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THE BELT
By J. M. WALSH

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Fantasies and Facts

WELL OVER two thousand years ago the philosopher Plato wrote of a thriving continent which was supposed to have sunk beneath the waves of the Atlantic long before his ancestor, Solon, learned of it from the Egyptians. Since then, thousands of sober treatises have considered the question whether or not Atlantis once existed . . . and as many imaginative romances have presumed that it did.

The renowned Captain Nemo, creation of Jules Verne, venturing *Twenty Thousand Leagues Under the Sea* in his marvellous submarine, chanced to glimpse the dead city on the sea-bed. Conan Doyle's Dr. Maracot, exploring his *Deep*, found the remnants of the Atlantean race still alive and healthy, eight thousand years after their deliberate submergence in advance of the threatening cataclysm.

Today there is an Atlantis Research Centre, concerned with amassing evidence in favour of the theory that there was once such a place. Atlantis . . . fantasy or fact? A bit of both, perhaps.

You might call it a *science-fantasy*.

OTHER GREEK thinkers had fancies about the Moon, to which numberless imaginary voyages have been made since Lucian of Samosata set the fashion in the second century. The astronomer Kepler's *Somnium* did much to inspire Wells' *First Men in the Moon*, one of the most famous of all the tales which have gradually enlarged on the theme of space-voyaging. Which Verne also took in his stride; though his idea of a suitable means of conveyance has been proved unfeasible, ballistically and biologically.

When the German novelist Otto Willi Gail based his *Shot into Infinity* on the notions of Hermann Oberth and others who believed that the rocket alone would enable Man to reach outer space, such stories—and theories—were still regarded as "impossible." Twenty years later, astronautics is a recognised science; the interplanetary tale is no longer concerned with the mechanical problem of how to get to the planets, but with the essentially human problems that will arise when we settle upon them.

Interplanetary travel and colonisation . . . a *science-fantasy* no longer fantastic, more science than fantasy. But which, since there are no limits to the imagination of the science-fiction writer, will continue to provide fascinating stories for years to come.

THE FIRST space-ship has yet to be built, if not designed. That most of the inventions we take for granted today were long since prognosticated in imaginative romances is a truism of which the science-fiction lover has no need to be reminded. The telephone, radio and television were all present, in crude conception, together with photography and dehydrated food, in a single tale of "spirits" penned almost three hundred years ago. Speculations upon "flying chariots," telegraphs and gramophones

were rife in quaint tracts even earlier.

The future, in concept, is already here; for the tradition continues. The world of tomorrow is the world of today's science-fantasy—errors and omissions excepted.

As well as exploring unknown regions of the Earth, the heroes of the earliest science-fantasy stories happened upon a world *inside* the Earth—long before the late Mr. Burroughs discovered *Pellucidar*. Today, geology reassures us: there is no such demon domain. But in 1818, one Captain John Symmes of Cleveland, Ohio, theorised that the Earth was composed of five hollow spheres one within the other, and all inhabited. A monument to his science-fantasy stands to this day, topped by a globe with holes at the poles which provided ingress to *Symzonia*. The Theory of Concentric Spheres interested Poe; there are traces of it in his tales.

If few had faith in an inner world, there were thousands who believed in 1835 that there was a world of green mountains and blue lakes in the Moon . . . and of flying men ! Richard Adams Locke's science-fantasy, better known as *The Moon Hoax*, was presented in the New York *Sun* in such clever style that it seemed gospel truth—at least for a week or so. More recently, New Yorkers exhibited no less belief in Mr. Wells' invading Martians, as dispensed by radio by Mr. Welles. And the Flying Saucers ? Space-ships, and little men from Venus . . . ? Truly, science-fantasy has a potency which does not always depend on its plausibility; for its dreams very often come true.

SCIENCE-FANTASY which is—intentionally—fiction. Science-fantasy which is—or might well be—fact. In this new magazine we shall be concerned with it in all its forms: with its significant ideas, its surprising prophecies, its sheer fictions, its evolution as a fascinating literature. We shall present both facts and fancies. Hence —SCIENCE-*FANTASY*.

Since the modern development of science fiction as a specialised form began in America many years ago, there have been as many magazines devoted to it; today there are no less than thirty publications of the kind, mostly originating in the U.S.A. None of them have ever compassed the field as SCIENCE-*FANTASY* will approach it and devote itself to it, in such a way that all who wish to sustain their interest in any one of its various aspects will find the stories and articles we shall publish a valuable source of entertainment and information.

Incorporated in SCIENCE-*FANTASY* is *Science-Fantasy Review*, which for the past three years has served as the infallible guide of science-fiction readers and collectors throughout the world, while reflecting the increasing popularity of this literature since the dawn of the Atomic Age. Although the more esoteric features of that journal have been discarded, SCIENCE-*FANTASY* will continue to bring to the notice of its larger circle of readers all new publications which are likely to interest them, and will be glad to receive individual reactions which will enable it the better to cater for all their tastes and requirements.

THE EDITOR

The Belt

By J. M. WALSH

All Man's striving for the Moon was doomed to failure . . . until there came, out of chaos, a new world that still retained its ancient mysteries.

Illustrated by Gaffron

Far out in the void, ineffably remote in point of time and space, some sort of stellar catastrophe must once have happened. Somewhere, possibly, a star collided with another, or perhaps a new one was born out of chaos. There must be some such explanation, but exactly what it was that initially occurred can never be rightly known. The genesis of the trouble may have had its being eons before ever Man was on Earth.

Undoubtedly, from the point of view of cosmic disturbance, it was only a minor catastrophe. In the sum of the infinite number of systems that go to make up the Universe, the passing of one body or the birth of another is a matter of no great importance. Even by us on this world the destruction of a whole system countless light-years away could be regarded with equanimity.

There might, of course, be exceptions. It was by such that the destiny of Tellus was intercepted and our world was changed, in some respects almost out of recognition, so that life which had hitherto run with reasonable smoothness along predetermined lines suddenly found itself shooting off at a tangent. But for it, Ron Fellen might not have been given—and have taken—his big chance. Then, too there was the girl . . .

FROM THE open window of her still unlighted room the girl could watch the night flyers shooting across the sky. As she gazed the huge, unwieldy bulk of a Newfoundland tramp waddled heavily across her line of vision. It was on the last leg of its run, making for the air docks far to the north. For a moment its clumsy lines completely blocked out the Moon. Though she did not know it, this was one of the last full Moons that the Earth was ever to see.

The tramp flyer passed, bucketing grotesquely on its way, and with its passing left the sky relatively clear. Then in the distance she saw a swift silver streak, and the slim, unmistakable lines of the Far Eastern night passenger mail, lights gleaming like pin-points pricked out along its hull, vanishing over the lip of the horizon. The sky-ship would cross Europe in the dark, meet the dawn above the Persian Gulf, and decant its passengers for breakfast at Rangoon or Singapore. These were the days when distance was being annihilated so that it almost ceased to matter, when it was possible virtually to circumnavigate the globe in twenty-four hours.

And not only on Earth were time and space being telescoped. The hands of man, through his latest contrivances, were reaching out beyond the confines of the planet. The first space-ship had been built, tested and flown five—no, six years ago. It had left for the Moon, but it had never reached its destination. There had been some miscalculation, some fault. When it should have curved in it had swerved out, gone on and on, then vanished. The void had swallowed it up.

There had been others since then. In one way or another, they too had met with disaster. The last, only a summer ago, had been the most successful. It had reached the Moon, landed—and remained. It had not crashed; it had come down gently, as far as could be ascertained, practically without a jar. The most powerful telescopes of Earth's observatories trained on it, waited for some signal; but none came, either visually or by radio. It just stayed there, inexplicably, a tantalising mystery.

There had been some talk, then, of the World Government forbidding all further spatial attempts, but it had come to nothing as the popular clamour had died down. The talk itself had been mainly to hide the fact that such work was still going forward. A successor to the lost craft was even now nearing completion, but so well had the secret been kept that few people outside those actually engaged on the project had any inkling of it.

But the girl knew of it. Indeed, she had an acute personal interest in it all. For Ron Fellen was one of those most intimately concerned; and she dreaded the day when the ship would be ready for space, for when it went it would take him with it.

She stirred as someone knocked and the door handle rattled. Then she jumped to her feet and crossed the room quickly. In the light that flooded in from the passage when she opened the door, she recognised her visitor.

"Ron !" she said, breathlessly. She had not expected him that evening. She could only think that the moment she dreaded was nearer than she had anticipated.

" 'lo, Mary," he greeted her in his clipped, casual way. He caught her in his arms, kissed her, then held her away.

She wriggled out of his arms. "You might let me shut the door first," she said admonitorily.

He laughed softly, then glanced quickly about him. "You've been sitting in the dark again," he chided. "What's the idea ? Been brooding ?"

She had switched on the light while he had been speaking. He had already closed the door.

"No," she answered lightly, shaking her head. "It's just that I like it. I've been watching the night sky . . . and the Moon."

"Oh !" He gave her a quick, searching glance. She missed the significance of it, for she had turned to close the window and draw the curtains. But when she came round again she looked at him intently in the full light and saw something in his face that had not been there the last time she had seen him. It was rather more than a mere hint of strain. At the back of his eyes was a kind of dullness—a deadness.

"You've been working too hard," she said accusingly. "Is it worth it ?"

They had argued over that more than once, but had never quite reached agreement. Now, to her surprise: "I'm beginning to wonder, myself," he said slowly.

"Why ?" The question jerked from her lips.

"Just this, Mary. I'm afraid it's almost too late."

"Too late for what ?" His tone had sent a chilling fear through her mind.

"For us—for humanity. Had interplanetary travel been perfected a decade ago, it might have been different."

She looked her next question with her eyes.

HE DROPPED on the settee, pulling her down beside him.

"I'd better tell you now," he said soberly. "I don't think there's much I can keep from you for long. Anyway, it's certain to leak out soon—any moment, now. It's not one of those things that can be kept secret." He smiled wryly.

"Whatever is it ?" she asked, wonderingly. "What on earth—?"

He cut her short. "It's nothing on Earth. It's up there." He pointed ceilingwards, dramatically. "Up in the sky. Coming towards us from out of space."

She furrowed her forehead in puzzlement. His narrative style left something to be desired. His words alarmed her, without really indicating the precise cause for her alarm. Swift speculations raced through her mind. An interplanetary invasion, perhaps ? In one sense, it was to be something of the kind, though not in the way she visualised.

"What is it that's coming towards us ?" she demanded.

He took a deep breath. "Listen," he said earnestly, then plunged into a maze of bewildering technicalities. Some of the calculations he hurled at her were too abstruse for her to follow, but she grasped the salient points readily enough.

In substance, they amounted to this:

Far beyond the outer planets a new body had given warning of its advent. It had been discoverable first as something that perturbed the motions of Janus. That happily named planet, as every schoolboy knows, had itself been something of a problem in its day. That there was such an addition to the Solar System had long been suspected, but the fact of its existence had not been definitely established until a quarter of a century later than the discovery of Pluto. Its name had been given it because of certain eccentricities in its behaviour that it is not necessary to go into here. These, now, had increased in a way capable of only one explanation. An extra-planetary body was nosing its way into the System.

"A space-ship from somewhere else in the Galaxy ?" suggested the girl.

Fellen shook his head. "No." He demonstrated why this was not possible. It was mainly a question of size, but other factors entered into it. "They're calling it a planetoid. I suppose that is as near to the real truth as we need get."

He was speaking more smoothly now, with less tendency to clip his words. She knew the signs: he was approaching the hub of his story. He came to it. Too small to be seen by the most powerful telescope on Earth, the body had first made its presence known by its effects. It had provided material for calculation, until at last it had yielded to improved methods of photography. The process was much like that which had eventually succeeded in locating Pluto many years before.

"We know, now," he said. "Our department is kept posted about anything like that. And today, just before I left, I saw the first photographs. It's only a pin's head in the biggest enlargements, nothing much to look at. But . . . ."

"But what ?" she urged him on.

"Well, there's the calculations supplementing them. A maze of figures that have been checked and double-checked, and they all tend to the one result. This—whatever it is—is headed directly for us. Its path intersects our orbit at a point where it is almost certain we shall meet. Maybe it will actually pass within a hair's breadth of us. But it will come near enough to make things very unpleasant."

She felt he was trying to keep something from her now; retreating from the line of his original statement, seeking to make light of what they might have to face. She caught him by the arm, twisted him round so that her brown eyes were looking straight into his blue ones.

"Tell me," she said firmly. "I can stand it. Tell me everything. I'd prefer to know the whole thing now instead of learning it bit by bit, having hope die by inches."

He shifted uneasily in his seat. "Oh, all right," he conceded at length. "They've worked it all out. There's only the slightest possibility of error. There's going to be a triple collision—it and the Moon, then both and the Earth."

He sat back grimly. The girl went white, and her lips moved. It was some time before she could find words. Then: "But that means annihilation," she whispered.

He nodded briefly. "That's why I said it was too late. If we'd had space-ships perfected by now, there might have been hope. Mass migration to another planet, perhaps. But . . . well, it looks as though we'll break even. The *Tellurian* will be ready for space possibly a week or two before the worst happens. Much good that will do us. We'll be earthbound anyway."

She touched him tremulously. "At least," she said softly, "it will mean that we can face the end—together."

IN THE WEEKS that followed, of Earth's millions, a few were thinking in much the same strain, preparing to face with complacency a catastrophe now deemed inevitable. But among the vast majority, panic spread like a prairie fire. It had been the original intention of World Control to keep the matter a profound secret, but somehow the news leaked out; and as always when censorship is exercised, the rumours to which the suppression of fact gave rise proved more harmful than the unvarnished truth might have been.

Among other things it was said that the members of the World Government, with their wives and families, were planning to migrate from Earth, to make for some other planet and leave mankind to its fate. More popular clamour arose. Those who but a few months before had been urging an official ban on all space-travel experiments now swung to the other extreme and blamed the Control for not speeding up research work. Control answered characteristically. In centres all over the world, plants were hurriedly set up and work commenced on space-ships modelled on the *Tellurian*. It was not a very effective reply—construction in the greater part could not be properly started, much less completed, in the time—but at least it gave the ordinary man and woman the feeling that something was being done.

And all the time the unnamed intruder came winging its way across the void. But it was pointed out by a sanguine few, celestial wanderers had passed close to Earth before. The asteroid Hermes had on one occasion of recent years passed within 362,000 miles, and this, as one reckoned astronomical distance, was quite a narrow shave. Yet nothing untoward had happened: Hermes came and went almost unnoticed, save by the curious and those whose business or pleasure it was to observe such things. Often enough, visiting comets had provided spectacles of interest and scared the superstitious for a time, but that was the full extent of their effect.

But still the intruder held steadily to its Earthward path, with something of the awfulness and inevitability of fate. It was only when it had crossed the orbit of Jupiter that it manifested the first sign of any wavering in its course. One observer poetically described it as a momentary hesitation. It could have been no more than that. Probably it passed at a point where the attraction of the giant planet was the merest trifle overbalanced by the forward impetus of the asteroid, as it had been thought best to call it. There were some who asserted that Jupiter's moons provided just that extra pull necessary to get it safely past the planet's

field of attraction. Be that as it may, the records which might now decide for or against this theory have somehow disappeared.

Then it came to the Asteroid Belt. The wanderer hit something there, apparently—possibly some relatively tiny and unchartered fragment. It staggered, so to speak; recovered, and came on rather larger and considerably brighter than it had been before. Not long after that, it became visible to the naked eye. Its speed of approach seemed to have increased, and it showed just the slightest variation in its course, albeit sufficient to throw all the observers' careful calculations out of gear and set them frantically recasting their figures.

With the first published results of these came the dawn of a new hope. The asteroid wasn't going to strike the Earth or the Moon, after all. It would sail by with room to spare. There would be terrestrial disturbances, of course—extraordinarily high tides, land tremors on a considerable scale, things of that sort—but nothing worse than that. The Earth, which had escaped so much in the past, was once again reprieved. Human life was to survive.

Only one man uttered a warning: one Heschel, from a private observatory somewhere in South America. He declared that the asteroid had on spectrum analysis been found to contain an entirely strange and absolutely unidentifiable element, something not known in Earth's atomic tables, and further, his calculation showed that its density was disproportionately high having regard to its mass.

Another panic threatened to run round the world. Then someone began to unearth or manufacture details of Heschel's past. It was said that he had once belonged to one of the premier faculties in the United States, but had been asked to resign because of certain wild and revolutionary theories he had enunciated. There were hints of a scandal, whispers that there was suspicion of trickery in his methods, that he was inspired more by sheer love of notoriety than any regard for facts. So the innuendoes piled up, to Heschel's discredit.

There came the time when the newcomer was visible by day. By then, some of his earliest detractors were beginning to revise their opinions of Heschel, indicating that they had spoken too soon and too vehemently. There seemed to be a certain substratum of truth in what the man had said, but they had gone so far in discrediting his evidence that they could not now admit they had completely misled themselves and the public. It would have started yet another and far worse panic at a time when the world had been lulled into a sense of comparative security. World Control clamped down on anything that threatened to shake the general complacency. Still, work on the *Tellurian* and its numerous progeny went on apace.

The asteroid drew closer. It was plain, now, that there was no danger of collision. Then Heschel made another pronouncement, but the public never heard it. All news of it was suppressed before it could circulate, and Heschel himself was gathered up by the public safety custodians and put where he could not further upset morale. Only to a limited circle, compelled to strict secrecy, did his last, most terrible prognostication become known.

"BY RIGHTS, I shouldn't be here," Fellen said breathlessly. "But I had to come. And now I'm here, I'm staying. I don't care what happens."

The girl stared at him in bewilderment. His forehead was damp with perspiration, his face had a strained, waxen look. His eyes were shrunken as if he had gone without sleep for days.

"What do you mean ?" she gasped, a queer fear tugging at her heart. "The worst is over, isn't it ? The asteroid has passed."

He nodded curtly. "Passed, yes. If that were all. . . . ."

"But isn't it ?"

He evaded a direct answer. "You remember when it passed ?" he asked.

"Yes. There's no secret about it. Some time before the dawn. I can't say exactly to the hour."

Again he nodded, as though in answer to a question forming in his own mind. "Then," he said searchingly, "you haven't been out this evening ?"

She shook her head. "No. Why ? Has anything happened ?"

He strode to the window and flipped aside the curtains. "Put that light out, then come here," he said, almost harshly.

Wonderingly, she obeyed. He had the window wide open by the time she joined him. He wreathed his arm protectingly about her. "Look !" he said tensely, pointing up into the night sky.

She stared in the direction he indicated. "What do you see ?" he asked, when she made no further response.

"The Moon," she said uneasily.

"Is there anything about it that seems different from usual ?" It was as though he wished her to make the discovery for herself.

"No-o-o. Er—yes. Or am I imagining it ? It seems rather bigger than it usually does at this time of night, perhaps. More—prominent. But one can easily be deceived by the Moon."

"It's no illusion. It *is* bigger," he said, with profound conviction. "And for a very good reason, Mary. It's *nearer*. The asteroid passed, but in passing it did something that can never be undone. It pulled the Moon out of its orbit."

"No ! It couldn't !"

"It could. It's done it. Heschel was right—they suppressed him because he was saying things they didn't want the world to hear. He could see further than the others. But it's too late for regrets. . . . Yes; the Moon's larger—and coming nearer. It's falling—on *us*. Already the difference is perceptible."

The girl's face had paled. "And then—?" she said huskily.

He shrugged. "I don't know quite what to think. It has started to fall, that's the main thing. And it will keep on falling. Nothing can stop it now. Then it will hit us. What happens after that no one can say with any certainty. Some think the world may come through it—badly damaged—but we'll survive. Others don't think so. The astronomers, scientists, are far from unanimous." He made a wry face.

She harked back to something he had said when he first came in. It took her

mind off the prospect ahead of them, if only for the moment. "What was that you were saying ? That you shouldn't be here, but that you had to come ?"

"Oh, well, if anything's going to happen I want to be with you. I've no one else in the world—"

"Yes, I know," she said, a trifle impatiently. "But there's more behind it, isn't there ?"

He screwed up his face in distaste. "It's not a nice story, but I'll tell you if you must know."

"Yes, Ron, I must. Tell me everything."

And so he plunged ahead. The rumours had been correct. The craven members of the World Government had been making their secret preparations. They were to board the *Tellurian* as soon as it became evident there was no longer any hope, take off and leave the world and its inhabitants to fend as best they could for themselves. They thought first of their own lives, though Fellen questioned whether any of them were really worth saving, gave it as his own opinion that they were a pretty poor lot. Earth's affairs had run so smoothly during the past fifty years or so that there had really been no testing out of its governors. Now, the first—and probably the last—big crisis had found them wanting.

Fellen himself came right into the front of the picture, because he was the first fully qualified pilot to graduate under the new dispensation, and it was to have been his task to take the *Tellurian* out into space for its tests. He doubted whether any substitute could be found in the limited time available. He was not even sure that the ship would be ready in time. Events were likely to move more quickly than preparations could be completed.

His views were his own, his judgment formed from his knowledge and intimate contact with those who were to have been his passengers. Perhaps he was wrong in his conclusions; the girl could not say, though somehow she had confidence that he was right. Something told her that, had the circumstances been different, he might have acted otherwise, and she shrewdly left it at that. Anyway, Fate was on the point of taking the decision clean out of Fellen's hands.

"They can stay here," he finished. "Stay and take their chance with billions of others. Of that. . . ."

His free arm swept round until his pointing finger aimed accusingly at the Moon.

THE MOON kept on falling. In the period that followed, it loomed larger and larger. It threatened to fill the sky. Features of the moonscape hitherto only visible by telescope could now be plainly seen with the unaided eye. Everywhere the tides rose enormously, and did not ebb to the extent they should have done.

Then, at the crucial moment when it seemed that it must soon strike the Earth, the startlingly unexpected happened. The Moon was little more than ten thousand miles away when the superior gravitational pull of the Earth began to assert itself. The Moon split—broke into thousands of pieces !

Hasty, half-hysterical descriptions of those days have come down to us. There are records of eye-witnesses who wrote of a whirling ball of shattered, jagged masses elbowing each other sullenly in the sky, of excoriated fragments that parted and fell to Earth in what seemed at first like a ceaseless bombardment. There are tales of meteors that wiped out whole cities, savage stories of fleeing, panic-stricken populations. Oddly enough, the greatest damage was done within a few degrees north and south of the Equator, though no part of Earth escaped entirely.

Through it all Ron Fellen and the girl somehow contrived to survive. The full tale of their experiences, the vicissitudes they suffered with their immediate neighbours, may be told some day, though this is not the place for it. At times they were very close to death. More than once they escaped as by a miracle. Life settled down more comfortably for them when they managed to reach and eke out an existence in some caverns close to where the *Tellurian* had been built. There were stores assembled there, for much of the work had gone on in secret underground. The great tidal waves of the earlier days had not reached there, or if they had they had done no great damage.

It was on their way there that they learned of the fate of the party which had intended to take off in the space-ship. Its members had been caught in the first bombardment, and before they could reach shelter of any kind had been wiped out by some of the falling debris from the Moon.

But all of that shattered body—the greater part of it, in fact—had not come to Earth. Many of the fragments, gigantic in size, had strung out in a line along the Earth's equator. There they had formed a ring somewhat after the style of Saturn's, but more compact and of greater width. Mankind, recovering from its shock and finding that, despite the appalling casualties of the time, it was not yet doomed to extinction, recovered some of its resilience. Emerging from their burrows, men looked up at a night sky now streaked with continuous showers of meteoric dust from their disrupted satellite, saw the ring and gave it a name. They called it the Belt. And by that appellation it was to go down in inter-planetary history.

The Belt was nearer Earth than any celestial body had ever been. It was at once an incentive and a lure. There were those who, had they been permitted, would have tried to get there without more ado. But the provisional Government that piloted the world through its period of recuperation quickly forestalled any such attempts, considering, not unwisely, that mankind had more immediately important tasks to undertake on the stricken planet. Besides, the Belt had not yet entirely settled into place. Fragments, giant meteors, still came hurtling through the sky to Earth. Telescopic observation showed the Belt as some-thing like a heaving, turbulent sea, a dangerous region for any spaceship to venture near.

That phase passed in due course. The Belt began to take on a distinct form and regularity of its own. Its features tended to remain constant. Then it was that the telescopes of the world's observatories that had escaped intact began to

sweep the prospect. They saw at first only bleak and tangled masses of jagged rock, partly fused by elemental forces and presumably sterilised by the racking cold of space. It must be remembered that in those days there was a good deal of haziness about such observations, due to the vast amount of Moon dust still permeating the atmosphere. There were inevitable visual distortions and uncertainties, errors in diagnosis, conclusions formed hastily and on insufficient evidence.

It was a man called Snegal, an obscure amateur of whom no one had ever heard, who announced that in one of these phases he had seen signs suggestive of movement on the Belt. He could not say what it was he claimed to have seen, but he described it as an indeterminate glistening, silver-grey body that appeared to shift from point to point during the time he had it under observation. He admitted frankly that it seemed to have no clearly defined characteristics, and that during those few minutes it was visible only intermittently.

At the end of that period it vanished. Most probably, if there had been anything there at all, he had momentarily lost sight of it, then could not pick it up again. But the general belief at the time was that Snegal had been the victim of an optical illusion and had mistaken some play of light and shade for

something more tangible; though he firmly maintained that he had seen precisely what he claimed, that it was no shadow or anything of the kind, but something that moved of its own volition. Whereupon the sceptics argued that the conditions in the Belt were hardly suitable for life; were, in fact, definitely adverse. Had they qualified their opinions by saying that they were referring to life as it was known and understood on Earth, they might have been nearer the mark.

Into the midst of the wrangle plunged the radio newsmen, armed with certain alleged facts they claimed pertinaciously to have unearthed concerning Snegal and his antecedents. They asserted that the man was a distant cousin of Heschel. The latter had been killed in the early days of the meteoric bombardment, and so was in no position to answer for himself. Anyway, he was still listed in the public mind as an unreliable, notoriety-seeking crank. That his last formal act had been to warn the world of its probable fate was still not generally known, it having been suppressed only too thoroughly by those weak, ill-starred members of the World Government of pre-Belt days; and their successors had seen no reason to reveal the facts in the present uncertain state of public opinion. They were too busy trying to build up confidence in a shattered world.

So, cleverly, by no more than a few implications, the newshounds managed to convey the impression that Snegal was following in his relative's footsteps and trying to acquire a reputation for himself with startling pronouncements which had no basis in fact. All Snegal's attempts to explain and justify himself were short-circuited, so that presently he retired offended, and refused to be drawn further on the matter.

Meanwhile, the trials of the *Tellurian* had gone on. Most of her flights had been within the outer layers of Earth's atmosphere, though once or twice she had ventured outside. But Fellen, pleased with her in many ways, was not altogether satisfied that the vessel was spaceworthy: she had shown certain minor defects that he considered should be remedied before any serious extra-planetary expedition could take place. In those days interplanetary voyaging as we know it was, in theory as well as in practice, very much in its infancy. It was largely a hit-or-miss business. Men had to learn from their mistakes by a process of trial and error, and there were some mistakes which, once made, men did not live to rectify. Those first daring spirits who had taken off in earlier days, and not come back, had probably made every one of them. Fellen, with others' lives in his care, was not prepared to take risks that science and expenditure could render unnecessary.

