reading public and its attendant literary critics (or where awareness is found, the erroneous impression held) which is responsible for this defensive attitude of the faithful adherents of science-fiction.

Despite evidence (most loudly acclaimed by the aficionados themselves) of science-fiction's wide ancestry in historical and similar literary sources, the recent vogue has its roots in the tight circle of readers of the fantasy " pulps " which grew up between the '30s and '40s. Whilst appreciation of scientific principles and their practical applications was becoming more and more widespread since the turn of the century, it remains true that the demand for " scientific fantasies " came from a small minority with the peculiarly lively imaginations bursting beyond conventional barriers.

Part of this defensive mechanism has been the publication of at least three treatises on the origin, development, treatment, and importance of science-fiction—J. O. Bailey's *Pilgrims Through Space and Time*, *Modern Science Fiction* a symposium edited by Reginald Bretnor, and L. Sprague de Camp's *Science Fiction Handbook* (all American publications, incidentally). The material collated by Bretnor is probably the most impressive evaluation among these three, but a common denominator is the references to historic origins, the influence of " mainstream "

writers (Verne, Wells, Lewis, Huxley, et al) and, inextricably tied up with all other aspects, the question of definition. I do not intend to enter upon this difficult problem of defining " science-fiction " (just how difficult can be seen by relevant reference to the above-mentioned books) but simply to note that much of the critical confusion (to the neglect of literary appraisal) is due to the narrow approach to a medium which widely, and diffusely, covers themes variable according to the knowledge and beliefs of the period. In other words, themes governed by scientific facts known at the time of writing, or reasonable and unreasonable extrapolations of the same (either of which can be reversed in light of later knowledge), derivations from myth and folk-lore, and " supernatural " phenomena.

It seems to me that Patrick Moore falls into this trap of definition in his own new evaluation of the field in **Science and Fiction** (Harrap, 10/6d) which is often repetitive in view of the previously mentioned works (but valuable, of course, in being the first publication of its kind in this country) and always interesting for the author's personal views on science-fiction. However the validity of his arguments and deductions will be questioned by many a veteran fantasy reader, particularly in regard to (*a*) the proper appreciation of scientific accuracy in science-fiction and (*b*) the derogatory treatment of all other types of fantasy fiction, especially the criticism levelled at the much-maligned " pulps."

The survey of this book is restricted mainly to stories of the interplanetary type and which have a scientific background. This is fair enough in view of Mr. Moore's noted enthusiams for astronomy and interplanetary flight, and, as a scientist, is entitled to his quick distinction of such science-fiction into two types, i.e., " 1. those which are scientifically inaccurate, and 2, those which are accurate as they can be made in the light of our present knowledge, though a good deal of licence must necessarily be allowed." Jules Verne is given the full treatment as the " real founder of Type 2 science-fiction.' Verne's scientific mistakes and unwarrantable assumptions can evidently be excused (" it is easier to believe in Verne's space-gun than in H. G. Wells' gravity-screening material. Neither is practicable, but the one is scientific while the other is not,") by Mr. Moore's qualifying licence for Type 2 stories. But why cannot many of the present-day Type 1 stories be acceptable to Moore in the same manner ?

Later he says " Wells in his early phase was a story-teller first and a technician afterwards. To him, scientific accuracy was of secondary importance so long as the tale held together and sounded plausible." Yet therein, I would say, lies the whole strength of science-fiction writing. How dull our books and magazines would be if one could read Arthur Clarke's inter-planetary stories (excellent though they may be, and even then the scientific accuracy is based on reasonable assumption to a great extent), but of course, it is well known that Arthur often puts his tongue well into his cheek at times and produces other wonderful fantasies. Thank goodness !

Mr. Moore dwells pungently on the pre-war " pulps." I agree that many rubbishy stories (as to literary and scientific content) were printed, but the reprints of Verne and Wells had dried up and presumably the science-fantasies published in *Argosy*, *Blue Book*, *All-Story*, etc., had used up all the available themes until the newer and better writers showed up and Campbell showed them the way in *Astounding* just before the war. The stopgap of B.E.M.'s and space-opera was beginning to wither, and authors of the calibre of Heinlein, Asimov and Clement began to appear. The lurid covers, of course, were a conventional American newsstand device, and while I fail to reason for introducing " horror-comics " into a discussion on science-fiction, I can remember only one magazine (*Marvel*) descending to anything near that level in its story content for several issues in 1940 before it folded. Incidentally, I believe that some of the boy's magazines Mr. Moore loved to read were pretty bloodthirsty at times before, and probably since the war.

On the whole magazine question, Mr. Moore appears to have had access to, or to have based his judgement on a small and unrepresentative selection of titles. I cannot think he has seen *Amazing Stories* of the 1933-37 era, a most staid and dully scientific journal and a likely candidate for his ideal Type 2 magazine. And the post-war *Astounding* is certainly not to be confused with its earlier issues or with the profusion of other " pulps " which (yes, indeed, Mr. Moore) appeared from 1943-54. He safely generalises on the modern magazines which are apparently harmless but too heavily Type 1 (and yet the Swedish *Hapna* is alone specifically approved as nearing Type 2, to the exclusion of *Astounding* or the best of the English magazines, *New Worlds*).

