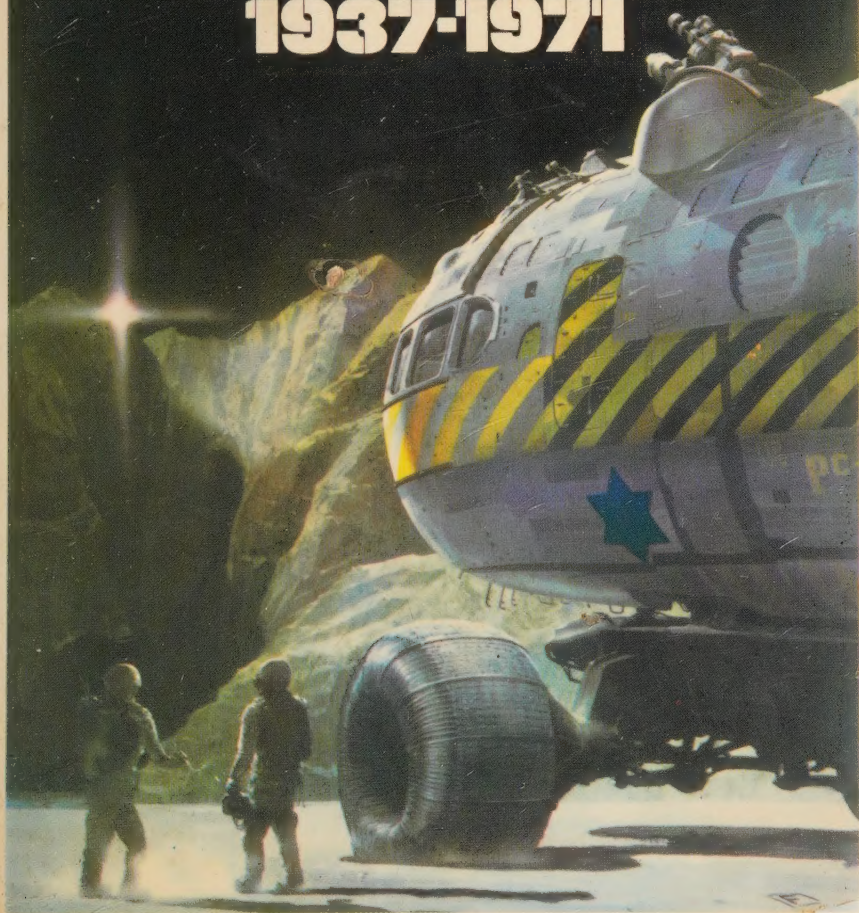


**THE
BEST OF
ARTHUR
C. CLARKE**

1937-1971



THE BEST OF ARTHUR C. CLARKE

(1937-1971)

Arthur C. Clarke

Travel by Wire (1937); *Retreat from Earth* (1938); *The Awakening* (1942); *Whacky* (1942); *Castaway* (1947); *History Lesson* (1949); *Hide and Seek* (1949); *Second Dawn* (1951); *The Sentinel* (1954); *The Star* (1955); *Refugee* (1955); *Venture to the Moon* (1956); *Into the Comet* (1960); *Summertime on Icarus* (1960); *Death and the Senator* (1961); *Hate* (1961); *Sunjammer* (1965); *A Meeting with Medusa* (1971).

The author of such science fiction classics as *Sands of Mars*, *Childhood's End* and the world-famous *2001: A Space Odyssey* is concerned with both the scientific and the metaphysical aspects of science fiction. A founder member of the British Interplanetary Society, Clarke originated the proposal for the use of satellites for communications: his technical knowledge is equalled only by his skill as a writer. These seventeen stories are chosen to show Clarke's development in both areas.

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'THE BEST OF ...' collections are intended to present the representative stories of the masters of science fiction in chronological order, their aim being to provide science fiction readers with a selection of short stories that demonstrate the authors' literary development and at the same time provide new readers with a sound introduction to their work.

The collections were compiled with the help and advice of the authors concerned, together with the invaluable assistance of numerous fans, without whose good work, time and patience they would not have been published.

In particular the advice of Roger Peyton, Gerald Bishop, Peter Weston and Leslie Flood is appreciated.