What was needed, now, was some sort of experimental station in space. The astronautics experts looked up at the sky, nodded wisely, and went into a huddle. The Belt was a good place on which to make a start. Could the *Tellurian* get there and back ? Fellen thought so, when they called him in. He made certain suggestions, and listed his requirements. In the end he got what he wanted.

EVEN SO, the *Tellurian's* passage through the atmosphere was slightly bumpy at the start. The working of gravity-nullifying plates had not yet been

reduced to an exact science. But she got into space without anything serious going wrong. Then, when they could use their acceleration rockets freely, Ron Fellen drew his first unlaboured breath.

The rest should be comparatively easy. The Belt was already looming up ahead of them, no great distance away as distance is measured in the void. It was merely, he considered, a matter of reaching the precalculated point between the Earth and the Belt as soon as possible, then shutting off the rocket discharge and dexterously using the Belt's gravitational pull to get them the rest of the way. He felt quite happy about the voyage.

It was at that moment that the communicator buzzed a warning note. He pressed the button on the control panel in front of him, and a voice came through. It was that of his third officer, Tarne.

"Have to report, sir," he said, "that we've checked right through the ship. She's stood the strain well. We've made one discovery though."

"What's that ?" Fellen demanded.

The voice gave a faint chuckle. "An extra passenger, sir. We've found a stowaway."

Fellen said something under his breath in a tone of exasperation. "Bring him into the chart room," he ordered sharply. "I can spare a few minutes. Grayle will take over control in my absence."

He pressed the button again, cutting off the communicator. Ordinarily, he supposed, he should have let the third officer deal with the stowaway, but he was curious to see for himself the hardy spirit who had taken such a risk. It was like going back to the old seafaring days one read about in the ancient romances. They had stowaways in plenty in those times. But, then, the adverse chances were not so great as they were now. Some silly, adventurous lad, he fancied, building up to be a hero in his own eyes. Still, whoever he was, he'd have to give him a dressing down.

He looked over at his companion. "Take control, Grayle. Keep her on her present course at the indicated acceleration. If there's the slightest deviation in either respect, call me at once. But there shouldn't be—I won't be absent more than a minute or so."

Grayle nodded understandingly, and moved into the control seat. Fellen passed through the small door into the adjoining room. He had scarcely arrived when the outer door opened and the third officer entered with his prisoner. The latter looked no more than a youth, from what could be seen of him. He wore a suit of regulation space overalls, his face was grimy and oil-streaked and his cap was pulled down over his eyes. At the moment he looked half sullen, half scared.

Fellen stared past him. A fleeting grin passed over the third's face; then his expression instantly went immobile as he met his superior's eyes.

"Where did you find him, Tarne ?" he asked.

"Down in the stores, sir, hiding among the fuel drums." He seemed to choke over something, then managed to get it out. "It's not a *he*, sir—it's a *she*."

Fellen jerked his head round. The prisoner's dropped. A suspicion floated through Fellen's mind, and he took a step forward.

"*You* !" he snapped. "You—here ? You should have known better. You might have endangered the lives of everyone on board, besides your own."

The girl hung her head. Tarne stared open-mouthed.

"All right, Tarne," Fellen said evenly. "Leave this person with me. I'll take the necessary disciplinary action."

Tarne started to say something, then thought better of it and slid out of the room. Instantly Fellen swerved round on the girl.

"Mary !" he said harshly. "You reckless fool ! Why did you do it ?"

"To be with you," she said in a small, contrite voice.

"Yes, I know." His tone softened. "But can't you see the position you've put me in ? All the others on board might like to have their wives or sweethearts with them—or they might not. But in any case I shouldn't be made an exception. Apart from that, we've worked everything out precisely. You're an extra person on board. Now we may have to recast all our calculations."

"I know. I'm sorry. But I didn't see it that way at the time. You'll have to discipline me; you said so. But isn't there something I could do, some way in which I can be useful ?"

"We'll find something," he said. Then he smiled. "But I can't kiss you with that grime on your face. I don't know what Grayle would say if I went back to him with a smut on my nose. Better clean yourself first. You'll have to dry clean—water's a precious commodity aboard this craft. You'll find the necessary in that cupboard over there."

"And then. . . ?"

"When you've made yourself presentable, come through that door into the control room. But when you do, please keep quiet. We may be very busy and not wish to be distracted."

She nodded. Her reception had not been quite so warm as she had anticipated in her more imaginative moments, but she realised she had only herself to blame for that. She was fast beginning to recognise some of the enormity of the thing she had done.

Fellen selected a spot that was comparatively grime-free, planted a kiss there on the impulse of the moment, then passed through into the control room. Grayle looked up inquiringly as he entered.

"Some runaway wanting to be a hero and not finding it all honey, I suppose ?"

Fellen shrugged. "Worse than that. Flat defiance. It's my wife-to-be."

Grayle's lips curled, but he checked the smile in time. He had an idea the Chief was more angry than he would admit. "It puts you in a spot," he said sympathetically.

Fellen made no answer, but slipped into the seat Grayle vacated. Life was not without its personal problems even here in space, he thought. Then he dismissed the matter from his mind and gave all his attention to the task in hand.

WHEN THE girl came into the control room she found two very absorbed men whose work was so important that they had no eyes for her, even though she had cleaned herself up passably and shed the ungainly overalls. Grayle, young and impressionable, did give her a quick, curious glance, but he was too well-trained to let her advent interfere with his duties.

At length Fellen looked up and turned his head in her direction. "Better sit in that chair there," he told her. "You'll find straps attached to it. Put them on. You may need them soon."

She obeyed, noticing that the others had already strapped themselves in. She supposed it had something to do with the gravity pull they would presently encounter, and remembered with distaste the uneasy feeling—it was, actually, something more than that—which had come over her immediately after their departure from Earth.

She had scarcely secured herself in the chair when a gong sounded. It was loud enough to carry throughout the ship. Then she was aware that everything had suddenly become very silent. There was no longer any roar from the rocket motors; the shuddering vibration which had been shaking the ship for so long had ceased. There came a sickening sensation as the vessel seemed about to turn over, and she understood now what Fellen had meant.

The upper part of the panel in front of him began to glow, and she saw that it was a visiplate. The dark, frosted look on it disappeared, and colours came and went. By craning her neck she could catch a glimpse of what was being recorded there, and gradually it dawned on her that she was looking at a portion of the surface of the Belt. It appeared to be rushing to meet them at an incredible rate. She shuddered and went white, thinking they were plunging headlong towards it.

Fellen, tense and tight-lipped, pressed another button, and again the gong sounded. This time he spoke into the communicator.

"Bow rockets !" he ordered. "Just the one charge, then stand by !"

A fraction of a second later, a convulsive shudder ran through the ship. It seemed to jerk violently, then stand still. There was a moment of sickening suspense, and the girl saw with relief that they were moving towards the Belt at a more comfortable speed. She knew enough of the theory to appreciate what was happening; that Fellen was employing the gravitational attraction of the Belt to pull them towards it, at the same time braking the vessel by using the repulsive force of the bow rockets. The result, if calculations could be relied upon, would be to achieve a state just short of perfect equilibrium which would enable them to land with safety. In theory, at least, the ship should come down like a gull on a pond. Actually, there would probably be some nasty moments of bumping and scraping.

That section of the Belt towards which they were heading, nose first, was now broadening out. It was visible on the plate, as an ill-defined, tangled wilderness of bare, bleak rock. Once more Fellen gave the ship the gong and spoke his orders into the communicator.

"Stand by to flatten out," he called.

She could not be sure, but it felt to the girl as though both the bow and stern rockets had been fired, one immediately after the other. In fact, there had been a perceptible interval between the two operations, during which the ship had gone into an almost complete reverse. It was a complicated manœuvre which Fellen was attempting. Torn between the danger of breaking the vessel's back and the risk of burying her nose in a landscape whose nature was yet little understood, he had chosen to come down stern first. Actually, he was handling her so as to describe the arc of a circle at the lowest point of which she should, if all went well, slide gently to rest on an even keel.

The surface of the Belt seemed to come swerving up at them. But for the straps which held them, they would have been flung out of their chairs. The perspiration stood out in congealed drops on Fellen's forehead. Grayle was white and tense. The girl, an odd feeling in the pit of her stomach, was torn between fear, wonder and pride. Fear of what might happen, wonder at the spectacle unfolding before her, and pride that she was the first woman to witness this stupendous event.

The *Tellurian* moved crazily. She thought for one horrible second that they were going to crash on the surface of the Belt. Then the ship seemed to straighten out; it jolted rather heavily once or twice, and finally came to a skidding stop with a sound like that of a pencil being dragged over a slate, only magnified a thousandfold. She started up in alarm, but the straps caught and held her.

Fellen looked round at the sound of her stifled cry. "That's nothing," he said reassuringly. "Only the landing skids."

She was to learn later what they were. Great strips of metal, like the runners of a sled, had been fixed to the under-portion of the hull to take the strain of landing and prevent any damage to the main fabric of the vessel.

Inside the air-filled *Tellurian*, she had heard the sound of these tearing across the rugged surface of the Belt; though had she been outside she would have heard nothing at all. For the airless surface of the Belt was wrapped in an elemental silence.

Fellen unhooked his straps and rose from his chair. Grayle did the same; and the girl, after a moment's hesitation, followed suit. Her lips moved, but no sound came.

"Well, we've done it, sir," Grayle said. The words were commonplace enough, but there was exultation in his tone. Fellen, for his part, looked flushed and happy. The first stage of the venture was over. They had made a safe landing on the Belt.

"Mary Greeber—Eric Grayle." Fellen introduced them. "The stowaway, Grayle. Should I put her in irons, or what ? What did they do with stowaways in the old days ?"

"Put them to work in the galley," Grayle said with a grin. He stopped, struck by a sudden thought. "We have a spare space-suit, I suppose ?" he added, his voice changing uneasily.

Fellen nodded. "Several. I insisted on that. Well, shall we take a peep ?"

Grayle turned and pressed a button, and a portion of the outer shell of the vessel slid aside. Through the thick quartzite part they caught their first close glimpse of their new world. It was not a nice-looking place.

"Hmm," Fellen grunted. "Much as we expected. A grim prospect !"

As far as they could see, the surface of the Belt was broken into great, heaped hummocks of grey rock, bare and desolate. In places the rock looked as though it has been fused together; elsewhere there were cracks and crevasses that seemed almost to move and undulate strangely, bewilderingly. Some of the fissures were like small canyons between the humped rock-masses, while others were so narrow that they could be distinguished only as thin, black lines that appeared to waver uncertainly in the hard, brilliant sunlight that poured down upon the Belt.

THEY STARED for a long time, saying nothing. There was little in the formidable outlook to stir them to speech. Then Fellen stretched.

"Well, we'd better see about taking a look round outside," he told Grayle. "Tell off a party of men and get them into their spacesuits. You'd better get hold of one of the spares, too, test it out and bring it here—for Miss Greeber. Perhaps when she's been out there once or twice she won't be so glad she's come."

The girl took a quick step forward. At least, that is what she meant to do, but to her surprise she went sailing right across the room almost as if she were treading on air. As she lifted a foot above the floor, Fellen reached up, caught her arm and drew her down. He acted quietly, without haste, as though each restrained movement had been carefully meditated beforehand.

"I should have warned you," he said. "Gravity's pretty weak here, possibly a twentieth of what it is on Earth—maybe less than that. We haven't been able to calculate it exactly yet. And we'll have to step things up a bit to get the ship back to Earth gravity. Meanwhile, be careful. If not, you'll find yourself doing all sorts of acrobatics."

Grayle had already turned to carry out his orders. He was halfway to the door when he stopped and gasped. The girl, facing in the same direction, cried out and clutched wildly at Fellen's arm. Fellen swung round, stared hard, then blinked.

"Good heavens ! Whatever's that ?"

Something like a dull grey blanket was spreading itself over the quartzite window. Already the port was three-parts obscured. The thing that moved across it was much the same colour as the rock surface of the Belt, but every now and then watchers caught a flashing glimpse of silver that lingered tantalisingly for an instant, then vanished. It was the merest occasional ripple on the surface of . . . whatever the thing was.

"Snegal's vision come true !" Grayle ejaculated. "But what the devil—?" He stopped, speechless.

Fellen said nothing, but continued to stare uneasily at the thing. Later, for want of a better name, they were to know it as the Ribbon Worm, but now it

was something utterly alien and appalling. Unhurriedly, sinuously, it moved, blotting out the rest of the quartzite window. And inside the control room, despite the lights, it seemed to have become very dark.

With an effort, Fellen jerked himself out of the queer lethargy which had seized him. "Grayle," he snapped, "close that port !"

Grayle moved towards the button. Normally, at the mere touch, the outer shell would have slid smoothly back into place to completely cover the quartzite, but now nothing happened. He tried the emergency manuals, but they would not work either. The thing blanketing the window heaved once or twice as though something was pressing against it, but that was all.

Grayle gave up. "It's no use," he said. "It won't close. That infernal thing's in the way."

"Maybe," Fellen admitted. "But that marsonite plate should have shorn through it like a hot knife through butter."

"Well, it didn't." Grayle eyed the other uncertainly. "Do you know what I think, sir ?"

"I'm no mind reader—what ?"

"Well, it's my idea that thing's alive—whatever it is. And I've a notion it may be the reason why the Selentz expedition to the Moon never came back. The ship landed safely, we know, but no one ever came out of it. You can't tell me that the shock of landing killed them all, or anything like that. I'm willing to bet it was this, or something like it, that prevented them getting out—or coming back." There was a strange, half-fearful look in his eyes.

"Nonsense !" said Fellen sharply. "Nothing could live on the Moon. Or on the Belt, either. There's no air."

"I know," went on Grayle, earnestly. "You'd say there wasn't a chance—and so would I. We've always had that drummed into us—no air, no life. But may be we're wrong. When we talk of life, we think of it in Earthly terms; of forms that have to breathe air in oxygen, that can't do without it. But may be there are forms of life—like this—that don't need air, and that can survive the cold of space as well as they can stand being fried by the heat of an untempered Sun. Now that we've left the Earth, we may have to reconstruct our ideas of . . ."

He broke off chokingly. The grey blanket was sliding back a little, moving down the quartzite surface. A small triangle of light appeared. Slowly the area increased, as though the ribbon-like thing was contracting. It twisted and turned with a slow writhing motion; then one end bent round, clamped itself against the quartzite window, and stayed there.

For a second or so, neither of the two men nor the girl was aware of anything more than that. It was only gradually that two yellowish spots, the size of saucers, made their appearance at the end of the thing which was fastened to the quartzite. The spots seemed to darken in colour, became more pronounced. Then, by degrees, the truth dawned on the watchers. The creature—if such it really was—was looking in at them. The saucer-like spots were eyes. Yet they bore little resemblance to eyes as they knew them on Earth: there was

neither pupil nor iris to be seen. They were merely great, tawny-coloured circles; but within them was a suggestion of dark, fathomless gulfs and of unplumbed depths holding a nameless horror.

The body of the creature started to sway, then, with an odd rhythmic motion, almost as if it were trying to lure them towards it through the quartzite. Its lack of success seemed to irritate it, for it began to beat its hard grey substance against the port. The blows were powerful; the thing obviously possessed considerable strength, and the space-ship, for all that it was firmly grounded, rocked slightly on its skids.

A stab of anxiety shot through Fellen. Could the thing possibly force its way in? Was it powerful enough to crush the vessel's sides? The idea seemed absurd, yet when he came to consider the probable constitution of the creature the possibility did not seem so wildly remote. Supposing it *had* existed on the Moon, that it had survived the cataclysm and had now settled down to conditions that were, almost certainly, even more onerous than before. Such a form of life must have powers of strength and fortitude far beyond anything known on Earth. Neither cold approaching that of absolute zero, nor heat untempered by atmosphere, would have any effect on it. A rocket blast might discourage it, perhaps, but it would have to be in the direct line of the tubes. Yet any other form of attack on it could hardly be attempted while they kept inside the vessel, and until they knew more about the thing it would be sheer idiocy to venture out in the open.

THE THING went on shaking the ship. Its rocking motion grew more violent. A call came through on the open communicator. It was the third officer, wanting to know what was happening. The others had become aware that something was wrong, and were getting uneasy.

"I'm sending Grayle to tell you," Fellen said, trying hard to keep any hint of alarm out of his voice. Grayle looked up alertly as Fellen turned. "You'll have to tell them something about it, but don't say too much. I don't want them to think it's anything serious. And when you come back bring the space-suits with you."

Grayle eyed him doubtfully. "Surely, you're not—"

Fellen cut him short. "I haven't decided anything yet," he reassured him, with one of his rare smiles. "I merely want to have them ready—just in case we need them."

Grayle swallowed, and went out.

"Tell me, Ron," said the girl quickly. "What are you going to do?"

Fellen shrugged. "I'm full of ideas. The devil of it is, I'm not sure if any of them will work."

He tried the controls tentatively; then, on the inspiration of the moment, decided to give the anti-gravity plates a weak charge, just sufficient to lift the ship very gently from her resting place. He got the reaction through as he set the switch, but the vessel did not rise. He advanced the switch another notch

The girl screamed. "Look !" she cried, pointing to the window.

Fellen whirled round. The huge, tawny eyes of the creature clinging there had changed in hue. They had turned red, a bright, angry red. Then, abruptly, the thing itself began to slide and slither. Inch by inch it withdrew down the quartzite, until it finally vanished from their view. Fellen at once seized the opportunity to press the port button. The plate slid easily into place now, covering the window.

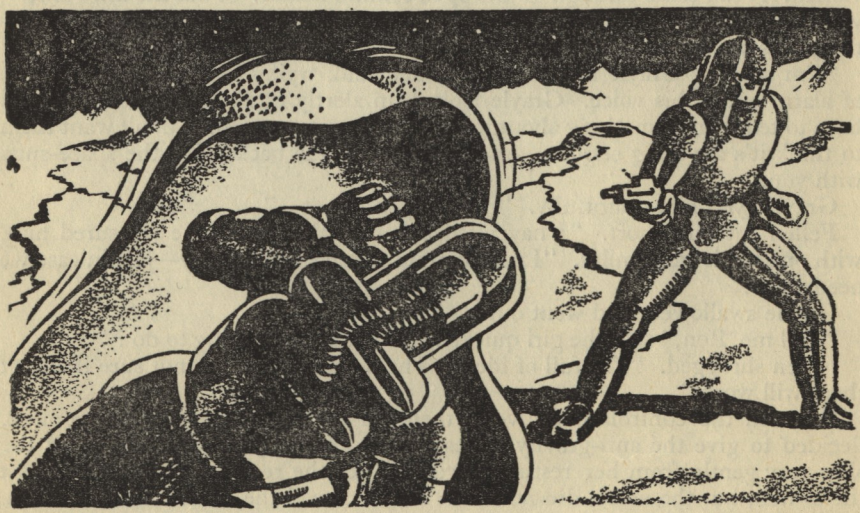
There came a mighty tug, something gave, and the *Tellurian* leaped upward. Hurriedly, Fellen switched on the visi-plate. The ship had risen straight up from the surface of the Belt and was still rising. The thing that had been keeping it down had dropped away, and was nowhere visible. Fellen retarded the gravity switch, and the ship dropped a little. The rest was a matter of tricky manoeuvring and calculations made at lightning speed, of anti-gravity plates activated and de-activated. In the result, the *Tellurian* presently came down again, rather bumpily, between two and three miles away from her original landing place.

Grayle burst in just as the ship settled again on an even keel. He took one look at the visiplate, and gave a sigh of relief.

"What happened, sir ?" he asked.

"I tried the lift," Fellen said unevenly. "I thought at first that it wouldn't work, that I was going to tear something apart. It felt as though we were dragging the Belt up with us. But we seem to have stood the strain better than that thing out there. How did the men take it ?"

Grayle grinned. "Better than I expected," he said. "They were more mystified than scared."



Fellen nodded absently. "Well, now that's over, I'm going to have a look outside. You've brought the space-suits ?"

"Yes." Grayle hesitated. Then: "Who's to go with you ?"

"No one," said Fellen determinedly.

"But if anything should happen—?"

"You'll have to deal with it as best you can. You're an efficient astrogator."

"All the same, I don't like the idea of your going out alone."

"He isn't," said the girl sharply. "I'm going with him."

"No ! You'll be in the way." Fellen was frowning.

"Not as much as I am in here. Can't I be of *some* use ? I'll do exactly as you tell me."

Fellen shrugged. He seemed suddenly quite indifferent, too tired to argue. "Oh, all right. Go in there." He pointed towards the chart room. "I'll be in with your space-suit in a moment."

The girl went out. Grayle looked at Fellen with anxious eyes. "I don't want to interfere, sir," he said, "but is it wise ?"

"Of course it isn't," Fellen said bitingly, "but it's the lesser of two evils. She'd fret herself to pieces in here. Anyway," he added, inconsistently, "we'll be all right as long as we keep our eyes open."

He was ready very quickly. Then he went and helped the girl into her space-suit, explaining every detail as he did so. Finally Grayle checked them over, making sure that they had all the necessary equipment, and at the last, thrust a reserve tube of oxygen in each belt. In an emergency, if the regeneration apparatus in the suit failed, the tube could be clipped in behind the helmet and the connection made in a fraction of a second.

GETTING THEM out through the airlock was slow work, but presently the air in the chamber was exhausted by the pumps and the outside port slid open. Fellen caught the girl's hand, made speech contact with his other glove.

"Remember what I've told you and walk warily. Our shoes are weighted, but we're bound to find the going strange at first."

The ground beneath their feet was perhaps the oldest on which man had ever walked. It was sterile, bleak and bare. It seemed impossible that such a place could support life of any sort; yet they had already had proof that there was a form of life that could exist under such conditions. And if one, why not others ? Fellen kept a sharp look-out, but could see nothing either of the ribbon worm or any other monstrosity.

From what he could see of it, he decided that the terrain was perfectly suitable for the purpose suggested by the space-travel experts, though, of course, it would have to be surveyed in its entirety before the final decision was made. None the less, he felt justified in looking ahead. Certain areas would be levelled, hangars and buildings put up, and air-manufacturing plants established. He wondered if it might not be possible to provide the Belt with an atmosphere of

its own eventually. Such a thing shouldn't be beyond the powers of modern science. But that wasn't his immediate concern . . . .

On this first trip out they spent about an hour, and only gave up then because the air regeneration apparatus in their suits had not been subjected to prolonged tests under practical conditions, and Fellen was anxious not to put too great a strain on it or on their own systems. Later, when they had adjusted themselves, longer periods could be spent in the suits. They got as far as a narrow chasm which Fellen dubbed the Slot, because it was the name which instantly occurred to them both. Beyond it he could see another, apparently much wider and deeper, but he decided to defer exploration of it until later. So, without incident, they returned to the ship.

The best part of a week was spent in such expeditions. The personnel of each party was varied, and all the men given a chance in turn to stretch their legs. There seemed no danger, now, in going further afield, since the ribbon worm had not reappeared. Possibly it was the only one of its kind and had retired discouraged, or perhaps there were periods during which it lay quiescent. Fellen, after the first few uneventful days, was inclined to the opinion that they had landed close to its lair and disturbed it, and that now they had left it in peace it was not likely to worry them again. The odd part of it, though, was that there was no indication of its hiding place. It had simply disappeared without trace.

By the end of the week things seemed to be going well. Helio communication had been established with Earth. They had tried radio, but without much success: obviously, greater power was required than they were able to generate under present conditions. But communication brought one result. World Control was getting restive, urging them to complete their preliminary survey in the quickest possible time and return. To effect this, Fellen started sending out two parties instead of one, always taking care to leave the remaining third of his complement behind in charge of the ship.

Then one day the second party, which had been sent out under Grayle, made a discovery. They had crossed the crevasse just beyond the Slot when, looking back, one of the men saw something that caught his eye. It was a little way down the wall of the chasm on the side nearer the space-ship, and only the fact that he had dawdled behind and passed at the moment when the Sun was at that particular angle explained his noticing what everyone else in the party had overlooked. Having drawn Grayle's attention to the object which had attracted him, he had obtained his permission to climb down and examine it more closely.

Such a descent would have been dangerous if not impossible on Earth, but here, with the lighter gravity, he went down like a fly on a wall. Presently he returned carrying something like a slab of metal, about a yard long, a couple of inches in depth and perhaps six in width. It was obviously metal of a kind quite unknown on Earth. Seen in the full light it was bright red in colour, with curious translucent patches all over one side of it. Indications showed that it was no freak formation; rather, all tests pointed to its being the work of intelligent beings.

Back in the space ship, Grayle and his men gave it a thorough examination. It was hard beyond belief. When they tried to remove a small piece for analysis it resisted every means they were able to employ. There was another peculiar feature that they did not immediately discover. It was only when Grayle brought it under a high-power electric light for closer observation that he noticed the translucent patches on one side of the bar were gradually taking more definite form. He continued the exposure, and at the end of half an hour the translucencies stood out much more clearly.

There was a sort of orderliness about them now. They seemed to fall into definite groups, as though they were arbitrary signs of some sort, words in the language of a race dead and gone many eons ago. But what message they were meant to convey was beyond the power of the men to decipher. All they could say with any degree of certainty was that this must be a specimen of the writing or printing of a highly cultured people of great scientific attainments.

The discovery fired them with a new desire. The chasm where the bar had been found might yield further secrets. Next day, Fellen himself took charge of the party that was to carry out the exploration. They went equipped to meet all contingencies of which they could think.

IT PROVED easy enough to descend into the depths. The broken, jagged rock gave good hand and footholds. For the first hundred feet or so there was nothing much to be seen; only the dead, hard rock walls on either side. Then, sharply, as though it had been cut short with a knife, the formation changed. It was no longer rock, but metal; the same queer stuff as the bar was made of, except that it was not red but a wonderful emerald green. In the light of the pocket torches the men carried, it glowed with a weird luminescence. Both walls and floor of the pit were lined with the substance.

Presently, as they still descended, they noticed something else. The walls had pictures carved or etched on them. They were mostly pictures of buildings, like those in an architect's vision of Paradise, and of ornaments and other articles of rare and exquisite beauty if doubtful function. But one thing was conspicuously absent. Nowhere was there depicted the figure of any occupant of the buildings, nothing that would give the faintest clue to the nature of the creatures who had made these wonderful things. Yet the pictures were so many and varied that it would have taken one man almost a lifetime to study them in detail. Fellen contented himself with photographing those of the more interesting.

So absorbed had they become that they had not noticed the passage of time. They would have lingered much longer, but Fellen realised that his expedition was not equipped to deal with the discovery as he would have liked. It needed a special party of trained men, armed with apparatus he did not possess. He would have to report their find on his return, and the scientists would then come flocking—archaeologists, selenologists, all anxious to wrest its greatest secret from the Belt.

They reached the surface without incident, and set their faces towards the space-ship. They had crossed the Slot and were within sight of the *Tellurian* when the first hint of danger manifested itself. One of the men leapt suddenly to one side as a grey patch of ground beneath his feet seemed to unroll itself like a carpet, and they all caught a momentary flash of silver as both ends of a ribbon worm flung upwards like a spring uncoiling. The man's bound carried him clear of the thing and for a second it seemed he was safe, but in an instant the creature had coiled itself into a cartwheel and was moving towards him with incredible speed.

As the others began to run forward, tugging at their weapons, he turned and fired at it with his electronic gun, which had appeared in his hand as if by magic. It was impossible to miss at that close range and the creature received the full force of the bolts, yet they only seemed to slide harmlessly off the thin, grey body. The next instant it had wrapped itself around him, enveloping the upper part of his body completely. He dropped, his helmet shattered like an eggshell.