He " read through six 1955 monthly science-fiction magazines, containing a total of 29 stories. Of these 21 dealt either with hostile aliens, unpleasant space diseases, or the menace to Earth. It is only fair to add that the remaining eight were original enough to be really interesting, and at least six were cleverly written, but only one made any pretence at technical accuracy." Mr. Moore can hardly insist on technical accuracy for the above three themes, but are they to be excluded altogether ? He goes on . . . " In fact, I have no quarrel with the magazines as such ; my only criticism is that they tend to bring true scientific literature into disfavour, because of their high percentage of Gloom stories, and because accurate science is almost totally lacking." Personally I think the scientists are responsible for the Gloom content (for allowing misuse of their discoveries) and in any case one must allow for realism. He shudders at one such story mentioning mayhem with a " blaster " and says " spacemen of the future are I feel unlikely to use blasters." Believe me, under present rules (which are hardly likely to alter) it is the most certain item of equipment in our first spaceships.

The book continues in similar interesting, if arguable vein, but I was stumped by Chapter 16, " Comment and Review." You will understand my reaction when you read it, and realise why I humbly hope, in the future, to get my Type Nos. right ! I particularly enjoyed the paragraph about the soundest science-fiction reviewers being the skilled journalists of the morning Press . . . " without any deep scientific knowledge but with a good appreciation of what is wholesome and what is likely to prove popular. Besides, he is often too young to remember the pulps, and is thus less likely to be prejudiced." At least Mr. Moore's juvenile science-fiction novels will provide fare for them even if his stories are not to be found in the tainted magazines.

The crowning admonishment lies in the appendix wherein Mr. Moore advocates a censorship of science-fiction to conform to his standards. I may be wrong, and Mr. Moore is possibly completely right in all his assertions but I feel (and recent events in science-fiction book-publishing seems to have proved it so) that the science-fiction reading public itself is its own best judge of what it wants to read, and that literary quality should be the criterion whether the story is Type 1 or 2.

Going to the fiction offerings this month, and happily reverting from Type, John Boland's second fantasy in the "Novels of Tomorrow" series, **No Refuge** (Michael Joseph, 12/6d) adopts that hardy perennial among fantasy themes, the utopian satire, and with the same imaginative flair that characterised his *White August* (and also the same almost indefinable wrongness of character and plot which places his intended realism just beyond credence) succeeds in producing what is to my mind one of the most unpleasant fantasy novels ever to cross my desk. Admittedly the slender story of the small-town bank manager who plots with an American pilot to steal a million dollars from his bank, and while flying to a hideout in Canada crashes into a lost civilisation in Greenland, is merely the vehicle for the author's satire. In fact, up to the time of their encounter with the inhabitants of Yademos (try it backwards !) the antics of the unsavoury pair are slightly boring and the story's crudity is painfully obvious.

But the bulk of the book, in which the author cleverly indulges his savage satire on the implications (greatly oversimplified, of course, Mr. Boland) of modern civilization in his description of the planned society of Yademos, compels the reader with the fascination of a hooded cobra, and one can almost sympathise with the errant bank-manager and his uncouth accomplice by the time their retribution is completed at the hands of the coldly cruel Masters and Servants. Mr. Boland is logical enough—within his simple references—but the often unsubtle antithesis of our own society shown in the development of Yademos is as horrifying in its way as Karp's *One* or Orwell's *1984*, without the former's insight of the human mind, and the latter's stark uncompromise, but with the same overall feeling of hopelessness.

In contrast to the bitter taste of *No Refuge*, Paul Capon's latest essay into science-fiction, **Into The Tenth Millenium** (Heinemann, 13/6d) is strongly saccharine. Here we have the young retired, millionaire-scientist who inveigles a hiking couple on holiday in Cornwall to accompany him on a trip eight thousand years into the future. It will be a one-way journey because Mr. Capon resurrects the unconventional (but more probable) method of time-travel in which the travellers decelerate their physiological functions to a point where one day's subjective time spent in a suitably prepared vault covers a span of 200 years in the outside world. Unfortunately the attempt to depict the

world of eight centuries hence, although at times ingenious in concept, failed to convince me, mainly due, I fear, to the continuity of the basic English drawing-room-novelettish behaviour in both present and future eras the author sees fit to depict. His other world of the future not only lacks the bite of contrast to be expected, but his story also fails in compensatory action, and suffers from a particularly banal ending.

In all fairness, I must say that Charles Eric Maine's new novel **The Isotope Man** (Hodder & Stoughton, 11/6d) is not represented as strictly science-fiction, as it has crossed further over the borderline into the scientific-thriller class than his previous four novels. As such it is an extremely entertaining and fast-moving story, owing not a little to the influence of Peter Cheyney and others. Added, of course, is Mr. Maine's own considerable ability in blending a scientific gimmick (this time an atom scientist with a displaced time sense, mixed up in a spy plot) with exciting action.

Leslie Flood

Juvenile Section

Reviewing children's books is always a difficult problem unless one writes exclusively for the adult who will decide upon the merits or demerits of such books. In effect the child for whom the book will probably be bought is ignored as far as the review is concerned. For **Space Cat Visits Venus** by Ruthven Todd (Chatto & Windus Ltd., 7/6d) I have tried a different technique I passed the book to my two children to read and criticise. After the usual argument as to who would read it first, my daughter Leslyn (aged 10) presented me with the following 'review.'

" I thoroughly enjoyed the book and liked the title very much. I think the best part was how the flowers were described and how " Flyball " and Fred Stone exchanged thoughts with each other. I also liked the six-legged mice and how " Flyball " and Fred got caught in the sucker flower. It was very thrilling all the way through."

Michael, aged 13, commented " Smashing ! But most of the things that happen are impossible !" Reading the book myself I find that I must agree with both of them—the story is delightfully told with considerable poetry of prose throughout its pages, but its science content as such is negligible. This doesn't deter from the book's enjoyment whatsoever. It is a fine story for younger readers.

J.C.