Angus Wells, Editor, 1973

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BEST OF ARTHUR C. CLARKE



1933: A SCIENCE-FICTION ODYSSEY

by

ARTHUR C. CLARKE

WHAT makes a writer tick? One element in his composition is certainly the desire to show off. The earliest memory of my schooldays is of standing in front of the class and spinning stories about prehistoric animals. In this I must have been encouraged by the village schoolmaster, Mr. Tipper. I have been lucky with my teachers; though some were better than others, I do not remember a bad one.

When I was about nine (on the other side of the Atlantic, Goddard had just launched his first liquid-fuelled rocket ...) Mr. Tipper felt that I needed wider academic horizons than could be provided by Bishops Lydeard, population *circa* 500. So I was transferred to Huish's Grammar School, Taunton, where I received my secondary education and remained until I entered the Civil Service in 1936 at the age of nineteen.

At Huish, under the influence of the English master Captain E. B. Mitford, I began to write sketches and short stories for the School Magazine. A third of a century later I was able to repay something of my debt by dedicating 'The Nine Billion Names of God' to 'Mitty, my first editor'.

I can still recall those editorial sessions back in the early 1930s. About once a week, after class, Mitty would gather his schoolboy staff together, and we would all sit around a table on which there was a large bag of toffees. Bright ideas were rewarded instantly; Mitty invented positive reinforcement years before B. F. Skinner. He also employed a heavy metre rule for *negative* reinforcement, but this was used only in class – never, so far as I recall, at editorial conferences.

My first printed words thus appeared in the *Huish Maga-*

zine, where I eventually published at least a dozen items, totalling several thousand words. Most of these pieces were only of ephemeral interest, being full of topical allusions which not even the author can now identify. However, even in those days my science-fictional tendencies were obvious, as will be seen from the following letter from 'Ex-Sixth Former' stationed at a torrid and high-altitude Outpost of Empire: Vrying Pan, British Malaria.

It is almost impossible to keep any liquid except under enormous pressure. However, with the powerful refrigerating plant at the rubber mines here it is possible to reduce water to its boiling point, which is a great convenience to us in the hot weather.

The precautions we have to take to preserve our lives are extraordinary. Our houses are built on the principle of the Dewar vacuum flask, to keep out the heat, and the outsides are silvered to reflect the sunlight . . . We have to take great care to avoid cutting ourselves in any way, for if this happens our blood soon boils and evaporates.

Electricity is very cheap here, as we can get large supplies from thermocouples. The hot end is in the sun, and the cold terminal in the boiler room at the mines, which is the coolest place in Vrying Pan . . .

However, I must leave off now as my ink has evaporated, in spite of the water-cooled jacket of my fountain pen.

This effort graced the Xmas 1933 issue of the *Huish Magazine* – which, for good measure, also contains two other short pieces, heavily disguised under the pseudonym 'Clericus'. They must mark my first appearance in print.

Even in 1933, I was obviously already writing about the Moon, and I know why. I had fallen under the spell of the old science-fiction pulps, and can still recall the very first

issue I ever owned. The cover of the March 1930 *Astounding Stories of Super Science*, containing Ray Cumming's 'Brigands of the Moon', is still clear and bright in my memory.

During my lunch hour I used to haunt Woolworth's, where issues of *Astounding*, *Amazing* and *Wonder* could be picked up for threepence. Much of the hard-earned money my widowed mother had saved for my food went on these magazines; I regard it as one of the best investments I ever made. I set myself the goal of obtaining a complete set of all the S.F. magazines, and had practically achieved this when the outbreak of war in 1939 caused a slight shift in priorities.

Half a lifetime later, I can still remember the ecstasy of receiving parcels – once even a *crate*! – of S.F. magazines I had bought for a few pence. Eventually I had a collection of three or four hundred magazines, which evaporated some time during the War. It would now be worth a small fortune.

The young readers of today, born into a world where many of the marvels of the 1930s have already come true, and where S.F. magazines, books and films are commonplace instead of rareties that had to be sought like gold, can scarcely imagine the impact of these old pulps. Of course, the literary standards were usually abysmal – but the stories were full of ideas, and amply evoked the famous 'sense of wonder' which is the goal of the best fiction. I see nothing incongruous in applying to those garish magazines Keats' immortal

*Charmed magic casements, opening on the foam
Of perilous sea, in faery lands forlorn.*

Soon after 1930 I came under the spell of a considerably more literate influence. In the public library at Minehead, the small West of England town where I was born, I discovered a copy of W. Olaf Stapledon's titanic *Last and First*

Men (1930). No book before or since ever had such an impact on me. The Stapledonian vistas of millions and hundreds of millions of years, the rise and fall of civilizations and entire races of men, changed my whole outlook on the universe and has influenced much of my writing ever since.