By the time Fellen had reached it, the ribbon worm had fallen across the body of its victim and was writhing and threshing its length furiously on the ground. One end of it—whether head or tail there was no way of knowing—just missed Fellen as he sprang back. The man beneath it was dead, obviously: he could never live with that smashed helmet from which the air must have rushed out instantly. Yet the worm seemed too discomforted to attack Fellen directly, and he guessed that the bolts had had some effect on it, though probably the creature's vital centres were only slightly affected.

However, he withdrew to a discreet distance, where Mary waited anxiously. She clutched at his free hand with her gloved fingers.

"Look, there's more of them—all round the *Tellurian* !"

"And behind us—coming out of the Slot." It was one of the others, coming up. Fellen looked back. The worms seemed to be pouring out of the chasm. Perhaps that was where the things had their lair.

It was obvious what they had to do: they must make for the ship and try to fight they way through the worms milling round it before they were any thicker than they were now. If they kept together and made a rush, they might be able to reach the entrance port and hold off the things while it was opened. It looked as though they could at least injure the creatures with the guns sufficiently to keep them at bay, if they couldn't kill them entirely.

He gestured urgently to his men as the rest gathered round. Rapidly they linked hands, and he gave his commands in a few terse sentences." . . . And Mary—keep in the centre, close behind me."

Forming a rough circle, they began to run towards the *Tellurian.* Fellen caught the girl by the arm, and they bounded forward together. Each man had his gun at the ready as they came up with a hideous, floundering group of the worms opposite the entrance port. Pushing the girl well behind him as the circle of men contracted, he fired at the nearest one. It moved towards them like a flash of lightning, and would have struck Fellen squarely on the chest if he had

not jumped aside, not an instant too soon. As it was, one flailing end flicked past him with a few inches to spare.

Instinctively he shouted a warning to the girl, well knowing she could not hear it. Following his cue, she had drawn back as the circle was broken, but not quite far enough. Before she could move further, the thing came flashing towards her even as Fellen and two of the other men, recovering themselves, drew in again hastily. But they could not fire, for fear of hitting her.

Panic-stricken, actuated by the sheer necessity to defend herself with something—anything—she snatched at the only thing she had—the spare oxygen tube in her belt. With all her strength, she struck desperately at the lashing end of the ribbon worm as it hung suspended before her. The tube shattered to pieces as though it had hit hard rock. Then an amazing, incredible thing happened. The worm collapsed in a heap on the ground, shivered throughout its length, then seemed to shrivel up to nothing before her eyes.

She gasped as relief surged through her and the others came crowding in again, gazing disbelievingly. Then to Fellen, standing stock-still staring through the glassite pane of his helmet, came swift understanding. Urging the rest aside, he advanced a few feet from them, plucked the tube from his own belt and flung it with all his might into the squirming group of slim, silver-grey bodies fifteen yards away. The tube smashed on impact, and at once the tangled mass of worms incontinently collapsed and began to dissolve like loose soil beneath the jet of a garden hose.

AS HE TURNED to glimpse their wondering, delighted faces, he beckoned the others forward. They needed no urging. Behind them, flopping slowly in their direction, were dozens of the things which had emerged from the Slot. They moved aimlessly, ridiculously. But they moved towards them and the ship. As the men advanced, Fellen fell back beside the girl, and the rest fumbled tentatively at the oxygen tubes in their belts.

Apart from a single, quiescent creature that flattened its length a few yards away, and which they carefully avoided, there were not many worms visible, now, on this side of the ship. Two or three had coiled themselves about the rocket-tubes at the stern, and there were several that seemed to be sinuously engaged in investigating the rounded nose. But the area near the entrance port, where at least half a dozen had succumbed to the impact of the smashed tube, was now almost free of the wriggling monstrosities, as though the rest shunned that particular spot. One or two still remained amid the remnants of those which had disposed of, but a single tube which burst among them had the same annihilating effect. Then, with a rush, the party made for the airlock.

Before they reached it, it had begun to open. The men inside obviously had seen their approach and were ready for it. The pressure chamber was big enough to hold all the space-suited men and the girl with a bit of a squeeze. In less than a minute, they had gained the interior of the ship.

Fellen, stripping off his space-suit, found himself face to face with an anxious-

eyed, pale-cheeked girl whose hands shook visibly as she struggled with her helmet.

"Good for you, Mary ! You got us out of a hole," he said, gratefully.

"But—I still don't understand. Those tubes—"

Fellen was giving orders to Grayle. "We've done our job. Let's get back to Earth. See if you can shake off the rest of those wrigglers clinging to our bows and stern—the rockets should do the trick. Then make ready to take off—the sooner the better."

As Grayle made for the control room, Fellen turned back to the girl. He smiled.

"It's crazy, of course. But, then, everything here must be different, much like Grayle said. These worm things have a make-up like nothing on Earth. They thrive in a near-vacuum—heat or cold has no effect on their weird constitutions. Even electronic bolts only partly paralyse them. And the only thing that kills them is oxygen—air ! It's deadly poison to them; they shrivel up at the merest whiff of it. You saw what happened."

"Yes, but it still seems incredible. That air, which all life on Earth must have —" She broke off. "I wonder what the creatures responsible for those pictures were like, if—"

"We don't know. In some ways, much like ourselves, perhaps. The worms may be a comparatively new form of life, produced by conditions quite different from what those intelligent, highly cultured beings who lived on the Moon in its ancient days were used to. They couldn't adapt themselves to the change. But while they lived—who knows ?"

He stood for a moment, his eyes half-closed, looking at her without seeing, and she knew that his work was not finished. He would come back. There would be other ships, bringing equipment and men to solve all the mysteries of the Belt: the secret of the bar of red metal, the history of the pictures on the green wall of the chasm and of the vanished race which had made them, the strange biological make-up of the worms.... And she would come back with him. She knew that, as she slipped her hand into his and felt the firm pressure of his fingers before he turned away towards the control room.

THE END

IN THE NEXT ISSUE

BLACK-OUT By John Russell Fearn

Do you remember Black Saturday—the day the Universe went crazy? This is the story of two ordinary people who wondered, with the rest of the world, what it was all about. And managed to figure it out....

The Road to the Stars

By GEOFFREY GILES

INTERPLANETARY FLIGHT, by Arthur C. Clarke, B.Sc. Temple Press, London. 8s. 6d.

MEN AGAINST THE STARS, edited by Martin Greenberg. Gnome Press, New York. $2.95c.

FLIGHT INTO SPACE, compiled by Donald A. Wollheim. Frederick Fell, New York. $2.75c.

THE MARTIAN CHRONICLES, by Ray Bradbury. Doubleday, New York. $2.50c.

WILLY LEY, a pioneer of astronautics, in an Introduction to *Men Against the Stars*, points out that the idea of space-ships has ceased to provoke sceptical titters since the prediction that long-range rockets would be used as war weapons was justified six years ago. When the war ended, it transpired that German ambitions towards space-flight were not mere fantasies; and it was not long before American militarists were talking seriously of artificial satellites and bases on the Moon. Recruiting posters showing a rocket-ship *en route* to a celestial depot have actually appeared in the U.S.A., where an intensive long-term programme of practical research towards this goal is well under way. How long? Mr. Ley states quite confidently that "we shall have space-ships long before the twentieth century has run its course."

This, too, he reminds the sceptics, is what those visionaries who have developed the theory of astronautics have been prophesying for a quarter-century. Our own British Interplanetary Society had its share of gentle ridicule before the war; now, with eight hundred members, most of them working engineers and technicians, it is the most respected body of its kind in the world. That a primer on astronautics should appear in a *Technical Trends* series designed for their uninitiated fellows seems the more fitting, therefore, when it has been prepared by Mr. Arthur C. Clarke, who besides being one of the Society's most ardent propagandists is also an author of worth-while science fiction.

His excellent little book is by no means the first to broach the subject, which already boasts a considerable library. It is more in the nature of a progress report for those who want to "take in" astronautics as a science they can scarcely overlook, while busying themselves in their own familiar fields. His approach, however, is from the astronomical rather than an engineering point of view; and his presentation of the problems which have still to be solved before space-flight can be achieved is not too technical to be appreciated by the layman. The science-fantasy reader will be specially intrigued by his analysis of the probable effects which the opening up of the Solar System will have upon the whole of man's affairs—and by the graphic illustrations and diagrams.

The number of stories that have anticipated the era of interplanetary exploration has multiplied of recent years until it runs into thousands. Their influence on the growth of the astronautics "movement" is admitted by the most sober of its technicians, many of whom have been attracted to its problems in the first place by this most conspicuous theme of the science-fiction magazines. Bulky anthologies of science-fantasy tales having become quite commonplace on American bookshelves, their editors are now casting around to give them a specialised treatment. As the first

of a promised series of volumes with a central *motif*, Mr. Martin Greenberg has compiled a splendid collection of stories which tell of the future conquest of space, from man's first attempts to reach the Moon, in Isaac Asimov's "Trends," to his penetration to the ends of the universe in L. Ron Hubbard's "When Shadows Fall."

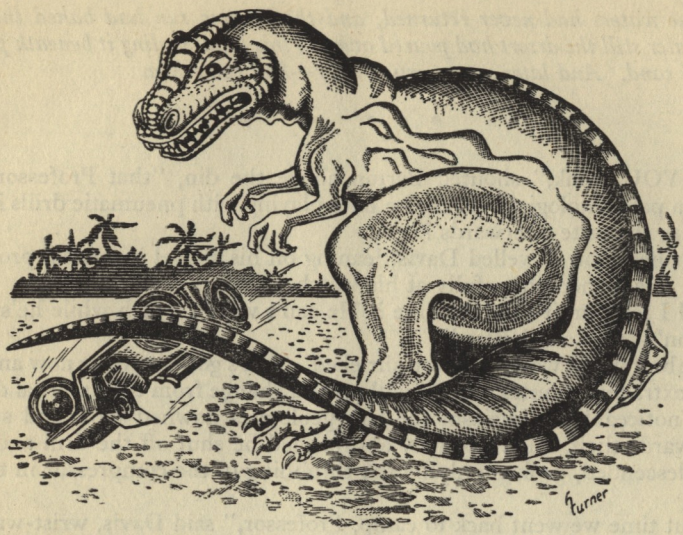
The title of *Men Against the Stars* comes from a tale by Manly Wade Wellman which shows that many sacrifices in men and materials will have to be made before the first Columbuses of Space have to contend with the alien forces which beset Robert Moore Williams' heroes in "The Red Death of Mars." Lewis Padgett's "The Iron Standard" indicates that the peculiarities of the life they may encounter on other planets may raise problems knottier than those of subjecting hostile races; while the difficulties of interplanetary commerce are illustrated in Harry Walton's "Schedule." That master of plot-complication, A. E. van Vogt, takes us out to "Far Centaurus" on the next lap of interstellar travel, to encounter such strange life-forms as Murray Leinster's "The Plants" and see the old pattern of ambition and war recurring in Asimov's "Bridle and Saddle." There are other pieces, on the way, by H. B. Fyfe, Hal Clement and E. M. Hull. All but one are from that popular magazine *Astounding Science Fiction*, and they make a magnificent collection.

Mr. Wollheim, an old hand at the game, has adopted a similar principle for his new anthology, but his treatment is different. Each of the twelve stories he has selected has its locale in or around a particular member of the Solar System, beyond whose extremities he does not venture. Each story, too, has an explanatory note concerning its venue, for the benefit of those who are not too well versed in planetary paths. He has taken as his source books no less than eight different magazines, and gone back as far as 1929 to include such memorable tales as Alexander M. Phillips' "The Death of the Moon" and Clare Winger Harris's "A Baby on Neptune." Other conductors on this tour of tomorrow's territory are Stanley G. Weinbaum (Venus), Stanton A. Coblentz (the Sun), Frank Belknap Long (Jupiter), Neil R. Jones (Saturn), and Leslie F. Stone (Pluto): all familiar old-timers of science fiction. Mr. Wollheim himself provides us with passage to Uranus; while Robert Moore Williams again takes care of Mars, a planet to which he had staked a claim long before it was annexed by Ray Bradbury.

Mr. Bradbury is, of course, the *enfant terrible* of science fiction, from whom readers of *Collier's* and other slick magazines have heard a great deal since he rose from the pulps—which, fortunately, he has not entirely deserted. His field, more strictly, is the macabre, though he was reading and writing science-fantasy before he had left school*. *The Martian Chronicles* is a series of tales telling of the fate of four expeditions to Mars; of its exploitation by the settlers from Earth with their new names, their neon lights, red tape and hot-dog stands; of the ancient inhabitants and their weird ways, still lurking in the background; and of the the eventual desertion of the old-new world by all but a few stragglers in the rush back to their native planet, stricken by atomic war. For "it's still home there . . ."

Some of these stories are little more than fragments, pieces of writing connecting such tales as "The Earth Men," "The Off Season," "There Will Come Soft Rains," and the final "The Million-Year Picnic," which have appeared before in magazines or anthologies. One or two of them, like "Usher II," hardly seem to fit into the picture, however carefully inserted in the chronology (1999-2026) which gives form to the whole collection. But it is the overall effect of the picture, achieved by the excellence of the writing, which matters. Even though you may find some of Mr. Bradbury's visions, such as an exodus of negroes to the Red Planet, a little hard to rationalise, they all have that aspect of freshness of approach which is his greatest asset, along with his peculiar but intriguing style. And the lessons of "—And the Moon Be Still as Bright" ("How would you feel if a Martian vomited stale liquor on the White House floor ?") are not to be denied.

*See "Fantasy's Prodigy": *Science-Fantasy Review*, Summer '49.



Time's Arrow

By ARTHUR C. CLARKE

What a boon to a palæontologist—to be able to view the procession of the Past, back to the dawn of Creation! Instead of painfully unearthing a dinosaur's footprints . . .

Illustrated by Turner

The river was dead and the lake already dying when the monster had come down the dried-up watercourse and turned on to the desolate mud-flats. There were not many places where it was safe to walk, and even where the ground was hardest the great pistons of its feet sank a foot or more beneath the weight they carried. Sometimes it had paused, surveying the landscape with quick, birdlike movements of its head. Then it had sunk even deeper into the yielding soil, so that fifty million years later men could judge with some accuracy the duration of its halts.

For the waters had never returned, and the blazing sun had baked the mud to rock. Later still the desert had poured over all this land, sealing it beneath protecting layers of sand. And later—very much later—had come Man.

* * * *

"DO YOU think," shouted Barton above the din, "that Professor Fowler became a palæontologist because he likes playing with pneumatic drills? Or did he acquire the taste afterwards?"

"Can't hear you!" yelled Davis, leaning on his shovel in a most professional manner. He glanced hopefully at his watch.

"Shall I tell him it's dinner time? He can't wear a watch while he's drilling, so he won't know any better."

"I doubt if it will work," Barton shrieked. "He's got wise to us now and always adds an extra ten minutes. But it will make a change from this infernal digging."

With noticeable enthusiasm the two geologists downed tools and started to walk towards their chief. As they approached he shut off the drill and relative silence descended, broken only by the throbbing of the compressor in the background.

"About time we went back to camp, Professor," said Davis, wrist-watch held casually behind his back. "You know what cook says if we're late."

Professor Fowler, M.A., F.R.S., F.G.S., mopped some, but by no means all, of the ochre dust from his forehead. He would have passed anywhere as a typical navvy, and the occasional visitors to the site seldom recognised the Vice-President of the Geological Society in the brawny, half-naked workman crouching over his beloved pneumatic drill.

It had taken nearly a month to clear the sandstone down to the surface of the petrified mud-flats. In that time several hundred square feet had been exposed, revealing a frozen snap-shot of the past that was probably the finest yet discovered by palæontology. Some scores of birds and reptiles had come here in search of the receding water and left their footsteps as a perpetual monument eons after their bodies had perished. Most of the prints had been identified, but one—the largest of them all—was new to science. It belonged to a beast which must have weighed twenty or thirty tons; and Professor Fowler was following the fifty-million-year-old spoor with all the emotions of a big-game hunter tracking his prey. There was even a hope that he might yet overtake it; for the ground must have been treacherous when the unknown monster went this way and its bones might still be near at hand, marking the place where it had been trapped like so many creatures of its time.

Despite the mechanical aids available, the work was very tedious. Only the upper layers could be removed by the power tools, and the final uncovering had to be done by hand with the utmost care. Professor Fowler had good reason for his insistence that he alone should do the preliminary drilling, for a single slip might cause irreparable harm.

The three men were half-way back to the main camp, jolting over the rough road in the expedition's battered jeep, when Davis raised the question that had been intriguing the younger men ever since the work had begun.

"I'm getting a distinct impression," he said, "that our neighbours down the valley don't like us, though I can't imagine why. We're not interfering with them, and they might at least have the decency to invite us over."

"Unless, of course, it *is* a war research plant," added Barton, voicing a generally accepted theory.

"I don't think so," said Professor Fowler mildly. "Because it so happens that I've just had an invitation myself. I'm going there tomorrow."

IF HIS bombshell failed to have the expected result, it was thanks to his staff's efficient espionage system. For a moment Davis pondered over this confirmation of his suspicions; then he continued with a slight cough:

"No one else has been invited, then ?"

The Professor smiled at his pointed hint. "No," he said. "It's a strictly personal invitation. I know you boys are dying of curiosity but, frankly, I don't know any more about the place than you do. If I learn anything tomorrow, I'll tell you all about it. But at least we've found out who's running the establishment."

His assistants pricked up their ears. "Who is it ?" asked Barton. "My guess was the Atomic Development Authority."

"You may be right," said the Professor. "At any rate, Henderson and Barnes are in charge."

This time the bomb exploded effectively; so much so that Davis nearly drove the jeep off the road—not that that made much difference, the road being what it was.

"Henderson and Barnes ! In *this* god-forsaken hole ?"

"That's right," said the Professor gaily. "The invitation was actually from Barnes. He apologised for not contacting us before, made the usual excuses, and wondered if I could drop in for a chat."

"Did he say what they are doing ?"

"No; not a hint."

"Barnes and Henderson ?" said Barton thoughtfully. "I don't know much about them except that they're physicists. What's their particular racket ?"

"They're *the* experts on low-temperature physics," answered Davis. "Henderson was Director of the Cavendish for years. He wrote a lot of letters to *Nature* not so long ago. If I remember rightly, they were all about Helium II."

Barton, who didn't like physicists and said so whenever possible, was not impressed. "I don't even know what Helium II is," he said smugly. "What's more, I'm not at all sure that I want to."

This was intended for Davis, who had once taken a physics degree in, as he explained, a moment of weakness. The "moment" had lasted for several years before he had drifted into geology by rather devious routes, and he was always harking back to his first love.

"It's a form of liquid helium that only exists at a few degrees above absolute zero. The Russians under Kapitza did a lot of work on it in the 1940's, during the Second World War. It's got the most extraordinary properties—but, as far as I can see, none of them can explain the presence of two leading physicists in this corner of the globe."

They had now arrived at the camp, and Davis brought the jeep to its normal crash-halt in the parking space. He shook his head in annoyance as he bumped into the truck ahead with slightly more violence than usual.

"These tyres are nearly through. Have the new ones come yet ?"

"Arrived in the 'copter this morning, with a despairing note from Andrews hoping that you'd make them last a full fortnight this time."

"Good ! I'll get them fitted this evening."

The Professor had been walking a little ahead; now he dropped back to join his assistants.

"You needn't have hurried, Jim," he said glumly. "It's corned beef again."

IT WOULD be most unfair to say that Barton and Davis did less work because the Professor was away. They probably worked a good deal harder than usual, since the native labourers required twice as much supervision in the Chief's absence. But there was no doubt that they managed to find time for a considerable amount of extra talking.

Ever since they had joined Professor Fowler, the two young geologists had been intrigued by the strange establishment five miles away down the valley. It was clearly a research organisation of some type, and Davis had identified the tall stacks of an atomic power unit. That, of course, gave no clue to the work that was proceeding, but it did indicate its importance. There were still only a few thousand turbo-piles in the world, and they were all reserved for major projects.

There were dozens of reasons why two great scientists might have hidden themselves in this place: most of the more hazardous atomic research was carried out as far as possible from civilisation, and some had been abandoned altogether until laboratories in space could be set up. Yet it seemed odd that this work, whatever it was, should be carried out so close to what had now become the most important centre of geological research in the world. It might, of course, be no more than a coincidence; certainly the physicists had never shown any interest in their compatriots so near at hand.

Davis was carefully chipping round one of the great footprints, while Barton was pouring liquid perspex into those already uncovered so that they would be preserved from harm in the transparent plastic. They were working in a somewhat absent-minded manner, for each was unconsciously listening for the sound of the jeep. Professor Fowler had promised to collect them when he returned from his visit, for the other vehicles were in use elsewhere and they did not relish a two-mile walk back to camp in the broiling sun. Moreover, they wanted to have any news as soon as possible.

"How many people," said Barton suddenly, "do you think they have over there ?"

Davis straightened himself up. "Judging from the buildings, not more than a dozen or so."

"Then it might be a private affair, not an ADA project at all."

"Perhaps, though it must have pretty considerable backing. Of course, Henderson and Barnes could get that on their reputations alone."

"That's where the physicists score," said Barton. "They've only got to convince some war department that they're on the track of a new weapon, and they can get a couple of millions without any trouble."

He spoke with some bitterness; for, like most scientists, he had strong views on this subject. Barton's views, indeed, were even more definite than usual, for he was a Quaker and had spent the last year of the War arguing with not-unsympathetic tribunals.

The conversation was interrupted by the roar and clatter of the jeep, and the two men ran over to meet the Professor.

"Well ?" they cried simultaneously.

Professor Fowler looked at them thoughtfully, his expression giving no hint of what was in his mind. "Had a good day ?" he said at last.

"Come off it, Chief !" protested Davis. "Tell us what you've found out."

The Professor climbed out of the seat and dusted himself down. "I'm sorry, boys," he said with some embarrassment. "I can't tell you a thing, and that's flat."

There were two united wails of protest, but he waved them aside. "I've had a very interesting day, but I've had to promise not to say anything about it. Even now I don't know exactly what's going on, but it's something pretty revolutionary —as revolutionary, perhaps, as atomic power. But Dr. Henderson is coming over tomorrow; see what you can get out of him."

For a moment, both Barton and Davis were so overwhelmed by the sense of anti-climax that neither spoke. Barton was the first to recover. "Well, surely there's a reason for this sudden interest in our activities ?"

The Professor thought this over for a moment. "Yes; it wasn't entirely a social call," he admitted. "They think I may be able to help them. Now, no more questions—unless you want to walk back to camp !"

DR. HENDERSON arrived on the site in the middle of the afternoon. He was a stout, elderly man, dressed rather incongruously in a dazzling white laboratory smock and very little else. Though the garb was eccentric, it was eminently practical in so hot a climate.

Davis and Barton were somewhat distant when Professor Fowler introduced them: they still felt that they had been snubbed and were determined that their visitor should understand their feelings. But Henderson was so obviously interested in their work that they soon thawed, and the Professor left them to show him round the excavations while he went to supervise the natives.

The physicist was greatly impressed by the picture of the world's remote past that lay exposed before his eyes. For almost an hour the two geologists took him over the workings yard by yard, talking of the creatures who had gone this way and speculating about future discoveries. The track which Professor Fowler was following now lay in a wide trench running away from the main excavation, for he had dropped all other work to investigate it. At its end the trench was no longer continuous: to save time, the Professor had begun to sink pits along the line of the footprints. The last sounding had missed altogether, and further digging had shown that the great reptile had made a sudden change of course.

"This is the most interesting bit," said Barton to the slightly wilting physicist. "You remember those earlier places where it had stopped for a moment to have a look round ? Well, here it seems to have spotted something and has gone off in a new direction at a run, as you can see from the spacing."

"I shouldn't have thought such a brute *could* run."

"Well, it was probably a pretty clumsy effort, but you can cover quite a bit of ground with a fifteen-foot stride. We're going to follow it as far as we can: we may even find what it was chasing. I think the Professor has hopes of discovering a trampled battlefield with the bones of the victim still around. That would make everyone sit up."

Dr. Henderson smiled. "Thanks to Walt Disney, I can picture the scene rather well."

Davis was not very encouraging. "It was probably only the missus banging the dinner gong," he said. "The most infuriating part of our work is the way everything can peter out when it gets most exciting. The strata have been washed away, or there's been an earthquake—or, worse still, some silly fool has smashed up the evidence because he didn't recognise its value."

Henderson nodded in agreement. "I can sympathise with you," he said. "That's where the physicist has the advantage. He knows he'll get the answer eventually—if there is one."

He paused rather diffidently, as if weighing his words with great care. "It would save you a lot of trouble, wouldn't it, if you could actually *see* what took place in the past, without having to infer it by these laborious and uncertain methods. You've been a couple of months following these footsteps for a hundred yards, and they may lead nowhere for all your trouble."

There was a long silence. The Barton spoke in a very thoughtful voice.

"Naturally, Doctor, we're rather curious about your work," he began. "Since Professor Fowler won't tell us anything, we've done a good deal of speculating. Do you really mean to say that—"

The physicist interrupted him rather hastily. "Don't give it any more thought," he said. "I was only day-dreaming. As for our work, it's a very long way from completion, but you'll hear all about it in due course. We're not secretive—but, like everyone working in a new field, we don't want to say anything until we're sure of our ground. Why, if any other palæontologists came near this place, I bet Professor Fowler would chase them away with a pick-axe !"

"That's not quite true," smiled Davis. "He'd be much more likely to set them to work. But I see your point of view; let's hope we don't have to wait too long."

THAT NIGHT, much midnight oil was burned at the main camp. Barton was frankly sceptical, but Davis had already built up an elaborate superstructure of theory around their visitor's remarks.

"It would explain so many things," he said. "First of all, their presence in this place, which otherwise doesn't make sense at all. We know the ground level here to within an inch for the last hundred million years, and we can date any event with an accuracy of better than one per cent. There's not a spot on Earth that's had its past worked out in such detail—it's the obvious place for an experiment like this !"

"But do you think it's even theoretically possible to build a machine that can see into the past ?"

"I can't imagine how it could be done. But I daren't say it's impossible—especially to men like Henderson and Barnes."

"Hmm. Not a very convincing argument. Is there any way we can hope to test it ? What about those letters to *Nature* ?"

"I've sent to the College Library; we should have them by the end of the week. There's always some continuity in a scientist's work, and they may give us some valuable clues."

But at first they were disappointed; indeed, Henderson's letters only increased the confusion. As Davis had remembered, most of them had been about the extraordinary properties of Helium II, which had once caused Kapitza's scientists almost as much distress as the approaching German armies.

"It really is fantastic stuff," said Davis. "If a liquid behaved like this at normal temperatures, everyone would go mad. In the first place, it hasn't any viscosity at all. Sir George Darwin once said that if you had an ocean of Helium II, ships could sail in it without any engines—you'd give them a push at the beginning of their voyage and let them run into buffers on the other side. There'd be one snag, though: long before that happened the stuff would have climbed straight up the hull and the whole outfit would have sunk—gurgle, gurgle, gurgle. . . ."

"Very amusing," said Barton, "but what the heck has this to do with your precious theory ?"

"Not much," admitted Davis. "However, there's more to come. It's possible to have two streams of Helium II flowing in opposite directions *in the same tube*—one stream going through the other, as it were."

"That must take a bit of explaining; it's almost as bad as an object moving in two directions at once. I suppose there *is* an explanation—something to do with Relativity, I bet."

Davis was reading carefully. "The explanation," he said slowly, "is very complicated and I don't pretend to understand it fully. But it depends on the fact that liquid helium can have *negative* entropy under certain conditions."

"As I never understood what positive entropy is, I'm not much wiser."

"Entropy is a measure of the heat distribution of the Universe. At the beginning of time, when all energy was concentrated in the suns, entropy was a minimum. It will reach its maximum when everything's at a uniform temperature and the Universe is dead. There will still be plenty of heat around, but it won't be usable."

"Why ever not ?"

"Well, all the water in a perfectly flat ocean won't run a hydro-electric plant—but quite a little lake up in the hills will do the trick. You must have a difference in level."

"I get the idea. Now I come to think of it, didn't someone once call entropy 'Time's Arrow' ?"

"Yes—Eddington, I believe. Any kind of clock you care to mention—a pendulum, for instance—might just as easily run forward as backwards. But entropy is a strictly one-way affair—it's always increasing with the passage of time. Hence the expression, 'Time's Arrow'."

"Then *negative* entropy—my gosh !"

For a moment the two men looked at each other with a wild surmise. Then Barton asked in a rather subdued voice: "What does Henderson say about it ?"

"I'll quote from his last letter: 'The discovery of negative entropy introduces quite new and revolutionary conceptions into our picture of the physical world. Some of these will be examined in a further communication.' "

"And are they ?"

"That's the snag: there's no 'further communication.' From that you can guess two alternatives. First, the Editor of *Nature* may have declined to publish the letter. I think we can rule that one out. Second, the consequences may have been *so* revolutionary that Henderson never did write a further report."

"Negative entropy—negative time," mused Barton. "It seems fantastic; yet it might be theoretically possible to build some sort of device that could see into the past. . . ."

"I know what we'll do," said Davis suddenly. "We'll tackle the Professor about it and watch his reactions. Now I'm going to bed before I get brain fever."

That night Davis did not sleep well. He dreamed that he was walking along a road that stretched in both directions as far as the eye could see. He had been walking for miles before he came to the signpost—and when he reached it he found that it was broken and the two arms were revolving idly in the wind. As they turned, he could read the words they carried. One said simply: *To the Future*; the other, *To the Past.*

THEY LEARNED nothing from Professor Fowler, which was not surprising: next to the Dean, he was the best poker player in the College. He regarded his slightly fretful assistants with no trace of emotion while Davis trotted out his theory.

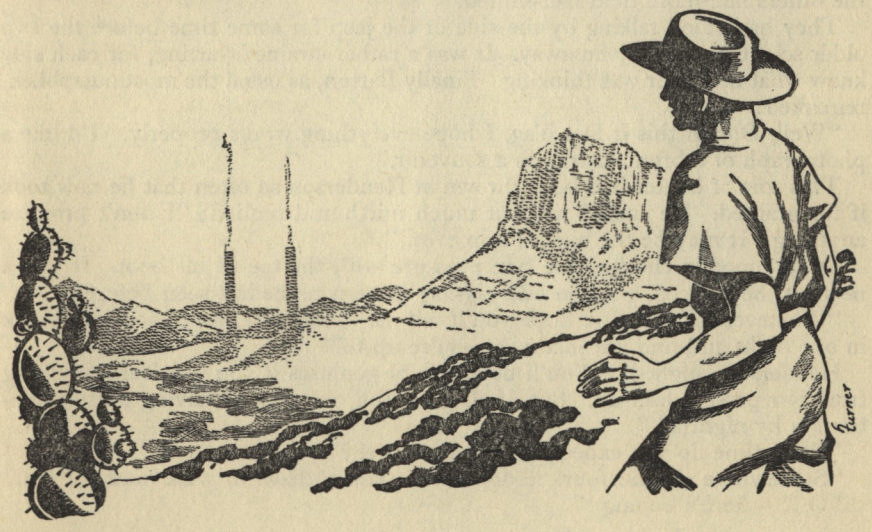
When the young man had finished, he said quietly: "I'm going over again tomorrow, and I'll tell Henderson about your detective work. Maybe he'll take pity on you; maybe he'll tell *me* a bit more, for that matter. Now let's go to work."

Davis and Barton found it increasingly difficult to take a great deal of interest in their own work while their minds were filled with the enigma so near at hand. Nevertheless they continued conscientiously, though ever and again they paused to wonder if all their labour might not be in vain. If it were, they would be the first to rejoice. Supposing one could see into the Past and watch history unfolding itself, back to the dawn of Time ! All the great secrets of the Past would be revealed: one could watch the coming of life on the Earth, and the whole story of evolution from amoeba to man.

No; it was too good to be true. Having decided this, they would go back to their digging and scraping for another half-hour until the thought would come: but what if it *were* true ? And then the whole cycle would begin all over again.

When Professor Fowler returned from his second visit, he was a subdued and obviously shaken man. The only satisfaction his assistants could get from him was the statement that Henderson had listened to their theory and complimented them on their powers of deduction.

That was all; but in Davis' eyes it clinched the matter, though Barton was still doubtful. In the weeks that followed, he too began to waver, until at last they were both convinced that the theory was correct. For Professor Fowler was spending more and more of his time with Henderson and Barnes; so much so that they sometimes did not see him for days. He had almost lost interest in the



excavations, and had delegated all responsibility to Barton, who was now able to use the big pneumatic drill to his heart's content.

They were uncovering several yards of footprints a day, and the spacing showed that the monster had now reached its utmost speed and was advancing in great leaps as if nearing its victim. In a few days they might reveal the evidence of some eon-old tragedy, preserved by a miracle and brought down the ages for the observation of man. Yet all this seemed very unimportant now; for it was clear from the Professor's hints and his general air of abstraction that the secret research was nearing its climax. He had told them as much, promising that in a very few days, if all went well, their wait would be ended. But beyond that he would say nothing.

Once or twice Henderson had paid them a visit, and they could see that he was now labouring under a considerable strain. He obviously wanted to talk about his work, but was not going to do so until the final tests had been completed. They could only admire his self-control and wish that it would break down. Davis had a distinct impression that the elusive Barnes was mainly responsible for this secrecy: he had something of a reputation for not publishing work until it had been checked and double-checked. If these experiments were as important as they believed, his caution was understandable, however infuriating.

Henderson had come over early that morning to collect the Professor, and as luck would have it, his car had broken down on the primitive road. This was unfortunate for Davis and Barton, who would have to walk to camp for lunch, since Professor Fowler was driving Henderson back in the jeep. They were quite prepared to put up with this if their wait was indeed coming to an end, as the others had more than half-hinted.

They had stood talking by the side of the jeep for some time before the two older scientists had driven away. It was a rather strained parting, for each side knew what the other was thinking. Finally Barton, as usual the most outspoken, remarked:

"Well, Doc, if this *is* Der Tag, I hope everything works properly. I'd like a photograph of a brontosaurus as a souvenir."

This sort of banter had been thrown at Henderson so often that he now took if for granted. He smiled without much mirth and replied: "I don't promise anything. It may be the biggest flop ever."

Davis moodily checked the tyre pressure with the toe of his boot. It was a new set, he noticed, with an odd zig-zag pattern he hadn't seen before.

"Whatever happens, we hope you'll tell us. Otherwise, we're going to break in one night and find out just what you're up to."

Henderson laughed. "You'll be a pair of geniuses if you can learn anything from our present lash-up. But, if all goes well, we may be having a little celebration by nightfall."

"What time do you expect to be back, Chief ?"

"Somewhere around four. I don't want you to have to walk back for tea."

"O.K.—here's hoping !"

The machine disappeared in a cloud of dust, leaving two very thoughtful geologists standing by the roadside. Then Barton shrugged his shoulders.

"The harder we work," he said, "the quicker the time will go. Come along !"

THE END of the trench, where Barton was working with the power drill, was now more than a hundred yards from the main excavation. Davis was putting the final touches to the last prints to be uncovered. They were now very deep and widely spaced, and looking along them, one could see quite clearly where the great reptile had changed its course and started, first to run, and then to hop like an enormous kangaroo. Barton wondered what it must have felt like to see such a creature bearing down upon one with the speed of an express; then he realised that if their guess was true this was exactly what they might soon be seeing.

By mid-afternoon they had uncovered a record length of track. The ground had become softer, and Barton was roaring ahead so rapidly that he had almost forgotten his other preoccupations. He had left Davis yards behind, and both men were so busy that only the pangs of hunger reminded them when it was time to finish. Davis was the first to notice that it was later than they had expected, and he walked over to speak to his friend.

"It's nearly half past four !" he said, when the noise of the drill had died away. "The Chief's late—I'll be mad if he's had tea before collecting us."

"Give him another half-hour," said Barton. "I can guess what's happened. They've blown a fuse or something and it's upset their schedule."

Davis refused to be placated. "I'll be darned annoyed if we've got to walk back to camp again. Anyway, I'm going up the hill to see if there's any sign of him."

He left Barton blasting his way through the soft rock, and climbed the low hill at the side of the old river-bed. From here one could see far down the valley, and the twin stacks of the Henderson-Barnes laboratory were clearly visible against the drab landscape. But there was no sign of the moving dust-cloud that would be following the jeep: the Professor had not yet started for home.

Davis gave a snort of disgust. There was a two-mile walk ahead of them, after a particularly tiring day, and to make matters worse they'd now be late for tea. He decided not to wait any longer, and was already walking down the hill to rejoin Barton when something caught his eye and he stopped to look down the valley.

Around the two stacks, which were all he could see of the laboratory, a curious haze not unlike a heat-tremor was playing. They must be hot, he knew, but surely not *that* hot. He looked more carefully, and saw to his amazement that the haze covered a hemisphere that must be almost a quarter of a mile across.

And, quite suddenly, it exploded. There was no light, no blinding flash; only a ripple that spread abruptly across the sky and then was gone. The haze had vanished—and so had the two great stacks of the power-house.

Feeling as though his legs had turned suddenly to water, Davis slumped down

upon the hill-top and stared open-mouthed along the valley. A sense of overwhelming disaster swept into his mind; as in a dream, he waited for the explosion to reach his ears.

It was not impressive when it came; only a dull, long-drawn-out *whooooooosh* ! that died away swiftly in the still air. Half unconsciously, Davis noticed that the chatter of the drill had also stopped: the explosion must have been louder than he thought for Barton to have heard it too.

The silence was complete. Nothing moved anywhere as far as his eye could see in the whole of that empty, barren landscape. He waited until his strength returned; then, half running, he went unsteadily down the hill to rejoin his friend.

Barton was half sitting in the trench with his head buried in his hands. He looked up as Davis approached; and although his features were obscured by dust and sand, the other was shocked at the expression in his eyes.

"So you heard it too !" Davis said. "I think the whole lab's blown up. Come along, for heaven's sake !"

"Heard what ?" said Barton dully.

Davis stared at him in amazement. Then he realised that Barton could not possibly have heard any sound while he was working with the drill. The sense of disaster deepened with a rush; he felt like a character in some Greek tragedy, helpless before an implacable doom.

Barton rose to his feet. His face was working strangely, and Davis saw that he was on the verge of breakdown. Yet, when he spoke, his words were surprisingly calm.

"What fools we were !" he said. "How Henderson must have laughed at us when we told him that he was trying to *see* into the Past !"

Mechanically, Davis moved to the trench and stared at the rock that was seeing the light of day for the first time in fifty million years. Without much emotion, now, he traced again the zig-zag pattern he had first noticed a few hours before. It had sunk only a little way into the mud, as if when it was formed the jeep had been travelling at its utmost speed.

No doubt it had been; for in one place the shallow tyre-marks had been completely obliterated by the monster's footprints. They were now very deep indeed, as if the great reptile was about to make the final leap upon its desperately fleeing prey.

THE END

IN THE NEXT ISSUE

MARTIAN MANDATE

By NORMAN C. PALLANT

Travellers in Time

By VALENTINE PARKER

THE OMNIBUS OF TIME, by Ralph Milne Farley. Fantasy Publishing Co., Los Angeles. $3.50c.

SIDEWISE IN TIME AND OTHER SCIENTIFIC ADVENTURES, by Murray Leinster. Shasta Publishers, Chicago. $3.00.

MASTERS OF TIME, by A. E. van Vogt. Fantasy Press, Reading, Pennsylvania. $3.00.

EXILES OF TIME, by Nelson Bond. Prime Press, Philadelphia. $2.50.

IN THE closing years of the last century, a young undergraduate named Herbert George Wells sat down and wrote a short story which embraced a startlingly original idea—that man might travel through the fourth dimension of Time into the distant future. Since *The Time Machine* was fashioned, the theme of time-travel has received almost as much attention from science fiction authors as the more reasonable concept of travelling through space; for the limitless vistas of past and future eons it opens up are as intriguing as the peculiar paradoxes it presents to the fascinated, if slightly baffled, reader.

The precise nature of Time—whether it is a dimension additional to length, breadth and thickness, as Wells conceived it, a mere mathematical abstraction, or something quite different—is a matter which Einstein would seem more competent to settle than any science-fantasy writer. But Mr. Farley, who is no stranger to physics, besides having considered Riemann's space-time continuum and grappled with Eddington's notion of time in relation to entropy, has theories of his own on the subject, on which he discourses while assembling in one volume seventeen of his fictitional pieces. His "post-mortem dissection" of his stories may prove rewarding to the reader who cares to examine his *After Math*, so long as he does not expect to find consistency in the theories and techniques he employs. For, above all, Mr. Farley is one of those "who pioneer for the drab scientists," and he glories in his own diversity.

Having long since decided that, whatever time may be, the concept of time-travel is feasible, he would seem to have justified his tentative claim to employing more varied time-theories than any other author. He has derived the mechanics of his time-travelling from the most reliable sources, as well as from his own ideas of a "laminated" space-time continuum and the possibility that, if size is merely relative, time-perception must change with the size of the observer. Similarly, his devices for time-travel vary from machines resembling those of Wells' Traveller to space-ships that go wrong and back-track through time instead of eating up space as they were intended.

Some of his tales, as he cheerfully admits, are better for employing no scientific means at all: for such as "I Killed Hitler," he has recourse to crystal globes or revolving swastikas and the power of incantation. And he includes in this veritable Tome of Time-travel a chapter which was cut from one of his renowned magazine serials, "The Radio War," in which the narrator learns about the future by communing with his descendants, having adapted the old Chinese trick of communing with one's ancestors—a device even more convenient than the earthquake in "The Golden City" which sends the

hero back into the past and brings him back alive.

With his trained legal mind, Mr. Farley also considers such debatable points as the limitations of time-travel; for instance, whether it is more reasonable to have his heroes travelling into the future, where all things have yet to be, than into an apparently immutable past. That no time-travellers of whom we are aware have visited the present or past centuries is an indication that backward time-travel is impossible; but it does not necessarily mean that one day we shall not be able to transport ourselves into the future. "Stranded in Time" revolves entirely around this argument; yet, in "The Immortality of Alan Whidden," the vessel which travels through time instead of space can only take the traveller back to the world-that-has-been.

Which, of course, raises the sort of paradoxes that are inseparable from the idea of time-travel and which never seem to be completely resolved when they are not conveniently ignored. But Mr. Farley revels in posing such tantalising questions as whether a time-traveller, back-tracking to a time-point he had previously visited, would find himself already there. Hence "The Man Who Met Himself," a story which the hero relates from both viewpoints, and "Rescue into the Past," in which the dual personalities fight side by side and one steals the other's girl. There is even a tale with two endings between which the reader may choose for himself !

Mr. Murray Leinster would like that one; for he believes in free will, even for rats. For him, neither backward nor forward time-travel is sufficient. At least, it wasn't for Editor Orlin Tremaine, who in 1934 was faced with the problem of finding a story of time-travel for *Astounding Stories* readers which would take a different tack from all those previously printed. Whereupon Mr. Leinster, whose first piece of science-fantasy was about a whole skyscraper which went travelling backwards in time,* recalled that one day he had designed a maze for a rat which left it free to take one of two paths, repeatedly, in order to find its way out through the only possible exit.

It worked all right, until he wanted to give the rat more than two ways to choose between, and he found he needed more than two dimensions in which to build the maze. So he visualised a multi-dimensional universe in which "everything that possibly could happen somewhere did, and everything that could have happened had"; and he produced the first story based on the concept of parallel time-tracks leading to several possible futures, and of the chaos which results when whole areas of the Earth's surface slip *Sidewise in Time* into worlds that *might* have been. In addition to which, in this collection of some of the best pieces of a veteran science-fantasy writer who really enjoys his work, we have the tale of "The Fourth Dimensional Demonstrator," which reproduces anything out of the past, whether it be burnt matches or kangaroos.

Belonging to a younger school of science fiction writers which is supposed to be concerned with realism, Mr. van Vogt takes things much more seriously. He did not emerge until the "thought variant" had had its day and Editor John W. Campbell had turned *Astounding Stories* into the more dignified, yet still unrestrained, *Astounding Science-Fiction;* and in *Masters of Time* he is striving as always to make the most of a basic idea in terms of imaginative extrapolation and original expression, while keeping to the approved story-pattern. Yet it is only his peculiar penchant for ingenious twists of plot-construction that makes it worth the effort of struggling through its major intricacies; for although the idea of supermen of the future waging a superscientific war and recruiting their cannon fodder from past ages is appreciable enough, the author's development of his thesis in conjunction with the climax leaves the reader who wants to sustain his understanding dissatisfied on either score. If you can tell, at the end, exactly what happened to Professor Garson and Norma so that they finished up where they started, before falling victims to the machinations of the sinister Dr. Lell, you are more intuitive than I, who found the

*"The Runaway Skyscraper": *Argosy Magazine*, February 22, 1919.

[*Continued on page 95*]

Monster

By CHRISTOPHER YOUD

Dilwan, last hope of the Kranaki, had ventured up from the Deep to seek the aid of the pygmies . . . those incredulous pygmies !

Illustrated by Turner

THERE WAS a swell moving in from the Deep. Even here in the Council Place, where it was sheltered, they could feel it and see the phosphorescence flickering under the quickening pulse of the waters. Out in the Deep the waters would be surging heavily. There would be damage on the outlying hydro-farms, and another bad harvest.

Dilwan, swimming in powerfully to the centre of the throng, could sense the mood of despair that hung over them. He looked down towards the mass of dark figures huddled on the sea-bed, and remembered what his father had told him

of the last days of Serbena. Dilwan himself had been born during those days, when the harvests had failed for the last time and the giant sharks had breached the defences and torn a path of destruction through the doomed city. In a vague way, he could even remember fragmentary details of the terror-fraught journey across the Deep to Kareeta. But most of what he remembered came from the stories his father had told him, many seasons before. Of the inky, non-phosphorescent blackness of the Deep. Of the huge forest of squids into which they had blundered, and where his mother had died. Of the flashing, bloody sorties of sharks, as they swept down on the tattered fugitives from Serbena. And at last, of the sight of the walls of Kareeta where they had found safety.

All that was ninety seasons ago. More than seventy seasons had passed since his father had been killed by the sharks while working on an outlying hydro-farm. In that time Kareeta, season by season, had slipped nearer to the doom that had overwhelmed her sister-city.

Each season the scavenger-fish preyed more openly on the hydro-fields, swooping down in the wake of the shark bands and laying waste acres of cultivated land. The two races had evolved a strange, menacing symbiosis; as though they were deliberately combining to exterminate the Kranaki and crush intelligence in the world of water. And they were only part of the doom hanging, more and more ominously, over Kareeta. Each season the squids advanced more openly up the sides of the Deep. They had overwhelmed the whaling station at Purka. And the whales themselves were less and less tractable. Fewer returned to their pens each season. Those that did frequently turned on their Kranaki masters.

Finally, in the last thirty seasons, eruptions and land-quakes had occurred with greater and greater frequency, bringing with them swells and storms, splitting and laying waste the hydro-farms and shaking Kareeta itself. It seemed to the Kranaki that the end could not be long delayed. And with the end of Kareeta would come the end of their race. There was no other city to which the survivors could retreat. Since the fall of Serbena, Kareeta had been the only stronghold of the Kranaki.

Dilwan stopped swimming, and allowed the current to carry him gently into the place reserved for him on the dais. They had been waiting for him. He relaxed and listened. The President, Balakon, began speaking, slapping the water with his huge flippers into impulses that rippled out to the antennae of the waiting Kranaki.

He said: "The allotment of *pilner* will be halved from the beginning of next season. All the *pilner* crops in the hydro-fields to the north-west have been destroyed by the last eruption."

A sigh rippled round and in towards the dais, emanating from hundreds of flippers. Dilwan felt the shock; a realisation of the desperate situation. Without *pilner* the Kranaki could not live. On half their present allotment they would be perilously near to starvation.

Balakon went on. "In the last season over a hundred Kranaki have been

killed; mostly by sharks, a few by squids, three by rebellious whales. Our numbers are now less than seven hundred. But even for seven hundred our harvests are too meagre. The fewer there are, the fewer we can spare for guards, and the more easily can the sharks break through to ravish the farms and even the outskirts of the city itself. We must break this stranglehold if Kareeta is not to die."

He paused, waiting for the impulses of despair to die out of the water.

"I can remember," Balakon continued, "when the Kranaki held five great cities and numbered more than a hundred thousand. That was only eight hundred seasons ago. In the times of our grandfathers the Kranaki cities spread out in hundreds to the further seas; to the warm seas of the south and to the cold seas that stretched beyond to the ice. And round the cities, league after league, lay the hydro-farms, growing a multitude of crops that now are only a memory."

He stopped for a while, remembering. "When I was very young," he said, "I tasted *charang*. It had a lightness and warmth and beauty in it, so that your body felt as insubstantial as a floater when you had eaten it. It grew only in the cold beyond the warm, in the gardens of the city of Charbera, which died seven hundred seasons ago. There will be no more *charang*."

A CURRENT swept through the Council Place, stirring the tendrils of the Kranaki with thoughts of the storms swirling up from the Deep around them.

Balakon said: "In the days of our grandfathers the Kranaki ruled from cold to warm and on to cold again; from the bottom of the Deeps to the thin waters above. The whales came and went at our bidding; the sharks cowered away from us in the thin waters, and our ancestors hunted them for sport. We were supreme until—the Shock.

"You have all heard of it; of the days when the sea-bed crumbled beneath our cities and substances bubbled up, turning the water into thin, blindingly hot mist. Only in the far south and here in the north did a few cities survive; cities that have fallen one by one before the attack of the sharks and the squids, and the tremblings of the sea-bed. Now there is only Kareeta, and it seems impossible that Kareeta can survive another ten seasons."

The vibrations of despair rocked more violently through the waters of the Council Place. Dilwan, listening, realised that the calm pronouncements of Balakon were grimly reinforcing the sense of doom that hung over the Kranaki. Each must have known the end was near, and hoped to be mistaken. Balakon spoke with a dreadful, inescapable authority. And yet Balakon himself had planned the one possible way of salvation. Now he went on, firmly over-riding the despair about him.

"It seems impossible," Balakon said, "but there is one chance of saving our race. For thousands of seasons, among the things that have dropped into our depths from the thin water there have been some that were not dead fish but strange, artificial creations containing queerly-formed, dead pygmies. It is in our history that these creations have changed throughout the seasons, becoming

more complex as though fashioned by a race of growing culture and ingenuity. We thought for a long time that the pygmies who must have made them lived in the thin water, and that these, perhaps, were their funeral vessels, designed to carry their dead into what, to them, would be the mysterious depths below.

"For thousands of seasons our ancestors planned how they might establish contact with the pygmies, and perhaps help them in their struggles against their enemies. Some of their bodies that we found had had limbs torn by our own enemies, the sharks. But by ourselves we could not penetrate up into the thin water. It was not until a few hundred seasons before the Shock that Ralbaned, the great hydro-farmer, developed that new hard, transparent coral of which Kareeta is built, and adapted it to the creation of pressure-suits moulded to our shapes.

"Since then our adventurers have swum up through the thin water and found a world of thin mist lying above it, and learned that the pygmies live on the bed of that mist, using their strange vessels to cross the intervening waters. When the Shock came we were preparing to send large expeditions to meet them. Even since the Shock our adventurers have dared the thin waters and the blockade of sharks to see this strange world above us. And we have kept a watcher at our last outpost, Berdan.

"A tunnel leads up to Berdan, a tunnel which the sharks have not yet found. Once at Berdan our watchers are safe from them, for Berdan itself is surrounded on all sides by the air-bed on which the pygmies live. For a season at a time the watchers stay, burdened by pressure-suits, trying to make contact with the pygmies. But as the watchers could only plunge into the mist for a fraction of time, they have always failed. The pygmies do not recognise them, except, perhaps, as strange fish.

"Now, in the time of our greatest need, another hydro-farmer has found what may be the solution to our desperate plight. Dilwan, a native of lost Serbena, has found a means of lining the pressure-suits with a new form of sponge. In the new pressure-suit a Kranak can venture into the mist, protected from thinness by the coral, and from waterlessness by the sponge. At last we can meet the pygmies on their own air-bed ! We will go to them, and they will help us against our mutual enemies, the sharks, and give us their strange, fashioned things to help on the hydro-farms, while we in turn teach them of all the richness that lies on the sea-bed for those that have the strength to take it. Nothing will be able to stand against the combined force of the Kranaki and the pygmies.

"But it will not be easy to penetrate the mist. Even with the new pressure-suits it will be an agonising adventure, only to be borne for a short time. We must send an emissary, who can first prove our intelligence to the pygmies. Dilwan, who made this venture possible, has asked to be allowed to go, and we have given permission. Dilwan ! The future—the very existence—of the Kranaki depends on your mission. May the Ruler of the Deep attend you !"

Dilwan heard the chorusing vibrations. "The Ruler of the Deep attend you !" He felt inside himself the pride of the Kranaki, of the race that had once held the

oceans to their furthest reaches. On him the future depended, and he would not fail them.

Two of the Kranaki floated down to him, holding the artificially-shaped coral that was to protect him from the thinness above. He wriggled into it, and when the head-piece had been pulled down the coral insects were set to work on the join, to seal them until his return. Only a small gap was left, so that water could continue to flood in round him. He would not seal this with coral until, at Berdan, he was ready to meet the pygmies.

Now, with powerful strokes, he swam above the Council of Kranaki. For a moment he watched them, feeling their vibrations of hope and goodwill beating even through the enclosing coral. Then, with a steady, powerful motion, he was swimming away from Kareeta. Six young Kranaki swam with him, spared from the desperately urgent need of the harvest to protect him against sharks until he should reach the mouth of the tunnel.

Half-a-dozen sharks eddied down, but sheered away quickly at the sight of the seven Kranaki. Dilwan felt a surge of vicious hatred against them and their cowardly avoidance of battle except when they outnumbered the Kranaki by four or five to one. The hatred changed into triumph as he though of his own mission, and how its success would put weapons into the hands of the Kranaki.

We shall hunt them down, he thought with grim satisfaction, we and the pygmies. We shall hunt them until not a shark remains in the oceans. Even the small ones in the thin water we shall destroy. And the cities of the Kranaki shall rise again.

ROGER BLAINE groaned in more than spiritual anguish. The road seemed to be turning into a sticky river of molten lead. The front wheel of his bicycle was continually popping the bubbles of tar that swelled up in front of them. Ahead, waves of heat shimmered up like a wall of mist between the loch and the forested hills. He felt as though he had been cycling for years through a section of Dante's Inferno. And Hilda, damn her, looked as cool and unperturbed as ever.

"Take it easy," he panted. "What are you using for power—atomic energy ?"

His wife smiled sweetly at him. "Just ordinary muscle power, darling," she replied. "I told you you were getting too flabby. This sort of holiday is just what you need. Wait till I've had you up and down Ben Nevis a few times ! You'll be a different man."

"I shan't last that long," he prophesied gloomily. "Another hundred yards of this and I shall melt into a grease ball and evaporate. When I think of the things you told me about the cool Scottish valleys and lochs, I feel that my faith in woman is shaken for ever."

Hilda smiled. "Hold on," she said. "It's less than a mile now to Invermoriston. I should hate to think of you melting away when almost in sniffing distance of a nice long, cool pint of beer. Contemplate the beauties of Ness and forget the heat. You might see the monster ! As a qualified zoologist, you could classify it. Think of it—*draco Blainensis* !"

Roger grunted. "Any monster with any sense would keep well under in this weather. Anyway, it's too early in the day, and the weather's too clear. For the creation of the Loch Ness monster you need a nice misty evening full of shadows, a preliminary oiling of good, strong Scotch, and a Celtic imagination. Given those three, you stand a chance of seeing monsters by the million."

"You sceptical scientists !" Hilda protested. "Just because you haven't got their bones neatly docketed in the Natural History Museum in Kensington, sea-monsters can't possibly exist. When it should be obvious that, if they live at the bottom of the ocean, you could never by any chance find their remains."

Roger mopped his sweating brow with a handkerchief. If anything, it seemed to be getting a little hotter, absurd as that must be.

"There are at least two very good reasons for disbelieving the Loch Ness monster story," he said wearily. "In the first place, it is difficult to see how the monster could get along the Caledonian Canal from Inverness to the loch without being spotted, and no one has yet reported its presence in the canal. In the second, if the monster lives, as you claim, at the bottom of the ocean, then the difference in pressure at the surface of the water would kill it immediately."

"Not valid," Hilda declared. "In the first place, the monster might have been in the loch for hundreds of years, or there might be a subterranean entrance somewhere. And in the second, it might be a tough monster, able to withstand different pressures. There could be all sorts of reasons. You're just a dogmatic scientist. I hope the monster comes after you !"

"I'll try the Scotch this evening, and brush up my imagination," he promised.

"We'll see about that," his wife said grimly.

At last the road bent away from the loch, and the welcome sight of the Invermoriston Hotel lay before them. With surprising speed Roger parked his bicycle and disappeared into the parlour. When Hilda followed him, she found him contemplating the remains of a pint of beer.

"Your watch was slow," he said reproachfully. "We almost didn't make it. It's a quarter to two."

"Lemonade would have been just as good for you," Hilda said, ignoring his instinctive shudder. "But I've good news for you. They have some room here. As it will probably be past three o'clock by the time we finish lunch, I thought we might have a rest and set off for Fort Augustus in the morning. I think you've lost enough fat for one day."

Roger rolled his eyes up. "Saved at the eleventh hour !" he murmured. "This calls for another drink."

Hilda watched the beer vanish. "Come on," she said. "Lunch is ready. If we get it over quickly we can go for a ramble up the Moriston."

She dragged him away, protesting.

IT WAS not until evening, however, that Hilda succeeded in getting him away from the hotel, and then he refused point-blank to walk up the winding Moriston, insisting instead on the shorter walk to the loch. And at Dalcataig

Pier he insisted on resting, developing a sudden passion for contemplation of the beauties of Ness.

The scene was impressive. Behind them rose the hilly forests of Portclair and Invermoriston, dark, tossing green in the evening breeze. In front lay the purple loch and, further on, the gently rising heights beyond Glen Albyn. The sun which had set behind Portclair was still lingering on the house-tops of Invermoriston.

A boat came into Dalcataig Pier, and men got out, workers from the aluminium works on the other side of the loch. Roger and Hilda heard them talking excitedly as they passed:

"Och ! Wullie McKay saw it. He said you couldna mistake it. It's the auld monster again. I ken fine we'll have the newspaper bodies doon with us again noo."

"There you are," Hilda said triumphantly. "It's back !"

Roger smiled the superior, irritating smile of one who knows better. "Let's get back to the hotel," he said. "I want to stoke my imagination up."

As they were turning back from Dalcataig they met a man running towards them. He called breathlessly:

"Tak heed ! The monster's in the Moriston, wallowing like a whale. I'm off to the Pier for a gun."

There was no disputing his sincerity or sobriety. Without a word, Roger and Hilda began to run towards the river Moriston. They reached the bridge to find all the inhabitants of the tiny village assembled up on it.

Then they saw it, wallowing up the small river from the loch. A vast, scaly neck rose from the water, upholding a long, flat head that peered dazedly about, as though the tranquil light of the Scottish twilight were too brilliant for it. Its body stretched behind, an impressive bulk tapering into flippers in parts. Just under the neck were two membranous tendrils, projecting stiffly like spears. It moved awkwardly up the river towards the bridge.

For a moment the villagers stayed, gazing at the invader in unbelief. Then they fled, panic-stricken, back to their houses. Hilda felt like joining them, but Roger was leaning so far forward over the bridge in his anxiety to take in all details of the monster that she felt obliged to hang on to his coat, in case he overbalanced and fell into the river.

The monster seemed to notice the villagers streaming away, and made a move towards the bank as though to follow them. But the pull of the water was too much for it, and it fell back defeated. Rolling in mid-stream, it lifted its head towards the bridge again, and saw the two people left on it. The long, scaly neck moved towards them. Hilda felt like screaming, but Roger was gazing at the approaching monster as though it were the Holy Grail. Her nose caught the thick, fishy smell of the sea. She stared at the broad, serpentine head and the gleaming eyes.

There was a cry from the south bank, and she saw the Scot they had passed on the road running towards them, waving a rifle.

"Ye're all richt !" he shouted. "Hauld on—I've got a bullet for it."

Roger shouted back frantically: "No, no ! Don't shoot for God's sake. *It's wearing a diving suit* !"

The Scot levelled his rifle. "I'm nae fashed if it's wearin' a kilt," he called. "It's not coming up the Moriston !"

The shot rang out above Roger's frantic appeals. The monster reared as a bullet hit it in the neck. There was a brief, high whistling, as though a balloon were being deflated, and the long neck slumped forward into the water.

Roger dashed down to the bank, and into the river, with Hilda following.

"It can't be dead," he muttered. "A single bullet can't stop an elephant, let alone a thing like this. Unless . . . . I can't believe it !"

The head had fallen sideways, so that it projected a little from the water. Roger bent over it, examining. After a moment he looked up at Hilda, watching from the bank. The villagers had begun to swarm back, realising that the monster had been overthrown.

Roger said: "It's dead all right. Diagnosis—multiple internal ruptures. The same as we would have if suddenly transported into a vacuum. That shot merely punctured its protective covering."

Hilda said: "You mean . . . ?"

"That it was an intelligent being !" Roger finished. "I guessed it from the bridge, when that fool was waving his gun about. God, what a waste !" He climbed wearily out of the water.

"Maybe another one will follow it," Hilda said reassuringly. "The natives can be warned. Next time it will be different."

Roger looked back over the bridge. The villagers were clustered in excited groups, looking down on the monster where it lay with the water washing over it.

"Maybe," he said. "If there is a next time."

THE LAST quake had brought down several pillars of the Council Place. A strong current was flowing through Kareeta, brushing the phosphorescent organisms into startling lambency. Balakon looked round at the huddled Kranaki.

"We must still hope," he signalled. "A young, strong Kranak such as Dilwan could last a whole season in a pressure-suit. Perhaps he is having difficulty in convincing the pygmies of the urgency of our plight. We must hope that he will come back. We have tried to duplicate the pressure-suit he made, but the sponge does not breed true. We might stumble on it again tomorrow—or never. And the harvest is worse, even, that we had expected. Kareeta can only survive a few more seasons. We must hope Dilwan will come back."

The Kranaki huddled silently about the dais from which their leader spoke. High above circled a school of giant sharks, watching and waiting with timeless malignance.

THE END

The Battle of the Canals

By THOMAS SHERIDAN

Those tantalising "canals" of Mars . . . are they waterways, built by super-engineers, or an optical illusion—capable of being photographed? The controversy continues . . .

PEERING AT Mars through their crude telescopes, the astronomers of three centuries ago saw a ruddy ball patched with bluish-green and orange and decided that it was a world much like Earth. The reddish-yellow areas were probably deserts; the greeny expanses great lakes and seas. As they mapped the planet's features, they noticed that the shining white caps at its poles grew smaller as the Martian summer advanced, to enlarge again in the winter. What more natural than to assume that these white regions were of ice or snow which melted and hardened with the seasons?

It was pretty obvious that Mars was no hot-spot of the Solar System, in spite of one observer's bright idea that its ruddy glow was actually red-heat. The general view was that, being half as far again from the Sun as Earth, Mars received much less warmth, and that since the force of gravity at its surface was less than half what it is on this planet, the older world retained hardly enough atmosphere to absorb more than a fraction of the Sun's heat. In 1882, E. Walter Maunder, of Greenwich Observatory, proved that the surface air of Mars must be as rare as that at the summit of Earth's highest mountains; and with the tropical temperature falling from 50 degrees Fahrenheit at noon to 130 degrees below zero in the night, he seemed justified in his conclusion that "we can scarcely suppose any living beings can exist upon a planet so unhappily circumstanced."

But, after two centuries of Mars-gazing, there were many who insisted that it alone of all the planets was a world very similar to our own (even if one original thinker conceived it as a hollow globe "with an average thickness of crust equalling 569 miles"); and that if no animal life could exist there, at least its changing features showed the growth and decay of extensive vegetation—which, said one, might be red instead of green, giving the Red Planet its predominant hue. And there were some who, arguing that all that human life required to manifest

itself on Earth seemed to be provided on Mars, openly plumped for the existence of the "Martialists."

It was in 1877, when Mars conveniently approached within 35,000,000 miles (as it does every fifteen years or so), that the Italian Giovanni Schiaparelli fired the first shot in the battle of the "canals" by drawing attention to a number of dark lines crossing the areas generally supposed to be continents. The peculiar thing about these lines, some of which had already been included in the areographers' maps, was that they were *straight*. They appeared to him to run straight for several thousands of miles and to vary in width from twenty to sixty miles; but he did not suggest they were anything but "channels," the Italian for which is *canali*. Hence the notion, which developed later, that instead of natural formations they might be artificial constructions—actual waterways built by the inhabitants to irrigate a world badly off for water.

That same year, the discovery that Mars was attended by two moons, so small that they are difficult to spot with all but the most powerful telescopes, rather overshadowed Schiaparelli's find—and, incidentally, compelled the poet Tennyson to revise his lines about "the snowy poles of moonless Mars," as well. In any case, the astronomer's fellows were inclined to doubt that his straight lines were more than hallucination; and their scepticism increased when, four years later, he announced that he had seen them *double*. Yet many observers who began to search for the *canali* soon found themselves seeing much the same markings as the Director of the Milan Observatory, and before long there was competition between the areographers for the honour of producing the most impressive map of the canals of Mars. Though these maps differed so much that their very lack of similarity seemed to dispose of the argument over the reality of the elusive streaks.

SO INTENSELY did the Italian pursue his own observations that his eyesight suffered, and for some years before he died in 1910 he was quite blind. But the American observer Percival Lowell was so taken up by the fascinating riddle of the Red Planet that he devoted his life to amassing evidence in support of the theory that it harboured intelligent life. Beginning in 1894, he and his assistants at the famed Lowell Observatory, built 7,000 feet above sea-level at Flagstaff, Arizona, applied themselves to a systematic study of the planet, which at its greatest distance may be nearly 250,000,000 miles away from Earth.

Since Lowell's death in 1916, these observations have been continued, aided by larger telescopes and the excellent seeing conditions of which the Professor himself declared that they were the only reason why most other astronomers saw nothing but blurred, hazy markings where he saw narrow, well-defined lines. He claimed to see canals that were only two or three miles in width; the broadest he estimated at between fifteen and twenty miles. As for their length, he found many of them stretching for 2,000 miles and at least one as long as 3,500 miles. According to him, there was a whole network of them, so clearly distinguishable in

themselves that he eventually mapped as many as 700.

To him, the strangely geometrical lay-out of the lines, apart from their straightness, was a clear sign of their artificiality; and the more he studied them, the more convinced he became that they were the work of sentient beings desperately striving to extend their lease of life on a dying planet. He found that they tended to radiate from the poles; and from careful observation of a dark blue band which marked the shifting boundaries of the pole-caps, he concluded that these were composed of something that did actually melt—in fact, of ice. Arguing that the thinness of the atmosphere and the length of the Martian summer—twice that of ours—would compensate for its greater distance from the Sun, he decided that the surface temperature varied enough to sustain this seasonal thawing process. Thus the canals, empty during the winter, would be refilled in the spring, to carry the life-giving water throughout the length and breadth of the planet.

The dark areas which had been taken for seas and, later, as more probably dried-up sea-bottoms were now seen to change colour with the seasons, blue-green fading to ochre and back to blue-green as Mars made its circuit round the Sun once every two Earth-years. The inference was that they were great tracts of vegetation which flourished and died according to the flow of water from the poles. That the canals themselves were inclined to vanish each winter, to reappear in the spring, was further evidence to support Lowell's hypothesis. The markings he saw in such detail were not the canals themselves—those, obviously, would be too narrow even for him to discern—but the belts of vegetation which sprang up along their banks as the waterways refilled.

In places, too, were great black spots covering an area of several thousand square miles, where the criss-crossing canals converged, as many as fourteen at a time: these he called "oases." Were they convenient centres of habitation for the builders of the canals—cities of the Martians? The argument gained still more strength from the further observation that the water which evidently produced the periodical surge of growth seemed to flow from pole to pole, as though actually assisted across the planet's surface—by a series of pumping stations situated at the oases?

PROFESSOR W. H. Pickering, of Jamaica, didn't think so. It was he who actually discovered the "oases"; but, while granting the existence of the *canali*, he thought they were no more than volcanic cracks radiating from "craterlets," like the "rays" which surround some of the craters of the Moon. Instead of water, he considered that gases escaping from the planet's interior through the cracks might promote the growth of vegetation. The same theory might account for the variations in tint occasionally observed on the Moon's surface, suggesting that it may not be entirely devoid of vegetable life.

In due course, Pickering became so impressed by the weight of evidence he helped to amass in their favour that he practically admitted the reasonableness of the idea that there were Martians,

and apologised for doubting the reality of the canals as such. Not so Dr. Alfred Russel Wallace, who shared the great Darwin's views on the evolution of terrestrial man but strenuously denied that life might have developed elsewhere in the universe. He thought that Mars, when it cooled down after its birth, was deluged by meteors and asteroids which formed a thin layer of molten rock about the planet, and that as this cooled in turn the imprisoned gases escaped through holes which became the "oases." Then, as the layer contracted still further, these craters developed fissures which radiated from them, to produce the spectacle of the "canals."

In support of this ingenious idea Wallace pointed to Mars' two pocket-size satellites, Phobos and Deimos, as the sole survivors of his swarm of invading asteroids ! Another variation of the theory that the canals were natural formations came from an English astronomer named Lynn who held that the planet was covered with a layer of ice, the cracks in which could be seen from Earth as the water beneath seeped through them. Some of the notions advanced in opposition to Lowell's were, in fact, no less fantastic than his own hypothesis—or even than the romantic imaginings of fiction writers inspired by the idea that those creatures of the Red Planet, resolved to ensure that their species should not die, might launch themselves through space to claim Earth for their home.

The peculiar doubling or "gemination" of the *canali* was a disquieting feature especially beloved of those who maintained that they were only an optical illusion caused by a trick of refraction or reflection, if they were not more simply explained by imperfect focusing of their instruments by those astronomers who claimed to see almost as much as Lowell did; for he had his supporters too. But it was pointed out that the eye is easily deceived, particularly by vague outlines that strain vision to the limit so that the brain unconsciously fills in details too faint to register on the retina. Said the sceptics: those who saw—or thought they saw—the canals were being deluded by irregular markings on the planet's surface which tended to assume the form of straight lines or circular spots.

Such minute streaks and blobs, said Maunder, for one, might be of any shape: if they were beyond the limit of vision and sufficiently scattered, the eye would knit them together into "lines essentially 'canal-like' in character," and where they were crowded together they would appear as "oases." To clinch his case, he conducted an experiment with a classroom of Greenwich schoolboys who were told to copy a drawing similar to one of the maps produced by the advocates of the canals, which was pinned on the blackboard. Those in front copied it accurately, while those at the back made fair drawings of the continents and seas of Mars without putting in any more detail. But some of the scholars who sat in the centre of the room inserted lines resembling the canals of the areographers, although the diagram actually contained nothing in the nature of a straight line; only a few dots and splotches in the regions where canals were supposed to be visible.

STILL, LOWELL was positive that he was not "seeing things," and claimed to have proved it to himself by an experiment much the same as Maunder's which produced the opposite results. He emphasised that only a fraction of the number of canals he had observed up to that time were doubled, and that these ran as parallel as railway lines, the distances between the lines varying between 75 and 200 miles. He pointed out, further, that the double canals were mostly seen in the equatorial regions and that they tended to avoid the blue-green areas of vegetation. All he could suggest was that they might be "return channels" in the complicated irrigation system of Mars, which must have taken centuries to construct.

The very size of this project, representing a feat of engineering far beyond human capacities, was itself an adequate denial of Lowell's fantasy, according to other disbelievers. It was estimated that to handle the volume of water he imagined was there, his pumping stations would have to employ 4,000 times as much energy as might be obtained by harnessing the whole potential power of Niagara Falls. An English engineer, C. E. Housden, was so intrigued by the stupendousness of the hypothetical water system that he wrote a whole book in which he considered the problems that must have been overcome if it did actually exist. That, of course, was before we had an inkling of the colossal energies we should one day release from the atom...

But Lowell, pointing to the obvious evidence of the decline of Mars, reasoned that it might well have spawned life long before it appeared on Earth, and that the Martians would therefore be far in advance of us, intellectually and scientifically. "In an ageing world where the conditions of life have grown more difficult, mentality must characterise more and more its beings in order for them to survive," he argued in *Mars and its Canals* (1906). "To find, therefore, upon Mars highly intelligent life is what the planet's state would lead one to expect." And in his later work on *Mars as the Abode of Life*, he wrote: "We are justified ... in believing ... that we have in these strange features which the telescope reveals to us witness that life, and life of no mean order, at present inhabits the planet."

Apart from hinting that the vastness of their life-saving enterprise was a clue to "the non-bellicose character of the community which could thus act as a unit throughout its globe," Lowell declined to speculate as to what the Martians might be like. He left that to the science-fiction writers whose stories, appearing within a year or two of the first publication of his theories, derived a good deal from them while drawing on the imaginative possibilities of the canal hypothesis. Besides the young novelist H. G. Wells, who prefaced his famous *Pearson's* serial of 1897 with a plausible summation of the problem which compelled his octopoid horrors to prosecute *The War of the Worlds*, there was the German Kurd Lasswitz, who in *On Two Planets* depicted the Martians as gentler beings and the *canali* as belts of giant trees overshadowing the moving ways linking their scattered cities; while Lowell's own countryman, Garrett P. Serviss, in what appears to

be a sequel to the Wellsian classic, visualised Mr. Edison and other leading scientists of the day making a reprisal raid on Mars and opening the floodgates of the canal system, which is designed to prevent the flooding of the Martian lowlands by the planet's brimming seas.

According to Lasswitz's concept, the water of Mars is conserved by a system of underground conduits; and this idea gains a certain credence from the objection once raised by Pickering that, in the tenuous Martian atmosphere, the polar snows would disperse too quickly for the water to be distributed over the planet by any other method. That is if the ice-caps could produce enough water even to fill a pipe-system; for opponents of the canals have always been very chary in their estimates of the thickness of ice at the poles. The Astronomer Royal, Sir H. Spencer Jones, subscribes to the view that it cannot be more than a few inches thick, and that its melting would provide just about enough water to fill a lake the size of Wales. Hardly enough for the whole of Mars' vegetation to thrive on, let alone animals or men . . .

BUT THOSE canals—those straight lines—surely one good photograph would settle, once and for all, whether they really exist or are just an optical illusion ? The camera has been in the astronomical picture long enough, and the camera doesn't lie. What about the new 200-inch "Giant Eye" at Palomar, which is really a giant star camera ? Won't that provide the answer to the riddle, one way or the other ?

Well, the first photograph of Mars was taken as far back as 1879, and incalculable thousands have been taken since then—over 100,000, up to 1934, at the Lowell Observatory alone. Yet, far from settling the question as one would expect, photography has only served to heighten the mystery, in spite of the progress made along these lines since Lowell offered his own first pictures of the planet for inspection by the sceptics 45 years ago. They remained sceptical: the photos were so tiny and dark that few could make anything of them, although Lowell claimed that eight canals could be picked out with the aid of a map of Mars !

Larger and better photographs were taken, later, at the Mount Wilson and other big observatories, but even these did not convince the sceptics; although they showed streak-like markings, they still did not look like canals. It was the same with further pictures taken at Flagstaff: though they proved that the lines were not optical illusions, and were indeed straight, they could not prove that they were artificial any more than Lowell's detailed maps could. Don't forget that some maps made by other areographers, even of recent years, show no canals at all. For even with the biggest telescopes, some observers cannot see any canals—and they include some who would really like to !

It was not until the opposition of 1941 that any photographs of Mars were obtained clear enough to give more definite detail than may be seen, by others more fortunate, by direct observation. Then, Dr. Bernard Lyot, the young Belgian astronomer at the Pic du Midi Observatory in the French

Pyrenees, which is reputed to have the best seeing conditions of any in the world, secured a whole series of photographs which not only confirmed the drawings of the great French areographer Antoniadi but showed a number of single and even double canals which were also observed visually. Since then, other double canals which most observers had dismissed as optical illusions have been seen at the Pic du Midi.

It was Antoniadi who, observing Mars from the Meudon Observatory near Paris, decided that "those geometrical spiders' webs do not exist" except as "irregular lines of complex structure produced by natural causes," and who claimed that he had "settled once and for all the canal question." And the "official" view among European astronomers today, in spite of the latest photographic evidence, is that the canals are no more than illusions suffered by observers who, if their instruments were more powerful, would not be so misled. Far from solidifying, they only vanish when studied with powerful telescopes.

That much is clear from an excellent summary of recent researches into the problems of Mars by the Secretary to the Commission for the study of the planet set up by the French Astronomical Society, which has now been translated into English by Patrick A. Moore, of the British Astronomical Association and the more visionary British Interplanetary Society.* While paying attention to other phenomena which have been neglected in favour of the tantalising canals, M. Vaucouleurs cannot escape the inevitable question, 'Are there any Martians?'; nor does he attempt to. And in an account of the canal controversy which is a masterpiece of brevity, he pays due heed to the affirmations of Lowell's former assistant, Dr. Slipher, that the many photographs taken at Flagstaff since 1906 also serve to corroborate telescopic observation of the canals and oases, with the result that "many American astronomers . . . are in complete disagreement with those of the European school of thought."

So the battle continues! Though, even in France, there are still upholders of the straight lines of Schiaparelli; among them one who finds "that each canal . . . can be considered as the embryo of a most important topographical formation capable of developing in the more or less immediate future," and that "the phenomena of the canals, considered as a whole, are specifically Martian." Make of that what you may. . . .

M. Vaucouleurs himself remains a strictly impartial observer. "What seems to emerge up to now, from this mixture of visual and photographic observations, is a hybrid representation of the Martian surface neither 'canalist' nor 'anti-canalist,' so that we can doubtless hope for the possibility of compromise that appears to have arisen between the two theories. But the significance of such a hybrid representation seems, at least for the moment, to be very obscure and very difficult to interpret. . . ." So, he

[*Continued on page 92*]

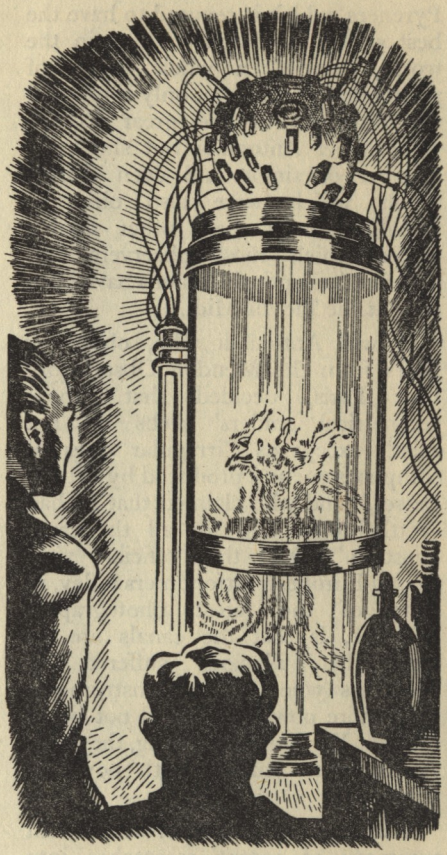
**THE PLANET MARS*, by Gérard de Vaucouleurs. Faber, London, 10s. 6d.

The Cycle

By P. E. CLEATOR

If you could increase the speed of an object's flow upon the Time Stream, it might escape from the Present. But if it was caught in an eddy-current—and the object was a man . . .

Illustrated by Powell



IT SEEMED to the fugitive, in the prolonged agony of his struggles, that he had been battling against the blizzard for untold eons. Time for him had lost all meaning: he just floundered despairingly on, almost waist deep in mountainous drifts of soft snow. Once he was completely submerged, when he inadvertently plunged into the depths of an unsuspected ditch. And all the while the dancing, whirling flakes descended smotheringly upon him. They got into his eyes and into his ears; they found their way down the back of his coat collar, filled his sleeves and his pockets, and even wormed their way into his shoes.

But from this assault a measure of relief was at hand, for the storm finally wore itself reluctantly out and a rising moon revealed the sparkling splendour of a whitened countryside. Yet the straggler had no eyes for the beauty of the scene

around him. He was almost at his last gasp, spurred relentlessly on by fear alone. The sudden moonlight, however, revealed a sight which made his heart leap—a familiar landmark. His destination was close at hand !

Thus encouraged, he stumbled on with renewed vigour, occasionally glancing uneasily behind him. But there was no need, he reassured himself, for apprehension. Thanks to the blizzard, he had successfully eluded his pursuers. And unless—improbable circumstance !—they were aware of his real name, they would have no reason to suspect where he was heading.

He thought of his brother-in-law, for whose house he was making, and the thought brought certain misgivings. True, John had always helped him in the past, though each time he'd sworn it would be the last. But how would he react when he learned about the killing ? Would he believe he had been forced to shoot in self-defence ?

It was a good thing that, on account of those previous scandals, he had assumed another name. Because of that the police were seeking one Edward Carter. Under his real name, he could leave the country without any trouble. All he needed was the money to take him to South America, and enough to live on for a while. In his present desperate circumstances, John couldn't refuse him that. Ah, there was the gate at last !

He gave one anxious backward glance as his frozen fingers fumbled with the latch. Not a sign of pursuit. Satisfied, he pushed open the gate, closed it behind him and disappeared in the shadows of a long tree-lined drive leading to a large house which stood in its own extensive grounds.

DR. JOHN ALEXIS THOMPSON, comfortably seated in his chair on the deck of the cross-Channel steamer *Coma Berenices*, paid no particular heed to the man who took the vacant chair beside him. He was studying a somewhat abstruse work on the electronic theory of valence, and it demanded all his attention. But, by degrees, he became aware that he was being gazed upon intently. Laying down his book at last, he turned to face his silent appraiser.

He beheld a biggish-built man, well past middle age (as was the Doctor himself), and with a reddish, weather-beaten face. He did not recognise the features, and was about to return to his reading when the other spoke.

"Excuse me, but aren't you Dr. Thompson, the scientist ?"

"I beg your pardon. I've no recollection. . . ."

"My name's Slade," announced the red-faced man. "Donald Slade."

Dr. Thompson shook his head and made as if to rise from his chair, "I'm sorry, Mr. Slade. The name conveys nothing to me. And now, if you'll excuse me—"

"We met about twenty years ago," the other insisted. "It was at your house near Penny Oak. I was a detective inspector in those days." Then, by way of a reassuring afterthought: "Not any more, though. Been on the retired list for the past twelve years."

"Now I remember," the scientist conceded, eyeing the man with renewed interest. "You've changed quite a bit, though. I didn't recognise you at first."

Slade gave a chuckle. "You've changed a bit yourself, sir. But then, it was part of my job to remember faces."

The Doctor screwed up his forehead. "Let me see... If I remember aright, you were close on the heels of some runaway or other at the time, and followed the fellow to my house."

"That's right, sir. You may recollect that there'd been a heavy snowstorm that night. It was thanks to the blizzard that our quarry gave us the slip. But we picked up his trail later, and it led straight to your house."

"Extraordinary ! Yes, I remember it clearly now," murmured Dr. Thompson.

"We thought it extraordinary, too—the way that, although his trail ended at your door, our man was nowhere to be found !"

"And the fuss you made about it ! You insisted on searching the entire place, and did everything but pull it down."

"Sorry if we inconvenienced you, sir. But in view of the circumstances, it had to be done."

"Of course. You were only doing your duty. I'm sorry, too, if I seemed inappreciative of the fact at the time."

"Doing my duty, yes—but not very successfully," observed Slade ruefully. "Where the man got to still beats me. That he entered the house and didn't leave it, I'll swear. Yet we couldn't find a trace of him."

The Doctor smiled good-humouredly. "You're satisfied you looked everywhere ?"

"From the roof to the cellars. We accounted for every inch of space within the four walls of that house."

"No secret hiding places ?"

"None."

"A mystery indeed ! But tell me, did you ever catch up with the fellow ? I've often wondered."

The ex-detective paused a moment before he replied. "And I've often wondered, sir, just where and how you managed to conceal him."

The Doctor frowned. "Come, Slade ! You surely don't think I had a hand in his disappearance. Why on earth should I ?"

"I don't know, sir," Slade went on doggedly. "Unless it was because he happened to be your brother-in-law."

The frown on Dr. Thompson's face suddenly relaxed. He sat back in his chair, stared moodily at the deck-boards for a full minute, while the other watched him curiously. He gave a little sigh, then smiled grimly.

"You knew that all the time ?"

Slade nodded. "We took the precaution of checking the fingerprints of the gentleman we were looking for. He was known to us as Edward Carter, but we found out that his real name was Arnold Stanford."

The Doctor laughed outright. "No wonder you knew where to seek him !"

"No wonder," agreed Slade. "Simple, wasn't it ?"

"And why didn't you confront me with the facts at the time ?"

"Because I didn't want to put you on your guard. You weren't very helpful, if you remember, despite the single trail of footprints which led right up to your door. It seemed plain enough that you were hiding our man, and I reckoned that as soon as the search died down you'd try to help him get out of the country. So I said nothing, and arranged a close watch. But weeks passed and turned into months, and still there was no sign of him. In the end I had to admit defeat. There was not a thing more I could do."

"You might have charged me with being an accessory," the scientist considered.

"On what evidence ?"

"Hmm. I see the difficulty. And you still think that I had a hand in Stanford's disappearance ?"

"Begging your pardon, sir, I do," replied Slade with conviction.

"Might not he have retraced his steps in the snow, as I suggested at the time, proceeding backwards until he was able to pull himself up into a convenient tree ?"

"No, sir." Slade rejected the idea immediately. "We examined the footprints minutely in the vicinity of the door. There had been no backward retracing of steps; nor were there any footprints anywhere leading away from the house. Stanford must have been inside the place all the time."

SILENCE fell between the two, as each sat busy with his thoughts. Slade, in whose memory the defeat sorely rankled, had turned the matter over in his mind so often during the past twenty years that it had become an obsession. There must be a conceivable explanation—and yet no explanation was conceivable ! As for Dr. Thompson, he was thinking of that night when Arnold Stanford had come knocking at his door.

Arnold had been in trouble, as always, and was craving assistance, as usual. The Doctor's first impulse had been to deny him any help whatever, as he had vowed he would henceforth do on the occasion of a previous transgression. But Arnold was in such a sorry plight and so obviously all in that he had relaxed his resolve to the extent of giving him shelter for the rest of the night. So he came to learn that his wayward relative had shot and killed a confederate he had caught in the act of absconding with their joint funds. By a happy circumstance, it seemed that he had conducted his affairs under an assumed name. All he needed was sufficient money. . . .

"Would you think me unreasonable if I were to ask what became of Stanford ?" inquired Slade, breaking the silence at last.

Dr. Thompson, brought abruptly back to the realities of the moment, hesitated. "Not unreasonable, Slade. But there are . . . difficulties," he ended, lamely.

"Difficulties ?"

"Believe me," the scientist implored, "they are real enough !"

"But surely—"

"Very well !" interrupted Dr. Thompson, harshly. "You ask what became of Stanford. The answer is: *I do not know !*"

Slade's expression was a mixture of incredulity and disbelief. "You don't know !" he echoed protestingly. "But didn't you—?"

"Yes, yes, I helped him, and I own it freely. He came asking for money—a lot of money—which I refused. But I made him an offer. I suggested that by assisting me in one of my experiments he could at the same time escape the consequences of his misdeeds. There was, however, danger, of which I duly warned him, and at first he would have none of it. But his position was so desperate that in the end he decided to chance it."

"Just what was the experiment ?" asked Slade, greatly curious.

"That is something I prefer not to discuss."

The look of chagrin on Slade's face betrayed his sense of disappointment and frustration more eloquently than a thousand words; so much so that the scientist made haste to avert the threatened flood of expostulation.

"Just what do you know about me and my work ?" he inquired.

"Not a great deal," admitted the ex-sleuth. "I know, of course, that you are famous as a physicist and have many important discoveries to your credit in that field. But exactly what they are or what they mean I don't pretend to be aware, let alone understand."

"Well, that's honest enough."

"It's the truth, sir."

"I'm sure it is, Slade. And it exposes an immediate difficulty, for much of my work is explicable only in terms of abstruse mathematical formulae."

Slade looked bewildered. "Quite so, sir," he answered respectfully. "But what has that to do with the disappearance of Arnold Stanford ?"

"A great deal, Slade, a great deal."

"At least I could *try* to understand !" urged Slade, desperately.

Dr. Thompson looked dubious. "I tell you what I'll do," he finally compromised. "Give me your word that on no account will you breathe a syllable to anybody about what you see, and I'll *show* you what happened to Stanford."

"You have my word on that, sir !"

"Good enough, then. The demonstration will, of course, entail a visit to my house. Suppose we say one day next week ?"

"You couldn't make it to-morrow, sir ?"

"I'm sorry, but that's out of the question. I'm journeying straight to London from Dover, and I'll not reach Penny Oak until after the coming week-end. Shall we say next Tuesday evening ?"

SO IT happened that the one-time Detective Inspector Slade found himself at the scene of his unsuccessful search of two decades ago. The place seemed to have changed little if at all, and memories long forgotten had come flooding back as he trudged up the long drive. In his mind's eye, he had seen once again that

single line of tell-tale footprints in the snow, leading straight to the front door of the house—and ending there. Was he really about to learn how his quarry had escaped, apparently into nowhere ? He had been promised a demonstration, and presumably he could believe the evidence of his own senses . . .

"This," said Dr. Thompson, breaking in upon Slade's meditations, "is the main laboratory. It was in here that the experiment took place."

Slade looked about him expectantly, but he observed nothing of note that he could not recall having seen years before. The laboratories and workshops, of which there were three in all, occupied the whole of the cellar space. And this particular room appeared much the same as the others—a confusing array of benches, intricate apparatus, and bottles. There must, he thought, be hundreds of bottles. . . .

His eyes came finally to rest on a peculiar structure which stood close to the wall at one end of the room. He remembered it had been there, in exactly the same position, on the occasion of his previous visit. And he recollected examining it at the time, without divining its purpose. Outwardly it appeared to consist of a wide glass tube, some three feet in diameter and at least six feet in height. It stood on one end, resting on a low pedestal, and was capped by a large globe of burnished copper which sprouted a forest of porcelain insulators and a maze of wires. He turned questioningly to his host, who nodded.

"That's it, Slade ! Have a good look at it while I fetch our victim."

Slade approached the machine, not very hopefully. It had been a mystery to him before, and it remained a mystery now. He guessed it was probably an electrical machine of some kind, but as for being the means whereby Stanford was concealed. . . . . He raised his head and listened. He fancied he heard a dog barking. Nor was he mistaken, for a moment later the sound was repeated, louder than before. Then Dr. Thompson reappeared, leading a large and vicious-looking animal.

"You're not going to cause him pain ?" enquired Slade anxiously. He was fond of dogs.

"I think not," answered the physicist, shortly.

He led the animal to the base of the machine, and pressed a switch. The transparent walls of the tube swung apart, and it became evident that it comprised two semi-circular components hinged at the rear. Carefully the Doctor placed the dog on the base and took off its lead. Then, at the touch of a second switch, the walls of the tube came together again, imprisoning the dog within. It began to bark furiously, making frantic efforts to escape.

"You're quite sure—" began Slade, uncertainly.

"Watch the dog closely !" The physicist closed yet another switch as he spoke, and a low hum came from the machine, accompanied by a vivid blue light which lit up the interior of the tube. The hum grew rapidly in intensity, and all the while the dog leaped and barked. Gradually the hum changed to a thin scream, and then tailed off into supersonic inaudibility. Still the dog howled and barked.

Then Slade, fascinated in spite of his doubts, observed a peculiar thing. The

dog's outline was becoming nebulous, as though the animal were dissolving into nothingness. He blinked his eyes, but it was no illusion. Nothing but a faint outline remained, now—a ghostly outline that continued to jump up and down as before. And the sound of the dog's barking was also steadily diminishing.

Slade strained his eyes and ears. He could no longer see the slightest trace of the animal, but he fancied that he heard a faint and distant howl. Then that, too, was gone. As though hypnotised, he continued to stare at the now empty tube with its dancing blue light.

The spell was broken by Dr. Thompson, who abruptly shut off the current. The blue light gave a last flicker, and disappeared. Then, as the switch was pressed, the transparent walls divided. Slade, suddenly coming to life, ran forward and reached into the opening, as though expecting to feel something there that he failed to see. But the tube was as empty as it seemed. The dog was gone.

NOT A LITTLE shaken, Slade straightened himself and turned to the scientist.

"What does it mean ?" he gasped.

Dr. Thompson smiled quizzically. "I promised you a demonstration, Slade—not an explanation."

"But you can't leave me like this, unable to believe my own eyes ! What is this infernal machine ? Just what does it *do* ?"

"What you need is a drink," replied the Doctor. "Let's go up to the library."

Once there, Slade accepted a whisky and soda readily enough and, thus fortified, renewed the attack.

"Am I to understand that Stanford—vanished, just as that dog did, and that you haven't seen or heard of him since ?"

The physicist nodded. "May heaven help him—and forgive me !" he murmured, reverently.

"But can't you reverse the process and bring him back ?" suggested Slade.

"Great heavens, man ! What do you suppose I've been trying to do for the past twenty years ? But it's no use. All I've achieved has been an endless succession of failures. All this time I've been working.... Time !" he exclaimed vehemently. "Wished to God I'd never toyed with it !"

"Toyed with time ?" Slade's puzzlement increased.

"Yes, with absolute Time—Time with a capital T. What's *your* conception of time, Slade ? I suppose you regard it as an arbitary and meaningless collection of seconds, minutes, hours, days ? You wouldn't think of it in terms of light-years, or want to measure it with the oscillations of the cosmic rays."

The ex-policeman's eyes twinkled. "I know nothing about time," he confessed, "except that it's supposed to march on !"

"Flow is the word, Slade—flow. Picture it as a vast, unhurried stream, of infinite extent, encompassing the universe, and flowing we know not where. But flowing, nevertheless—steadily, evenly. And floating downstream on its

placid surface, Slade, are you, me, and millions like us. Blissfully we imagine that we are masters of our fate, that we can shape events to suit our ends. But events don't happen to us, Slade. *We happen upon the events.* Our world of experience is merely a vast human drift from one happening to the next."

Dr. Thompson paused, then continued more soberly: "You are perhaps wondering why I'm telling you all this. But there are precise mathematical explanations which you would not understand. And the implications of that machine, Slade—they cannot be denied ! I devised it for a specific purpose: to cause a disturbance—a ripple, if you like—on the surface of the Time Stream. If my theory were right, such a disturbance would have an anti-synchronal effect upon anything in the immediate vicinity of it. In other words, that thing would be shifted from the *now* of events and, as a consequence, either experience once again events that were done and gone or prematurely meet with events that lay ahead. Either way, it would vanish from and have no existence in the present. Do you follow me ?"

"In a vague sort of way," answered Slade, manfully. "But carry on !"

"Such was the theory. And if the theory were correct it should be possible,

by causing a compensatory disturbance, to effect synchronisation once more. This was what I had in mind when I induced Arnold Stanford to take part in the experiment. Though I hadn't up to that time actually brought back any of the animals I had caused to disappear, I didn't doubt but that it could be done. Certain calculations would, of course, be necessary, and adjustments made to the setting of the machine in accordance with them. Naturally, it wasn't a matter I could test at a minute's notice. But I explained the position to my brother-in-law, and he elected to take the chance."

"What went wrong ?"

"I can't be certain, Slade. But I believe that what I've succeeded in doing is to cause, not a ripple, but an eddy. From this it follows that Stanford is lost in the past, and not the future. It seems that the machine gives rise to a contrary current, running back against the main stream, which you will readily see can only result in a circular motion and the formation of a whirlpool. . . ."

The scientist's voice dropped almost to a whisper. "And if, as I now believe, the effect of the machine is to cause the formation of a vortex in the Time Stream, then Stanford, for the past twenty years, must have been experiencing a never-ending cycle of events. Worse, he's doomed to endure the horror of eternal recurrence for all time, for he's by now so far away from current events that there's nothing I can hope to do to save him."

"And what particular set of events do you suppose he's experiencing ?" Slade asked, a look akin to awe on his honest, weather-beaten face.

"Undoubtedly, those events which immediately preceded the experiment. His giving you the slip, his long battle with the blizzard, his coming here, and entering the machine. He's doomed to endure all that, over and over again, for evermore !"

"Good grief ! What a fate !"

"And I sent him to it ! It would have been better a thousand times if you had caught him—if only to hang him."

"Hang him ? For what ?"

"Why, for killing that scoundrel partner of his. That's what you wanted him for wasn't it ?"

"But the fellow wasn't dead ! The bullet from Stanford's gun merely creased his skull. He fell stunned, bleeding like a pig. We only wanted Stanford for questioning. And we'd have caught up with him, too, if it hadn't been for that confounded blizzard. . . ."

IT SEEMED to the fugitive, in the prolonged agony of his struggles, that he had been battling against the blizzard for untold eons. Time for him had lost all meaning: he just floundered despairingly on, almost waist deep in mountainous drifts of soft snow. Once he was completely submerged, when he inadvertently plunged into the depths of an unsuspected ditch. And all the while the dancing, whirling flakes descended smotheringly upon him. . . .

THE END

A History of the Future

By JOHN K. AIKEN

THE MAN WHO SOLD THE MOON, by Robert A. Heinlein. Shasta Publishers, Chicago. $3.00.

RED PLANET, by Robert A. Heinlein. Scribner's, New York. $2.50c.

WALDO and MAGIC, INC., by Robert A. Heinlein. Doubleday, New York. $2.50c.

THE NAME of Robert A. Heinlein, which has been revered among readers of science fiction for a decade, is fast becoming familiar to a larger public through the presentation of his excellent stories by several publishers concerned with preserving them between hard covers. Soon, his name will be at least noticeable to an audience numbered in millions; for Mr. Heinlein is the man who has sold the Moon to Hollywood. The first serious attempt of the film-makers to show what a rocket voyage to Luna will be like, *Destination Moon*,* will shortly be seen on cinema screens in America and in this country. It is a semi-documentary film with a story based on one of his earlier science fiction novels† which, although designed for teenaged readers, are thoroughly intelligent and restrained in treatment; and it was made with the author himself at hand to ensure special attention to the technical aspects of space-flight which are generally overlooked in screening the exploits of such doughty interplaneteers as *Flash Gordon*.

Though we have yet to see the picture, we feel that Mr. Heinlein must have filled his unseen role admirably, and that it will be the better for his ministrations. For it was he who, with one or two other writers, set a new, improved style for modern science fiction in the early '40's: a matter of meticulous attention to background detail and scientific plausibility in the depiction of future or alien civilisations, combined with a genuine feeling for human personalities and a sense of humour. Almost overnight, magazine science fiction (or, at least, the best of it) was transformed from a hotch-potch of impossible death-rays, improbable monsters and tinplate characters into a series of logical propositions involving real people, well-considered scientific ideas and good talk. For which we have also to credit Editor John W. Campbell, who in encouraging Heinlein to write for *Astounding Science Fiction* helped himself in his efforts to effect the change.

From the publication of his very first story, "Life Line" (August '39), he was acclaimed a top-rank writer, and his increasing contribution to the field has enabled him to maintain this eminence. Little more than a year after his appearance, two or three pseudonyms were needed to cope with his output, not on account of variable quality but because of his facility for a type of writing which would seem to have come to him naturally, and which at that time was much in need of refreshment. From being an amusing hobby, science fiction soon displaced engineering as his chosen profession; and before the end of the war his stories in this genre were being atypically accepted by the *Saturday Evening Post*, reputedly the highest-paying fiction magazine in the world.

If this had been all his contribution, Heinlein would have much to be thanked for; but his most unique offering is something else again—his now-famous outline of Future History. Early in his career he mapped out, in characteristic manner, a schedule of the events of the next six hundred years or so, into which his stories

*See *Science-Fantasy Review*, Spring '50.
†*Rocket Ship Galileo* (Scribner's, New York: '47.)

would be fitted—thus avoiding the inconsistencies and self-contradictions which would otherwise occur between one story and another. Anything which fell outside this scheme—as an occasional inspiration must—appeared under a pseudonymous by-line; the first and most celebrated of these being that of Anson MacDonald, who at once became a keen competitor of Heinlein himself for the honour of the year's best-liked author.

Although Heinlein had developed the outline primarily for his own guidance, Mr. Campbell happened to get a glimpse of it and, realising its potential interest to his devoted readers, insisted on publishing it. Since then (1941), a good deal of its detail has been filled out—fictionally speaking—and instalments are still appearing. Meanwhile, one of the specialist science-fantasy publishers who are reprinting the cream of the magazine output of past years has embarked on a major project: the presentation in five volumes of the entire Future History series in chronological order, comprising twenty-three stories in all.

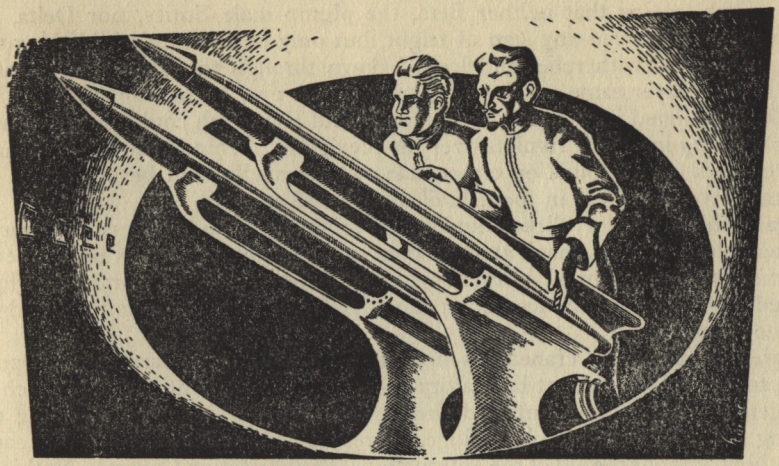
The Man Who Sold the Moon, which inaugurates this series, covers the immediate future in six tales whose themes range from atomic power (in "Blow-ups Happen," an almost too intelligent anticipation—by about five years—of Los Alamos), through travelling roads driven by sun-power ("The Roads Must Roll"), to the conquest of the Moon. Much of the book will be familiar to Heinlein devotees of long standing, though the long title-story is new. This is largely concerned with the political and commercial manœuvrings which bring Delos Harriman business supremacy but not realisation of his ambition—a Lunar landing, which he achieves—momentarily—in "Requiem."

The justification of including "Life Line" in the scheme is somewhat nebulous; but it is a much better story than "Let There Be Light," a flippant handling of the boy-scientist-meets-girl-ditto theme which is below the author's usual level and should have been omitted. The volume also contains a table setting forth the chronology of the whole series, with the entrances and exits of the various characters involved, from which it may be noticed that Heinlein puts the dawn of the first human civilisation at about 2075 and the beginnings of the first mature culture at something after 2125—it's to be hoped he isn't over-optimistic. Meantime, we are in the Crazy Years and the False Dawn preceding the Period of Imperial Exploitation (1970-2020), the great days of interplanetary enterprise coinciding with the life of Rhysling, the Blind Singer, of which we shall read in the next volume in the series, *The Green Hills of Earth.**

Red Planet, by intention a juvenile novel, is a worthy successor to the author's *Space Cadet* (Scribner's, New York: '49), and an even better tale. It fits smoothly enough into the Future History, and is a good deal more readable by the adult than nine-tenths of the science fiction designed for him. Sub-titled "A Colonial Boy on Mars," it is the story of two boys' struggle with their martinet of an Earth-born, power-seeking schoolmaster—a struggle which becomes identified with the colonists' attempts at emancipation and to which the key is provided by a most appealing little Martian creature, lightly regarded as half-pet, half-friend by one of the boys, but possessing unusual aptitudes and a mysterious connection with the ancient and still powerful civilisation of Mars.

Of *Waldo* and *Magic, Inc.*, two short novels published in one volume, the former is Heinlein at his very best; a truly intriguing tale in which such apparently incongruous elements as ballet, micro-surgery by remote control, repair of power-units by witchcraft, and the co-existence of an Other World are welded into a complex plot. The protagonist (one can hardly call him a hero), Waldo himself, is a remarkable piece of character-drawing. The other story suffers inevitably by comparison. Appearing originally in *Unknown* as "The Devil Makes the Law," it is one of Heinlein's few excursions into the whacky, a territory in which he is not too happy. Still, the conception of a United States in which magic is a commercial proposition is entertaining enough, a high-spot being the rescue from Hell of an F.B.I. man condemned to an eternity of masquerading there as a demon.

*After which will come *If This Goes on, Methuselah's Children, The Endless Frontier.*



Advent of the Entities

By E. R. JAMES

To a world equipped with labour-saving machines, the creation of synthetic human beings came as a threat—to the people who produced the machines. Unless they could use them to tighten their already strangling grip on humanity...

Illustrated by Turner

THERE WAS a breathtaking silence in the stratorocket as it reached the peak of flight. The blazing orb of the Sun, the cold semicircle of the Moon and the fleecy cloudcarpet covering the Earth all seemed to hang motionless. Then the floor of the cabin tilted; the cloudbanks swung dizzily until they were directly below, and the thin air whistled against the plastic shell as the rocket plunged down.

Gently the floor righted itself; and old Professor Kavenagh, his gnarled hands clutching the sides of the bucket-seat, his breath wheezing and his pink face beaded with sweat, found time to glance over his shoulder at the two green-clad Entities occupying seats behind him. How, he was wondering anxiously, would his laboratory-reared humans react to this, their newest experience of modern

life ? Then, seeing that neither Beta, the plump male Entity, nor Delta, the lissom female, showed any sign of fright, but only of a natural childish excitement, he sighed with relief and looked down through the nose of the rocket.

The cloud layer came rushing up at them with ever increasing speed. Then they were plunged into its shadowy depths, and Kavenagh could see condensed water running in frantic rivulets over the plexiglass. Behind him, the automatic pilot clicked. The clouds on either side swirled madly, and he knew that the air brakes were opening in the fishtails of the rocket.

Again the autopilot clicked and, with frightening suddenness, the rocket slipped sideways. Kavenagh started, then grumbled at himself as he realised it was merely the automatic correction of wind-drift. At that moment daylight flooded the cabin and the ice-pack panorama, laced with black mountain ridges, became visible.

Professor Kavenagh craned his head forward, his gaze searching the polar waste to pick out the secret laboratory he had prepared months ago for such an emergency as this. He muttered furiously to himself when, discovering the baffling sameness of each black ridge, he realised his helplessness. One could do nothing without the aid of the International Prefabrication Control. Nothing ! For they controlled the whole of the world's factory production. Even at this moment, although a fugitive because he had infringed the I.P.C. monopoly law, he had to depend on an automatic pilot which could have been made nowhere else than in an I.P.C. factory.

It was maddening. How could the World Council be so blind as to give these monopolists of manufacture the chance to grasp the ultimate prefabrication ? Had he, Kavenagh the biologist, reared human beings from the very first life stages to maturity by totally synthetic means, only that the I.P.C. might use them exclusively for their own purposes—to staff their factories and complete their domination of human life ? Fearful thought ! Humanity would still need the manifold products of I.P.C. for its mechanised way of life; but the power of the I.P.C. would be complete—they would no longer need humanity !

The stratorocket slid sideways again as it drifted down. Then the autopilot set the low altitude motors in action. The jets on either side whistled as the nose of the rocket lifted, describing a quarter-circle and rushing straight towards a towering black rock pointing up from the ice and snow. Kavenagh tensed. His distrust of I.P.C. automats made him fearful of a crash.

The jagged black mass, speckled with white, loomed closer. With a series of clicks the pilot altered course twice, and Kavenagh saw that directly ahead the surface of the rock was broken by a circle of velvety gloom. It swallowed them. The jet motors cut out and the cabin floor vibrated as the rocket touched down, to slide along an unseen friction runway. Ahead, now, he saw a small disc of light growing rapidly larger, until suddenly they swept out into the brilliant light of a large cavern.

The drag against forward motion increased, and a moment later the rocket, with a jerk came to a standstill. Somewhere behind there sounded a clang as of

heavy metal doors swinging shut, and Kavenagh sighed with relief as he switched off the autopilot. He felt safe here in these uninhabited wastelands—even from the I.P.C. Unstrapping himself with fumbling fingers and motioning the Entities to do the same, he opened the cabin hatch and stepped thankfully out into the warm air of the cavern.

DR. ARNOLD ROYCE, World Council Special Representative, flying back from the spherical laboratory from which, with Royce's help, Kavenagh had made his getaway, was only too aware of the delicacy of his position. The World Council would see only that he had taken the law into his own hands and helped an offender to escape. His official status wouldn't save him from trial; rather, it would tell against him, and he'd probably be denounced as a traitor as well. Certainly, if I.P.C. had anything to do with it. They weren't inclined to forgive and forget when anyone dared to frustrate them.

Well, at any rate, he would get a chance at the trial to convince the World Council of the danger from the I.P.C. Kavenagh, by rearing human beings from primary cell to maturity—even though his process was far from perfect—had unleashed the possibility of unlimited labour in a world wholly served by automats. And I.P.C., who were responsible for the manufacture of everything from autopilots to paper-clips, wanted the monopoly of making human beings too.

The thought frightened Royce. He could imagine their already formidable influence growing, their ego distending. By supplying their own labour, they could dispense with normally-born factory staffs. And, drunk with self-sufficiency, this overgrown government department would see its way clear to the final plum of world domination.

The warning buzz of the radar automat was the first intimation of pursuit. Looking up, Royce saw a rakish craft come swooping out of the blue, and realised from its scarlet colour that it was of the I.P.C. Contraband Patrol. Alarmed, he opened the throttle. But too late. Suction arms snaked down and clamped. Abruptly his forward leap was halted as the belly of the scarlet craft grated upon the glass shell of his small flier.

The roof hatch snapped open and scarlet-uniformed men swung down upon him. He struggled but, unarmed and outnumbered, soon found himself a prisoner. They handed him up into the patrol craft, and climbed back themselves. He saw his flier floating earthwards under slowly spinning gyro-arms, and then he was blindfolded, gagged and bound.

There was a drag on his body as the patrol craft's jets whistled and it leapt forward. Then followed a long, blank period which ended in a rapid descent like going down in a lift. There was a slight bounce as the flier touched down. His legs were released and, lugged upright, he was frog-marched off on a round-about route.

Abruptly he was halted. Hands removed his bonds, gag, and the cloth which blinded him. Blinking in the light, he peered before him. Behind a scarlet desk,

a very fat man sat watching him. Like a restless elephant the man stirred, grunting, and the thick lips parted.

"You know who I am—uh ?"

"Yes." Royce had seen him many times: Supra, head of I.P.C., the man directly and solely responsible for organising the factories of the world.

"Uh ! Listen, now. But for your interference, the law would have taken its proper course in this matter of Kavenagh and his synthetic humans. I can only account for your puny but temporarily effective actions by imagining that you do not appreciate your personal danger. However, I have had you brought here to try to reason with you."

Royce shrugged. With a grunt, the fat man rose to his feet. "You will follow me."

With two scarlet-uniformed guards forming close escort, Royce walked after Supra as he waddled out through a door which opened at his approach. The hum and clink of machinery sounded loudly in Royce's ears as he stepped on to a gangway high above slow-moving assembly lines.

A large, cigar-shaped casing, like a simplified but elongated flier, came out of the wall on a moving platform directly below him. It entered the maw of a huge machine, and the tiny workman beside it glanced at a row of dials watching for electronic warning of imperfections. Out of the other side of the machine the casing slid, and Royce saw that it was now coated with shining scarlet plastic. On it passed through other machines, fitting it with gyrovanes and jet propulsion units.

Obviously, it was some kind of flier. But it was too slim to carry even a single man. Then, as Royce followed its further progress, he saw it fitted with ray-weapons. So it was a battle flier. In his absorption he forgot his captivity, and Supra's smug tones startled him.

"When I tell you that this is an unregistered factory you will at once realise that I am secretly arming. As things stand now, these robot air destroyers are being turned out at the rate of five hundred a day. I estimate we will require at least another two years to complete the million robots necessary to cancel out the World Council Police fleets. But if I had Kavenagh's laboratory-reared people working for me, I could accelerate progress tremendously. I am, therefore, asking you to co-operate with me."

"Oh ?" The man's coolly confidential manner amused rather than surprised him.

"I see you are thinking that if you can inform the World Council, I shall be ruined. You underestimate me, Dr. Royce—"

A shout from below interrupted him. "Supra ! I must see you !"

The fat man frowned. He leaned over the rail. "Later, Professor Inex, later."

Looking down, Royce saw Inex, I.P.C. specialist in radioactive armament, shake his smooth head. "You've said that before, Supra. I'm tired of being put off. It's bad enough to keep me cooped up in here. You must make some

arrangement about this sunlamp of mine. You can't turn such a thing down merely because it would cripple existing industries. The motto of I.P.C used to be 'Progress before profits'—what is it now ?"

Hurriedly Supra ordered Royce back into the room. The two guards seized him roughly, shoved him through the doorway. In the room, a lie detector and its overalled operator now stood near the desk. Supra, flushed and scowling, came in and flung his bulk into the chair so that it creaked. He thumped the desk.

"Put your hand in the detector."

A guard forced Royce to obey, and held his hand in the slot.

"Now listen, Dr. Royce. You've seen the potentialities of the power I wield. I can rule the world—*will* do so—and you would do better to work for me than try to impede me. Uh ! I must know where Kavenagh's rocket has landed, so that I can take steps to gain the secret of his process. Will you tell me peacefully —or must I make you talk ?"

"I want no part in your plot !" Royce snapped. "And it so happens that I don't know where Kavenagh landed."

Supra's frown deepened. The operator of the lie detector looked up. "No lie," he announced.

"What ?" roared Supra disbelievingly.

"It's the truth," said Royce.

"So it seems. Then I'm wasting my time talking to you. Take him away and deal with him as I ordered. Uh !"

WHEN TWO men in the blue of the World Council Police entered his cell, Royce thought he was rescued; for now that he knew what Supra was planning, the I.P.C. boss would never hand him over voluntarily. But the two officers, without a word, handcuffed him and nodded amicably to the I.P.C. guards. In sudden bewilderment, he went out with his escort to a police-blue flier.

In an official gaol in the world capital, he awaited trial. It was just as he had feared. They told him that, because of his status, his crime was political as well as civil; he would be accused as a traitor to World Government rather than an ordinary law-breaker. Except for a visit from a defence lawyer, he was held incommunicado.

On the second day he was taken under close arrest to the court-room. He noted that the trial was not being televised, and that the public seats were empty except for Public Relations Minister Cylk Verity, who would be attending for political reasons. He recognised the judge as one he might well have chosen himself. "Old Blindfold" they called the wizened, strictly impartial ancient. With renewed hope, he glanced at the lie detector. What he had to say in evidence would surely shake the I.P.C. to its rotten foundations, besides making the World Council alive to the danger existing to benevolent rule. Or was there some flaw in his reasoning, some factor he had overlooked ? Why was Supra putting no obstacles in the way of the trial ? It seemed too good to be true.

The Court Clerk called the first witness. The little rat-faced I.P.C. patrolman

who had discovered Kavenagh's laboratory took the stand. The lie detector hummed.

"You will place your right hand in the detector and answer counsel's questions in a straightforward manner."

"One moment !" Old Blindfold leaned across his desk towards the operator of the detector. "Mr. MacKey, it is my duty to warn you to think carefully before you answer the question I am going to put to you. According to my perusal of the written accusation, which is to be confirmed by Patrolman Lymas, the charges against Dr. Royce are: firstly, murder of a World Council policeman, and secondly, criminal collaboration with Professor Kavenagh, who it is said has manufactured synthetic human beings in direct contravention of the I.P.C's monopoly of manufacture.

"Now, in view of the accused's status within the World Council organisation and the consequent charge of high treason, either of these charges, if proven, may carry the death sentence. Much of the evidence being circumstantial, a great deal depends on the lie-detecting machine in your care, and I charge you to consider your responsibility well before you answer. Is the machine in perfect working order ?"

"It is, your honour."

At once Royce's counsel was on his feet. "I protest that the court does not know this man. Where is the usual operator ?"

Old Blindfold frowned. "Counsel is out of order. This operator is the head automat expert of the I.P.C., and has previously sworn before another detector that this machine is to be relied upon. I was merely making sure, before you raised the point. We will proceed."

Defending counsel sat down, apparently satisfied. Royce felt far from that. The I.P.C. made the lie detectors, and their agents serviced them. How easy for them to fake the trial ! No wonder Supra wasn't worried. Though it was just possible. . . .

Prosecuting counsel stood up, facing the witness. "Name and occupation ?"

"Lymas—I.P.C. Contraband Control, No. 74931."

"Will you give the court an account of the events which transpired germane to this case on the . . ."

Royce's attention wandered. Something *must* be wrong ! If the detector registered correctly, Lymas could not lie in giving his evidence. Yet he could not tell the whole truth, for in doing so he would have to confess to the murder of the World Council policeman who had accompanied Royce to the laboratory, of which the prosecution now accused him.

"When I arrived on the scene," said Lymas calmly, "Dr. Royce was standing in front of the entrance to Professor Kavenagh's house. In his hand was a ray-weapon, still smoking, and at his feet was the ray-scorched corpse of a World Council policeman. He disappeared into the Professor's house and I called up reinforcements. After blasting a way into the house, I was tricked and disarmed, but not before I had discovered that Kavenagh was manufacturing synthetic

human beings and thus breaking the monopoly law. When I challenged him, the Professor admitted his crime in Dr. Royce's hearing.

"I was forced at the point of a gun to enter the spherical laboratory. Reinforcements arrived and began to burn through its plastic shell. The Professor brought out of an inner room the newest of his synthetically-reared humans—Entities, he calls them. They then endeavoured to tilt the movable sphere housing the laboratory, in order to fire the escape rocket out of the central tube at the correct angle so that the automatic pilot could do its work. This they eventually did, leaving Dr. Royce and myself outside."

Incredulously, Royce looked at the lie detector. No warning buzz ? No red light ? Why did the green light burn so steadily after such blatant lies ? There could be only one answer.

AS IN A DREAM, he heard other evidence. Lord Pallen, eagle-faced aeronautical advisor to the I.P.C., rose to testify that the launching tube in the centre of the sphere had been at an angle which, according to calculations made from standard trajectories, would land the rocket in the North Polar region. Rigor, I.P.C. mathematician, followed him to confirm this, but added that it was impossible to give the exact point of landing owing to partial destruction of the launching tube and broken aiming mechanism.

Then, to clinch the case for the prosecution, an inspector of the World Police was called to give evidence that Royce had been party to a trick which had resulted in freeing the aiming mechanism incorporated in the spherical laboratory.

With all this evidence against him, Royce took the witness stand, and inserted his hand in the slot of the lie detector. Tiny, blunt pins gripped his fingers, palm and wrist.

Old Blindfold leaned towards him. "In the face of Professor Kavenagh's absence, I understand you are asking us to judge you on the basis of your past excellent record and your present testimony. You have no other witnesses to call ?"

"None, your honour."

"Very well. The court will give you every chance to justify your actions. Proceed."

"To begin with, your honour, I admit that I have broken the monopoly law, and that I oppose the I.P.C. in their desire to lay their hands upon this, the ultimate manufacture." Royce glanced at the lie detector. Green light. Continuing, he addressed himself to the tall, blond man sitting alone in the public seats. Cylk Verity, Public Relations Minister, was in the confidence of the World President. "It seems to me that, with the ability to manufacture their own labour, they would soon wield more influence than the World Council itself. Even now, this overgrown government department is so powerful that it is held responsible for its actions only to the President of the World himself !"

Royce turned his head to watch the lie detector. "I submit, for the consideration of this court, that I have not betrayed the World Government; rather have I postponed the day when I.P.C. will complete its plans to subjugate it entirely."

The green light flickered out. The red light glowed. The lie detector buzzed stridently.

Royce hesitated, and the lights changed back. "I say," he continued, "that Kavenagh wants only to make his Entities for the benefit of a labour-starved world—" Red light and buzzer again as he shouted:"—not for the exclusive use of I.P.C !"

He waited until the buzzer stopped. "I accuse Patrolman Lymas of murdering the World Council policeman at Kavenagh's laboratory. I did not do so !"

Zzzz—lie ! The accusing red light again.

"Even as I returned from the laboratory I was kidnapped by the I.P.C. Supra—himself !—showed me a hidden factory—"

Zzzz !

"—where they are making robot fliers with which they hope to wipe out the world's Police fleets—"

Zzzz !

"—and finally I submit to this court an appeal for my re-trial. I am convinced that this lie detector has been tampered with !"

Old Blindfold glared down. "Well, have you quite finished ?"

Royce, with sinking heart, nodded.

"I have never—" Old Blindfold paused. "—never before witnessed such a disgraceful exhibition. This detector has been submitted to every conceivable test by World Council technicians. Mr. MacKey himself is above suspicion. I cannot admit your plea, but I do condemn your contempt of this court."

Royce cried desperately: "I have every respect for your honour—"

"Silence !" the judge snapped. "Your plea for re-trial will be submitted to the proper authorities, but in the meantime this court must announce its findings."

Without surprise, but with the last dregs of hope draining away, Royce heard the verdict pronounced. "The prisoner is found guilty on both counts, and is sentenced to be confined in the lethal chamber until dead."

WHEN HE was told later the same day that his plea for a re-trial had been refused, Royce reasoned that the I.P.C. were using all their influence to speed his execution. While he lived, he was a potential danger to them; why they had bothered to hand him over to the World Council at all, he could not fathom.

At sunrise the following morning, guards came to his cell. The time of their arrival gave him his clue to their mission. Escape seemed impossible, and resignation seized temporary hold on him. At least, he was not being kept in suspense.

They left the prison building and, with the chill of early morning striking

through Royce's thin clothes, crossed the grey courtyard to a hut near the main entrance. Entering this, he stared in surprise, Cylk Verity and Supra sat, evidently awaiting him.

"Sit down." The Public Relations Minister waved a hand to the guards. "Wait outside. Now, Royce. We are here on a very unusual mission. I am informed that the manager of the hotel at the Polar Junction of International Tube Transport has observed the descent of a mysterious rocket somewhere in that area. He refused, however, to give the exact location to a representative of the I.P.C. who called upon him. He says that he will do so only to an accredited agent to the World Council.

"Supra, here, has therefore intervened on your behalf. He points out that should Kavenagh be approached by a stranger, he might very well destroy both himself and his secret. I am given to understand that the Professor is a very hasty, self-opinionated man. And so, in order that his suspicions may not be aroused, we ask you to go on this mission. He knows you, and has reason to trust you. If you do this, you will receive a full pardon and reinstatement to your old position."

"I see," said Royce. "And the alternative ?"

"You are a condemned man."

Royce hesitated. Dead, he would be no use to Kavenagh or himself; alive, he might find some way of joining the biologist in outlawry.

"What do you propose I should do ?"

Supra grunted. "You will travel unobtrusively by tube to the Polar Junction, interview this LeRoi and—uh—fly into Kavenagh's hide-out. Secreted in your flier will be Patrolman Lymas and, possibly, another man. For the success of the mission, I understand you will receive full pardon for your crimes—"

"Which," interrupted Royce, "are not my crimes at all."

"That is your obsession," said Supra, fatly. "Well—uh—will you do it ?"

"I have no option," Royce admitted.

Two hours later, he and his escort stepped off the moving road-strips of the world capital and descended by escalator to the tubeway station. There was money in his pocket and a suitcase full of clothes in his hand. He felt it was good to be alive.

Lymas, small and rat-faced, met them. "Thought you'd never get there," he grumbled.

The escort left them, and Lymas threatened: "No tricks, now !" He grinned unpleasantly. As he inserted coins in the ticket automat, Royce frowned at the scarlet stamp upon the machine. Normally he would have taken it for granted, but now it seemed to sound a warning of the all-pervading I.P.C. He must not underestimate them again.

They progressed to the platform barrier and through a turnstile to the North Polar departure platform. Two minutes later, an atomic-powered, bullet-shaped locomotive drawing two cylindrical carriages came smoothly out of the tunnel to a standstill. Royce followed Lymas on board into a double-bunked

compartment, and within another minute the train was moving slowly forward. It quickly gathered speed, and rocketed to maximum velocity.

Ignoring Lymas, Royce adjusted the compartment automat, recoiling mentally at the ubiquitous red seal upon it, and went to sleep in his bunk. Three hours later the automat's arm awoke him with a gentle pressure. Simultaneously, a small table unfolded itself and the automat disgorged a meal from the electronic cooker. As Royce picked up knife and fork, he noticed that Lymas was awake; probably he didn't dare go to sleep. The patrolman's black scowl of disapproval was most pleasant to see.

Presently the train slowed and braked to a halt at the Polar Junction. Lymas opened the compartment door, and Royce followed him out. Passing through the turnstile, they were carried up into the warmed air of the huge plastic bubble which enclosed the Polar Junction Hotel, its garages and offices, and with as much personal comfort as in a city of temperate latitudes, travelled on by moving road-strip.

IN THE HOTEL, Royce, without consulting Lymas, took the initiative and asked for the manager.

"You want him personally ?" asked the desk clerk.

"Yes."

"I'm sorry, sir, but Mr. LeRoi is not available. No one knows where he is. He went to his room yesterday and hasn't been seen since."

Lymas gripped Royce's arm. "All right—never mind," he told the clerk. "Come on," he said to Royce.

As the sliding lift carried them up and along, the patrolman chuckled nastily. "We have naturally taken precautions to see that LeRoi doesn't squawk to the World Council—at least, until he's told us what we want to know."

"You think he'll tell you ?" Inwardly, Royce cursed himself for a fool. He might have expected that I.P.C. wouldn't hesitate to bring their usual methods to bear in a case like this.

"Of course. He's the type to play at strong man. I've handled his sort before. They crack up without any trouble once they're convinced they're in real danger. We don't like to *have* to use torture."

The lift stopped, and the doors slid apart. In the large apartment beyond, Royce saw several men grouped around a chair. The occupant of the chair was obviously LeRoi, a small, dapper man. The others Royce recognised at once. There was MacKey, the automat expert, Lord Pallen, the aeronautical adviser, Rigor, the mathematician, and Inex, Supra's armament specialist.

"What are you all doing here ?" began Lymas in surprise. Then he stopped, and Royce was astonished to see that in the hands of MacKey and Pallen gleamed the tubes of multiple-ray weapons.

"Remain quite still, both of you," commanded Pallen grimly.

Inex disarmed Lymas, and ran his slim hands over Royce. "Dr. Royce carries no weapons."

"Good," said Pallen. "Now, Doctor, you may relax. Since you are unarmed, it is obvious this patrolman did not trust you. That means—that we can. Won't you sit down ?"

Royce did so. Without understanding, and dimly suspecting an elaborate trick, he watched MacKey and Rigor bind and gag the squirming Lymas, then carry him bodily into an adjoining room. With more courtesy, but firmly, Pallen escorted LeRoi to another door, closed it upon the hotel manager, and pressed the lock button. As he came back to Royce, he smiled.

"A lot depends on you, now, Doctor. I consider that we are now on trial, and you are the judge."

"Really ?"

Professor Inex coughed as MacKey and Rigor came back. "Perhaps I could explain ?"

"By all means," agreed Pallen.

Inex nodded, and seated himself near Royce. "Do you remember the complaint I made to Supra about my sunlamp in the factory ?"

"Sure."

"Then you must have gathered that I do not care for Supra's methods. I may add that I have only continued to work for him because it is impossible under the present system for a scientist with my objectives to carry on his researches in any other way."

"Yes ?"

Inex looked at MacKey, who ran his fingers awkwardly through his red hair. "The lie detector at your trial was fixed, and I was the man who did it. But I am really working at cross-purposes with I.P.C. They wanted me to cover Lymas's perjury and turn your true statements into lies, and I had to do so or reveal my true sympathies. You see, there were other lies besides Lymas's, and we dare not trust a stranger."

Lord Pallen nodded. "Supra wanted it stressed at the trial that he did not know where Kavenagh was. It was true that he didn't, but it was a lie to say that I did not. We are sorry you had to be victimised so cruelly, but it was part of our scheme that we should secure your release afterwards—for our own purposes, not Supra's. He would never have gained Cylk Verity's sanction for your reprieve if it had been for the ends of I.P.C. But to disarm Supra's suspicions, we encouraged him to intervene on your behalf."

Rigor the mathematician tapped his thumbnail with a pencil. "You see," he said in clipped, precise syllables, "Pallen and I found the firing tube of the rocket was damaged. But, knowing the exact heat-resistant capacity of the plastic used in its construction, we were able to estimate the fuel used in the take-off. The range of such rockets is controlled by standard fuel measurements and flight trajectories. We knew the quantity of the fuel, and a simple reconstruction gave us the trajectory of flight."

"So," said Royce, "you know where Kavenagh landed."

"To within half a mile," confirmed Rigor.

"But," explained Pallen, "we did not want Supra to know. Hence our continued co-operation with him."

"Oh." Royce was beginning to understand. They were making themselves out as conspirators against the I.P.C.

"I think," said Pallen, "that it was your courageous stand at the trial that finally decided us. It was only recently that we all realised what Supra was up to with these robot fliers. We plotted together—to frustrate him. In our position of trust, it was easy to commandeer three transports containing all the materials to build a small aircraft factory. But we need a place of refuge and are desperately short of labour. Kavenagh, with his hide-out and these Entities, can solve both these difficulties for us.

"We knew long ago, when he gained his first success with his experiments, that he had established this secret sanctuary against the day when he might have to flee from the I.P.C. In fact, we provided the labour for it, though he never realised the extent to which we assisted him, nor that we were secretly in sympathy with his plans to evade the clutch of I.P.C. We saw only too clearly the inevitable results of a monopoly in the manufacture of human slaves, and the possibilities of the proper use of his process once he had perfected it. Especially as concerned the culmination of our own plans to scotch the growing menace of I.P.C. domination, made all the more urgent by our realisation of Supra's intentions.

"For us, in our position, it was a very ticklish situation, but we have managed to avoid detection and, so far, keep one move ahead of Supra. Now we have no need to play a double game—we must go into hiding and secure Kavenagh's help in preparing the last, crushing blow against I.P.C. We are, incidentally, quite confident of success."

"I see." Royce felt them all watching him closely, awaiting his reactions. "But I don't understand where I come in. If you know the whereabouts of this hide-out—"

Pallen smiled. "Even though we helped him build it, we never knew until now its exact location. The workmen we supplied—the technicians—had, of necessity, to be kept in ignorance. Indeed, it was better that we ourselves did not know. For a long time, we four could not trust each other any more than Kavenagh would have done had he known who was helping him. And now, knowing him and his bitter hatred of I.P.C., we fear that he may be so alarmed if we approach him directly that he will destroy himself, Entities and hide-outs by atomic disruption. He has taken that precaution, and he will never trust us. But he trusts you—you helped him escape. We need you, as we persuaded Supra, to herald our friendly arrival. Though, of course, Supra did not know we had our own plans to use you for quite different ends."

Royce looked up at them. "I wish," he said with a grim smile, "that I had a lie detector handy to check your real intentions."

MacKey started towards an inner door. "If that's all you need to convince you—"

"No !" Royce waved him back. "I'd sooner trust you than any more of your machines. I think I can take your word—and I'm with you !"

"Excellent !" smiled Pallen. "Then we'll go at once, in my flier. The transports will be waiting. Professor Inex, perhaps you will attend to Mr. LeRoi and the patrolman. Then we can get away."

THEY PASSED out through the airlock in the top of the Polar Bubble, sped silently away over the ice-peaks and, leaving the normal airlines, joined up with the three transports. Soon, while still some distance from Kavenagh's hide-out, Pallen and his three co-conspirators transferred to one of the giant aircraft, and Royce flew on alone.

Following the course plotted for him by Rigor, he easily located the entrance to the cavern in the range of black mountains. He manœuvred the flier into the black hole and eased it along until his passage was suddenly obstructed by great metal doors. Simultaneously, the dark silence of the tunnel was shattered by the clamour of alarums, and the flier became the focal point of blinding lights as metal grapples grated on its plastic hull.

Instantly, a grim face showed on the little television screen above the automat panel. He pressed the button which would reveal his own features to the guardian of the cavern, and announced his identity. A moment later, Kavenagh's surprised face stared at him.

"Dr. Royce ! How the devil did you get here ?"

"Let me in, and I'll tell you. It's all right—no I.P.C. tricks. I've come to solicit your help against them."

The metal doors parted and he landed the flier in the cavern to find two armed men ready to escort him into the Professor's presence. Kavenagh was taking no chances. Royce saw the deep suspicion in his eyes as he hurriedly told him the purpose of his mission. He fully expected the biologist's irascible response.

"No !" His pink face reddened quickly as his temper rose. "No, no ! Why should I turn this place into a home for refugees ? You, perhaps, if you've got into trouble on my account—though your coming here only increases the risk to me and my work, unless you want to help me. But to take in these others, even if they are anti-I.P.C.—no, I say !"

"But," Royce reasoned, "they know you're here. You've got to help them, if you want to stay in hiding. If it weren't for them, you'd never have had this place—"

"Poppycock ! They're liars, thieves—all of them ! They've hoodwinked even you !" In his bitter antagonism, born of fear for the results of his life's work, the old man could not credit Royce's brief summary of the position.

"Listen !" said Royce, catching Kavenagh's arm as he stalked up and down impatiently. "Let me tell you what happened to me, what I saw with my own eyes in Supra's hidden factory. What will happen to the whole world if we don't get together to stop him. . . ."

And, presently, Kavenagh became more tractable, nodding his grey head in

sober agreement. "I see. Robot air destroyers, eh? And Pallen and these others have a plan to combat this madman's scheme of world conquest. Do you know what it is?"

"No—but they have the pick of the world's best brains, even if they seem to be working for Supra. And whatever it is, they are confident of success, if only they have the benefit of your support. I believe they have the secret backing of the World Council, too. But Supra's power is already too great for them to challenge it openly."

"But if I do help—do they know it will take eighteen months, with my present equipment, to rear a single brood of Entity workers? We need sunlight—lots of it. My Entities are a sterile race; they cannot reproduce themselves."

"Inex has a new sunlamp which will produce all the radiations you need. And Supra estimates it will take him another two years to prepare for his insurrection. That's why he wants your Entities for his armament factories."

The Professor wagged his head vigorously. "All right, then. We'll help each other, if it's to beat the I.P.C. for good and all. Bring your conspirators here, and I'll work with them. But woe betide them—and me!—if it's another of their scurvy tricks!"

Royce smiled wryly to himself as he rose to re-enter the flier. Even when he was convinced, to expect Kavenagh to admit as much was as futile as expecting an I.P.C. lie detector to register the truth about them. . . .

So Royce went out and led the transports into the cavern. The tunnel was only just wide enough to admit them, but once through the metal doors there was ample room to move around. No sooner had the transports touched down than their crews were called together by Pallen and, following a consultation with Kavenagh, the available labour was divided, the biologist being allocated the larger part since his claims were the most urgent. He already had a great deal of materials at hand, and by the end of that day bubble-built incubators of green plastic had begun to fill the cavern floor like so many igloos; while Inex and his assistants worked far into the night assembling two great sun-spheres to be installed in the roof.

NEXT MORNING, Royce found Inex at work near a wide ventilator shaft. The armaments specialist was busily checking dials and making adjustments to two slender, silvery rocket torpedoes, each about four feet long. When Royce inquired after their purpose, Inex chuckled grimly.

"They're for our friends at the hotel, of course. One for your patrolman, the other for the manager, LeRoi. We left them both in a comatose state, but they'll have revived by now. And they're free to wander where they will—except in this direction. I inoculated them both with a serum containing a radioactive compound, quite harmless to the bloodstream but very damaging to them if they should venture to seek us out. LeRoi has a vague idea where we are, and Lymas will naturally do his best to extract that information from him. But these torpedoes are extremely sensitive to the radioactive emanations which will

proceed from their bodies for a long time to come, and should either of them come within a mile of us on any snooping expedition, they will take off, seek them out and—"

He made an explosive sound with his mouth as he spread his fingers. "With the help of a lie detector—a good one—I convinced them both that I wasn't bluffing. I think it will be an effective deterrent to their taking too much interest in our whereabouts, don't you ? Even if they put the screws on LeRoi, his sense of direction is likely to be very confused. And Lymas is the type whose sense of duty can scarcely rate higher than regard for his precious skin."

Royce felt a cold, tingling sensation ascending his spinal column. "Very ingenious—very," he commented as he turned away. He felt a little sorry for LeRoi, whose powers of observation must have diminished considerably since he saw that rocket.

Within a few hours, the Entities were put into production. In the incubators of transclucent plastic, human primary cells from Kavenagh's experimental stock were placed in glass dishes and fertilised. Nourished by synthetic sunlight and reconstituted human blood mixed with the biologist's life-giving stimulant, these began to multiply before Royce's astonished eyes.

In a matter of days the growing Entities were sufficiently large for transfer into soft rubber sacs. Kavenagh, Royce and their assistants worked feverishly for three days and nights completing the changeover. Out of 1,500 embryonic organisms, they discarded just over four hundred for various reasons. Some had obviously received an overdose of the stimulant, and grew at a rate suggestive of monsters; some had received too little and, after a first spurt of growth, showed a tendency to wither and develop deformities. Others, particularly those which were overgrown when their turn came to be transferred to the rubber sacs, had burst through the initial protective covering of oily ooze and, in their extremely delicate state, became infected.

The sunlamps, working on the same principle as the sun itself, building up atoms of helium out of hydrogen, blazed continuously overhead. Normal humans found the heat and the harsh, imperfectly filtered rays uncomfortable, but the Entities thrived.

At the end of three weeks the task of cutting away the sacs and withdrawing the feeding tubes began. Wastage at this stage was so small during the first day that Kavenagh felt confident of well over a thousand workers. But as time went on, mistakes became alarmingly frequent. The human factor of their personal fatigue took toll. "This is a job for a machine," said Royce on the third day, when, with less than nine hundred young Entities surviving out of the 1,500 original cells, he and the old biologist left the incubators for long overdue rest.

According to Royce's wrist-watch, he had slept only six hours when he was awakened. A worker had collapsed. Would he come at once ? Royce investigated, and found the man had all the symptoms of acute sunstroke. This started him off on a tour, and he found that all of Pallen's workmen were suffering from sun-blisters and rashes. He devised protective clothing, but the rays penetrated even

that. It took him all his time to keep the men going, but as he worked he gained an insight into what they were doing.

He had been too occupied with the Entities, until then, to gather more than a hint of Pallen's objective, and he was a little dismayed to learn that this was a single, super air destroyer. They had materials for one only, but he was assured that it would be quite sufficient to cope with the whole of Supra's million robot fliers. Its size would be truly colossal, limited only by the dimensions of the cavern, from which they would have to blast the entire wall around the entrance tunnel in order to provide exit for it. But that was looking ahead.

At present, planning and preparations for the construction of the super ship were proceeding with tantalising slowness. Much of the equipment the technicians needed was not to hand, and they did not dare send men out of the cavern, even if they could spare them, to forage for supplies; instead, substitutes had to be improvised from available materials. Calculating machines, for example, were not included in the stores, and Rigor was full of complaints at having to do all his figuring by the long, hard, primitive method. Heat-resistant plastics for bearings and air torpedo tubes were hardly sufficient: Royce heard Inex's

bitter comments when it was necessary to create hard metal alloys from half-forgotten formulae learned in his student days. Radioactive elements for atomic weapons were, too, in short supply, and in spite of economies, expensive and time-wasting cyclotrons had to be constructed to radioactive substitute materials.

In fact, amid all this tremendous activity, only one thing was undisputably good. The I.P.C. did not find them.

THE TIME, eighteen months after the beginning of the Entities' mass production, when the synthetically-reared workers reached maturity and the artificial suns could be switched off, came as a relief. Then, Royce and Kavenagh found themselves mere spectators watching Entities and normal humans working together on the grey bulk of the air destroyer.

Though none ever ventured outside the cavern, the rebel community kept watch on the outside world by television; and from general obervation of I.P.C. activities and a closer insight gained from communication with secret sympathisers, Pallen was able to divine with shrewd accuracy the progress of Supra's plans for world conquest. At no time in spite of delays, did his confidence lessen in the slightest, and as the work proceeded apace his optimism fairly bubbled, buoying up the spirits of the rest until even Kavenagh became consistently good-tempered.

When news came in that the Polar Junction Hotel was to be the venue for an international conference of Public Relations Officers, the biologist at once tackled Pallen.

"This will be a grand opportunity for me to introduce my Entities to the world," he said jubilantly. "Representatives from all parts of the globe will be there to discuss the problem of the world's dwindling population and the shortage of certain types of labour for which automats cannot substitute entirely. Hotel servants, for instance. If I could staff the hotel with my Entities, it might convince the delegates that the world needs them. They would bring pressure to bear on the World Council to ensure that the I.P.C. doesn't get control of them—or any other monopoly that might take the place of I.P.C."

But Pallen argued that it was more important to use the Entity workers to smash I.P.C. for ever, before diverting their energies into other channels. For once, Kavenagh did not attempt to disagree, and on gaining Pallen's assurance that his Entities would soon be free for any plan of development he had in mind for them, settled down to wait for the completion of the super destroyer with a patience remarkable for him.

Then, six days before the conference was due to start, Pallen consented to Royce's proposal that he should visit the hotel to put Kavenagh's offer to the manager, LeRoi. As a precaution against a possible encounter with I.P.C., he applied a facial mask of flesh-plastic, and after taking a roundabout route in the flier, penetrated the huge bubble of Polar Junction.

Safely installed in a comfortable suite, he sent for the little hotel manager, revealed his identity. LeRoi seemed more relieved than surprised.

"You don't know what I've had to put up with all this time," he complained. "That I.P.C. spy—he's been nosing around here month after month, trying to worm out of me more than I ever knew. It took me three weeks, after you went into hiding, to convince him I didn't know where you'd gone enough for him to go away and leave me alone. Then he came back with some of his henchmen and tried to persuade me to go out in my flier in the direction I saw the rocket land—said I should be glad to sacrifice myself for the I.P.C. I nearly did, too, life became so unbearable. But I wouldn't help those scoundrels !"

Royce nodded sympathetically. "You'll get your reward for your co-operation." He told him of Kavenagh's offer to staff the hotel with Entities for the conference. But LeRoi did not take kindly to the idea.

"It would be asking for trouble—and I've had enough. When they knew I'd had dealings with this rebel biologist, they'd never believe I still don't know where he's hiding, even if one of their own lie detectors said so. I'd be tried for conspiracy, as well as for using illegal substitutes for their confounded automats. It's too risky—"

"The I.P.C. have enough on their hands without prosecuting you," Royce calmed him, patiently. "And if everything goes well, it will be a tremendous opportunity for you. You'll be the first to use the new synthetic labour. Think of the prestige ! When Kavenagh is backed by the World Council—as he will be—he won't forget your help."

LeRoi's smooth hands fluttered. "Prestige ! Here am I with my neck in a noose, and you talk of prestige ! I tell you, Lymas won't rest till he knows where these Entity people have come from, Supra is so desperate to get his hands on them. Lymas knows that if I don't sacrifice myself so they can get a bearing on the hide-out, he may have to act as direction finder himself. That's the only reason why he's kept his bosses away—he daren't tell them about the radioactive torpedoes. But Supra himself is to attend this conference, and Lymas is here now, working on me harder than ever. I tell you, I'm scared to death !"

"You needn't worry about the torpedo—Professor Inex will see to that. Nor, I think, about Supra and his coming clash with the World Council. Pallen and the rest will see to that. You'll be on the winning side."

"You're sure ?"

It was evident that the little man's dread of Inex's rocket torpedo was greater than his respect for the hated I.P.C., with all its powers of persuasion. By playing on his sympathies with Pallen's cause and the prospect of reaping ample rewards for his collaboration, Royce finally convinced him.

"If it's any comfort to you, I'll be staying here to give you moral support and watch the reaction to the Entities," he told LeRoi. "If there's any trouble, I'll take you to safety in my flier. But I fancy there'll be more urgent matters to occupy our friends of the I.P.C. Long ago, Supra decided he'd have to do without the Entities. And if he doesn't strike now, his opportunity will be lost."

Using a secret wavelength, Royce sent a code message to Pallen on his personal radio. Ten minutes later, one of the transports, its airscrews whirring at full

speed for the first time in twenty-one months, sneaked out of the cavern with one hundred Entities aboard. With new identity numbers and papers carefully forged, it joined the regular airlines, to all intents and purposes an ordinary I.P.C. cargo ship running a special consignment of goods to the Polar Junction Hotel.

DELEGATES FROM the four hundred Public Relations Councils of the world were at their places in the conference hall. Dr. Royce, sitting in his room seven stories above, focused an X-ray televisor downwards so that he could see and hear as clearly as if he were at the conference tables himself. The meeting had not yet begun, and the main topic of conversation among the waiting delegates did not surprise him.

"Did you ever see such a place as this ?"

"Never. All it needs is a little publicity and the world will flock here."

"These servants—they seem scarcely human. I haven't seen an automat in use anywhere. Instead of having to think out what you want and fiddle with the controls of some I.P.C. contraption, everything is anticipated by one of these green-uniformed fellows. Wherever did they get so much labour, I wonder—?"

"*Shhh* ! Here's the World Council Minister."

Royce swung the televisor to focus on the entrance to the hall. Cylk Verity, tall and blond, came into view. Behind him swarmed a host of officials. Hurriedly they made for the top table, but Verity did not wait for them to seat themselves.

"Gentlemen, this conference is cancelled," he announced. "It is my duty to inform you that the world is at civil war !"

In the deathly stillness that followed, he continued grimly: "The I.P.C. have just delivered an ultimatum to the World Council demanding that it abdicate instantly or be destroyed. Even now these would-be tyrants are assembling a mighty fleet of robot fliers above this Polar region. The world's Police fleets are mustering to engage them, but they are hopelessly outnumbered. It is automats versus humans !"

An apprehensive whisper rustled like a cold wind through the conference hall. Cylk Verity held up his hand.

"Our situation here is serious. Sabotage has already wrecked the Polar Tubes. It is probable the I.P.C. will try to seize the Polar Junctions as strategic points from which to wage their global war. We must expect to be attacked, and we cannot retreat since we are cut off from the rest of the world except by air, and no craft could get through safely. I can only advise you to seek shelter, and not to give way to despair. The outcome of this reckless bid for supreme power on the part of Supra and his minions is by no means as certain as they think—"

The delegates were rising, hurrying for the exits, making for the silent Tubeways. World Police officials prepared to take over the hotel as fighting headquarters. Royce left his room to meet LeRoi, his face a ghastly white, running along the passage towards him.

"The I.P.C.—"

"All right. We'll have time to get through—I hope. Is the flier ready ?"

"Yes. In my secret hangar on the roof. I had it put there, for safety's sake—"

At a run, LeRoi led the way to a lift and they rose swiftly to the roof. While the hotel manager operated the lock automat to open the concealed hangar doors, Royce sought out and pressed the emergency switch which would open an airlock in the Polar Bubble immediately above them. Then he sprinted, climbed aboard the waiting flier.

As they lifted, Royce saw a scarlet patrol craft rising after them from below the roof of the hotel. He snatched up a ray-weapon as LeRoi, at the controls, shouted in alarm. The I.P.C. vessel thudded grindingly against their hull; the floor bucked madly, and the two fliers, locked together, shot up through the airlock into the dim arctic twilight.

Suddenly the scarlet craft broke free, fell back slightly. Opening a hatch, Royce fired his ray-weapon down upon its gleaming shell, spraying it from bows to tail with the blasting razor-rays. As the glare faded, he saw the enemy flier plummeting earthwards, burning fiercely.

"That would be Lymas, I'll wager." The hotel manager shivered. "He's been watching and waiting for us—for me—to try to make a getaway, hoping I'd lead him to Kavenagh's lair. He'd begun to lose faith in Inex's torpedoes—"

"A pity," Royce said, grimly. "He'll miss the big show. That would have restored his faith, I fancy."

The pale-blue, ice-encrusted surface of the Polar Bubble fell rapidly away, below and behind. Royce shifted his gaze to where the ice-pack met the grey sky. Away to the east he saw a host of twinkling lights, shining scarlet and white.

"Look !" exclaimed LeRoi, nervously.

"I see them," Royce responded. "Scarlet for I.P.C." His eyes roved. "Now look over there."

LeRoi peered, frowning. Nearer, but still many miles away to the west, hundreds of blue lights flickered, moving steadily towards the red and white constellation.

"The Police fleet ! But what a few against—Oh, dear !" The flier lurched, then slowed.

"What's wrong ?" Royce turned impatiently on LeRoi, who was suddenly struggling with the controls.

"I set the autopilot as you told me, and now it's jammed. I can't get the manual controls to work—"

"Leave them alone !" It was a new voice, from behind. LeRoi gave a little scream and leapt out of the control seat. Royce spun around. Facing them, just emerged from the tiny cabin in the tail of the flier, which connected with the roof hatch above, stood Lymas, sneering at them over the barrel of a multiple-ray weapon.

"So you've set the autopilot," he gloated. "Then you can leave it to take us where we want to go. And no tricks !"

ROYCE REALISED that he still held his own ray-weapon. He spun on his heel, smashed it down upon the jammed switch. A blue light flashed as he threw himself on LeRoi, bringing him to the floor beneath him. He saw Lymas drop his weapon, clutch frantically at the cabin doorway to steady himself as the flier tilted, then sank alarmingly, jerked up, and began to fall again more slowly.

As Royce struggled to his feet, Lymas lurched across to the controls and, cursing, fiddled with the automat. But it was now little more than a tangled mass of fused and twisted metal, and he soon gave up.

"You fool !" he raved. "We'll be lucky if we reach the ground alive. I'm a good mind to make sure you two don't, here and now." He pointed his ray-weapon threateningly, as LeRoi scrambled upright.

"I shouldn't," said Royce. "You don't know yet who's going to welcome you when you land. The World Council has one murder against you already."

Impotently, Lymas swore, while the disabled flier sank steadily. Outside, Royce could see the dim, blue shapes of the first of the approaching Police ships. The scarlet lights seemed bigger and brighter, too, but they still hung on the distant horizon, a spreading band of brilliance. Then, as they all watched, a huge ship left the battle array of the Police fleet and came sailing majestically towards them. It seemed immense, many times bigger than any of the rest. As it came nearer, its gleaming silver bulk swelled to staggering proportions, and Lymas's thin, dark jaw dropped.

"Lord Pallen's ship !" Royce felt a glow of pride. LeRoi's eyes sparkled, reflecting the blue lights outside. "There's something for your I.P.C. to tackle, Lymas !"

The patrolman grunted, disrespectfully. Soon the super ship loomed so close that they could see the air torpedo projection tubes slanting out at an angle in serried rows along its tremendous length—thousands of them. The strange, muttering rustle of its hundreds of power jets grew less insistent, so that the pall of the arctic silence seemed scarcely disturbed. Yet Royce felt certain it must run them down, and they all tensed themselves to meet the grinding crash.

Then they saw the nose of the gigantic vessel gape like the mouth of a cavern. In a moment, it swallowed them. Lights blazed in upon them, and green-clad Entities appeared on all sides, steadying the flier and beckoning them out. Lymas went, dazed, behind the wondering but vastly relieved LeRoi. Royce followed, to see a mop of flaming red hair bobbing amid the Entities.

"Just in time, Royce. Ah, LeRoi ! Brought a prisoner with you, too ! Good work !" It was MacKey, rushing them to a moving escalator. Around them, more Entities moved purposefully.

On the top deck of the super ship, beneath the transparent shell, Royce stared ahead at the scarlet lights of the I.P.C. fleet, growing steadily brighter. They were farther apart now, scattered far across the darkling sky in an expanding crescent whose horns reached to touch the blue lights of the Police fleet massed solidly behind the monster airship, as though to encircle it with their twinkling red menace. He had an awful sense of their being slowly trapped, a pitiful few,

doomed to pit their strength against impossible odds. Those moving points of scarlet brilliance were uncountable. A million of them, Supra had said. . . .

Suddenly, from the leading enemy ships, ray-blasts crackled out across the unguessable distance. The black mountains behind threw back sharp echoes of their red roar. Ice pinnacles cracked below. The great ship shuddered as waves of blast from the outranged rays encompassed it.

"Now, watch !" It was Inex who spoke, confidently.

Tiny, fiery trails leapt out from the bows of the super ship. A hundred of them—then more, and still more, pouring out from both sides of the tremendous hull, until the space ahead seemed alive with them and the darkness was turned into a sunset glow. Soon afterwards, a blinding flash ripped the sky where the red lights shone brightest, followed by a vicious report. Another flash—another, each with a blasting explosion in its wake. And so on, until the whole scene—the sky full of ships, the mountains and ice-peaks below—stood out in vivid relief and seemed to rock with the overwhelming concussion.

Amid the flashing tumult, Royce caught sight of distant scarlet specks falling earthwards, flaring red fire. Inex chuckled in his ear and bellowed:

"When I tell you that these rocket torpedoes are so attuned that they are attracted by the colour radiations given off by I.P.C. scarlet, you'll see that the fate of Supra's robot fleet is sealed. And the I.P.C's as good as—"

His words were drowned in the increasing roar of the exploding rockets as they still poured out of the super ship's gleaming sides. Royce averted his gaze from the distant glare as he heard Lord Pallen shouting at LeRoi:

"It's the end of the I.P.C.—thanks largely to Kavenagh's Entities ! We'd never have finished the ship without them."

THE END

The Battle of the Canals—*continued from page 59*

concludes, "the question remains open, and calls for the most energetic research."

On the question of life on Mars he is equally cautious. He suggests that the question has not as yet been properly faced; indeed, that we are evading it, because of the "prodigious upheaval" in human affairs that would result from certain proof of the Martians' existence. "We have by no means demonstrated that the well-established phenomena cannot be interpreted with the sole aid of the usual laws of physics and chemistry, but neither have we demonstrated that life could not adapt itself to the known conditions . . . which prevail on Mars." But he looks to the near future, with more application of the refined and penetrating methods of astrophysics, to provide a final solution.

Meanwhile, you can have your three guesses.

SCIENCE-FANTASY REVIEW

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The Jinn in the Test-tube

By HERBERT HUGHES

THE EXPANSION of science fiction in America during the past few years has attracted attention in several places, apart from the bookshops whose shelves have become increasingly laden with collections of stories and novels reprinted from the pulp magazines. Comprehensive write-ups tracing the evolution of science-fantasy, explaining its fascinations as "escapist" literature, and defining its values as an indicator of the future, have appeared in leading journals under such titles as "Science on a Spree" (*This Week*), "The Science in Science Fiction" (*Science Illustrated*), "Imagination Runs Wild" (*The New Republic*), and "The S-F Phenomenon in Literature" (*Saturday Review of Literature*). Even in England, the boom has not escaped notice: *Lilliput* discovered that "Space Ships Also Leak."

Recently, a more serious analysis appeared in the *Continental Daily Mail* in the shape of an article, published in co-operation with Unesco, by Dr. J. Brunowski, the "eminent thinker and writer," who sees in science fiction the "Folklore of the Atomic Age." He credits Mary Wollstone-craft Shelley, author of *Frankenstein*, with having invented science fiction, thus rationalising such Middle Age fancies as the Elixir of Life and the Philosopher's Stone in terms of scientific formulae. So, at length, Siegfried has become *Superman*, complete with radar, and the Jinn has been transferred from the bottle to a test-tube. For its development during the last century he thanks such writers as Verne, Wells and Conan Doyle, and particularly those whose scientific training enabled them to set the style for the best of today's science fiction.

The last half-century, which has seen the flowering of the literature, has also produced a growing credulity and fear of the things which science may accomplish. Whether it be fear or hope that accounts for the fascination of the science fiction lover, Dr. Brunowski finds in this increasing interest an acknowledgment that science has become the most powerful instrument for good or evil; and he traces the evidence of this attitude back to the 1920's, when "it suddenly became clear that there was a larger and less literate public for these stories than had ever shuddered with Edgar Allan Poe or been edified by H. G. Wells. Science fiction invaded the pulp magazines and captured them overnight . . ."*

He observes that this merging of the scientific with the marvellous and mysterious has exerted an influence towards the popularisation of the literature of science itself. But the ultimate in "vivid simplification" he sees in the comic strips, where *Buck Rogers* and *Superman* made their debut before the war, when Hitler and Mussolini were at their height. (These heroes of the science fiction

*He mentions specifically *Wonder Stories* and *Astounding Stories*, which actually followed three or four years in the wake of *Amazing Stories*, started by Hugo Gernsback in 1926. Though *Amazing* was the first publication solely devoted to "scientifiction," other American magazines had featured such stories consistently since the days when H. G. Wells' masterpieces first appeared in *The Strand* and *Pearson's*.

cartoon, which goes back as far as 1909, are a good few years older than Dr. Brunowski imagines, nowever. Perhaps he does not know that *Buck Rogers*, adventurer in the 25th Century, actually originated in a story of future warfare which appeared in *Amazing Stories* in 1928, and that *Superman* was first created by two teen-aged science fiction fans who related his exploits for fifteen years before other artists took him over three years ago. As for Wonder Women, we had them in the magazines—unfortunately—before they invaded the "funnies.")

None can dispute Dr. Brunowski's finding that "science fiction in words or pictures has taken on the dimensions of a new social force." As he readily concedes, distinguished men of science are among its writers and readers, and its "addicts" may cite countless instances of its predictive powers. "But," he argues, "it is not this occasional foresight and the Utopian philosophising of scientists which make the mass appeal of science fiction . . . Among the good and the bad influences (which it exerts), we may as well discard out of hand the smart predictions and the tolerant interest of some college scientists. The issues are immeasurably larger than this."

On the credit side he places the constant reiteration by science fiction of the fact that science has become "the major issue for our world, a matter of life and death." Its familiarisation of scientific concepts and technical possibilities among its millions of fans is, to him, "an important piece of education." But, looking at the titles of the pulp magazines which dispense science fiction to the masses—"all the *Amazings*, the *Astoundings*, the *Incredibles*"—he discovers the paradox that their appeal is not in their simplification of science but in their capacity to astonish and tickle the fancy, to pander to the sense of wonder. "Whatever may be the mass effect in the long run, the immediate effort of science fiction is undoubtedly to paint science as a mysterious and superhuman power in the hands of a few." In these respects, he thinks, science fiction does nothing but harm.

The prevailing tendency to depict the scientist as an all-powerful witch doctor or magical hero who can solve the problems of ordinary mortals by supernatural powers is, according to him, the most dangerous inclination today. "This is the disastrous side of science fiction, and there is a danger that it will remain uppermost. Science stories cannot begin to play their part in our daily education until they get rid of this degrading bias. For science is the human effort to find order and reason in the world, to flood the mysterious with light, and to show the unexpected as a simple extension of the familiar. There could be a science fiction which could do this modestly and intelligently. It would not be as sensational as Buck Rogers, but neither would it be as silly and at bottom as monotonous. It would be, and could be, quite simply, the fiction of a scientific age. And that might well be the literature of the future."

The ceaseless barrage of criticism from their most devoted followers which manifests itself in the readers' columns of most science fiction magazines is evidence of the rightness of some of Dr. Brunowski's thinking. Although its primary function must be to entertain, there is in science fiction something more than mere titillation of a sense which, he points out, may never be completely satisfied. There is the same drug-like quality about detective fiction, whose "addicts" crave more and more mysterious murders. But there is abundant proof that the science fiction enthusiast is genuinely interested in the constant efforts of science to rationalise the mysterious universe—which it does by a process of trial and error, of speculation and experiment, of theorising and amassing the facts which support its theories.

ONE of the liveliest features of *Science-Fantasy Review* was *FANTASY FORUM*, where readers expressed their views on all matters pertinent to its field. It is hoped to continue this feature in future issues. If you have any comments to make on the contents of this magazine or on any matters arising, send them to The Editor, SCIENCE-*FANTASY*, 25 Stoke Newington Road, London, N.16.

The main appeal of science fiction has always been—must always be—the appeal to the curious mind, the wondering imagination, which is the mainspring of science itself. Scientists read it for relaxation—and for inspiration. At the same time, its more discerning fans (who are usually the most addicted to it) temper their admiration of the things that science has accomplished with a shrewd appreciation of its present limitations, and carefully appraise the potentialities for good or ill of all its new achievements. They are no blind worshippers of super-science or *Superman*. Their minds are open, but so are their eyes.

Dr. Brunowski would seem to have paid too much—or too little—attention to the infiltration of science fiction themes into the comic strips, which do not exert any opposite influence except to attract imaginative minds still in their juvenile stage towards the more advanced realm of the science fiction magazines. It is true that some of these are hardly more adult in their approach, frankly flaunting an adolescent appeal. But it is not for nothing that *Astounding Science Fiction* has sought to discard the superlative with which it began its career twenty years ago, since when the field has developed out of all proportion, until it has acquired the status of a literature worthy of investigation by discriminating readers.

Today, the accent in science fiction is not so much on the strictly scientific, nor on the element of wonder. The adventurous aspect is still there, as it must be of necessity, since popular fiction is essentially a matter of conflict and struggle. But the human factor is more pronounced than it was in the days when the three magazines which pioneered the field derived their titles from an almost entirely *fantastic* appeal, and Editor Hugo Gernsback, while believing in "sugar-coated science," found that *Wonder Stories* had more pulling power than *Science Wonder Stories*. Instead of educating or amazing, today's science fiction is more concerned with the impact of science on all of man's affairs and with his reactions to the situations arising in a world—and in other worlds—transformed by science. Reactions which are not always fearful.

There are writers—mostly the scientist-writers—who still see in science the saviour of mankind (though they are not quite so certain as they were); others who regard it as a menacing monster which will have to be caged if it is not to destroy humanity altogether. But those who are making the best contributions to this still struggling literature have a finer sense of proportion, and a more vivid imagination. They see in the future, however distant, the possibility of man's developing the latent powers in himself, glimpsed through such new sciences as parapsychology, so that by a combination of mental and mechanical advancement he may become more nearly the master of his fate in an ever-widening sphere of activity.

Superman? Perhaps . . . but not just yet. Will man survive to evolve to such heights? That is the hope in science fiction, the prospect that lures its "addicts."

Travellers in Time—*continued from page 44*

accompanying tale of "The Changeling" more comprehensible and, therefore, more enjoyable.

The reader who wants something simpler in essence and treatment, without any pretensions at all, would do well to go for Mr. Nelson Bond's story of an archeologist who, discovering an amulet in an ancient Arabian tomb, is transferred by its magic powers back in time to the earliest days of Earth's history. There, with his fellow *Exiles of Time*, including a nice girl from Philadelphia, he makes a gallant effort to save a civilisation of 30,000 years ago from the destruction which threatens from a runaway comet, learning in the process the secrets of Lemuria—and, of course, getting the girl. It is a gusty tale, a mixture of science and myth: the idea, in fact, comes from Plato's *Timaeus*. But there is nothing classical about it; appropriately, it is set in very large type.

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