Twenty years later I was to meet Stapledon, and persuaded him to give a talk entitled 'Interplanetary Man' to the British Interplanetary Society, of which I was then chairman. His was one of the noblest and most civilized spirits I have ever encountered; I am glad that there is now a revival of interest in his work and thought.

But hard-cover books of S.F. were still very rare, and magazines were my mainstay. Through their correspondence columns I made many friends, in particular the English writer Eric Frank Russell, who encouraged my early efforts. It was thanks to Eric that I earned my first cash – as opposed to toffees – from writing. He used one of my ideas in a short story, and paid me handsomely for it. I wish I had kept his long, witty letters, written in the most beautiful hand I have ever seen. In this permissive age, most of them would now be quite printable – but, alas, they too were lost during the war years. Thank you, Eric, for your kindness to an annoyingly persistent schoolboy.

Science fiction has always encouraged an enormous amount of amateur writing, and there have been literally thousands of duplicated (sometimes printed) magazines put out by enthusiastic 'fans'. These have served a very useful purpose in providing launching pads for many professional writers in the field. The first stories I ever completed appeared in some of these magazines, and a few samples may be of interest now. If they do nothing else they may serve as a kind of absolute zero from which my later writing may be calibrated.

'The Awakening' appeared in the February 1942 issue

(No. 4) of *Zenith*, edited in Manchester by Harry Turner and Marion Eadie. A revised version was published in *Reach for Tomorrow*.

'Travel by Wire!' was published in the second issue (December 1937) of *Amateur Science Fiction Stories*, edited in Leeds by Douglas W. F. Mayer. 'Retreat From Earth' appeared in the third (and last!) issue, dated March 1938 – which also contained another story of mine, 'How We Went to Mars'.

'Whacky' appeared in *Fantast*, edited by Douglas Webster of Aberdeen, of July 1942 (Vol. 3, No. 2, whole number 14). The same issue contains my first serial, of interest only to S.F. fans: 'A Short History of Fantocracy'. I am happy to see how many of the characters therein are still active, thirty years later.

Incidentally, I have discovered with much interest that some of these ancient magazines contain perfectly dreadful pieces by a certain Ray Bradbury. I am keeping them carefully for purposes of blackmail.

Just before the War, the first British S.F. Magazine *Tales of Wonder* was put together by Walter H. Gillings. Walter did more than buy my first articles and stories – he gave me my first typewriter, which I carried home on a London bus from his home in Ilford. And he is the only editor I ever encountered who turned a story down, saying that it was too good for him – and a rival editor would pay more. The least I could do in gratitude was to dedicate my first collection, *Expedition to Earth*, to him.

But in spite of the traditions of Wells, Doyle, Haggard and Kipling, S.F. did not flourish in England and its spiritual home was still the United States – as in many ways it still is. I sold my first stories to John Campbell of *Astounding* (later *Analog*) during the closing months of the War, while I was in the Royal Air Force. His first purchase was 'Rescue Party' – though 'Loophole', sold a little later,

actually appeared first. At the time of these sales (1945) I was stationed just outside Stratford-on-Avon, and I remember thinking modestly that there was something singularly appropriate about this.

The stories that follow were written, therefore, during a period of thirty years from 1933 to 1963. They were selected by Sphere's editor Angus Wells from my six volumes of short stories, which contain virtually everything I have written in this genre.

These tales should speak for themselves and I do not think it is appropriate to comment further on them. However, there is an historical footnote to 'Death and the Senator' which is of some interest. This story was written in 1961, long before the great days of the U.S. space programme, and foretold an era when it had fallen on hard times – as has indeed happened. And now Nature has imitated Art, for this fictional account of a U.S. space committee hearing has *itself* been read as evidence to the House of Representatives Committee on Astronautics (March 14th, 1972)! I hasten to add that though I have known all the NASA Administrators, none of them is reflected in the character of Dr. Harkness.

And I suppose everyone knows what happened to 'The Sentinel', sixteen years after I wrote it at Christmas 1948. Those who would like detailed instructions for turning a 'glittering pyramid' into a black monolith will find them in *The Lost Worlds of 2001*.

ARTHUR C. CLARKE

Colombo, Sri Lanka
December 1972

TRAVEL BY WIRE!

You people can have no idea of the troubles and trials we had to endure before we perfected the radio-transporter, not that it's quite perfect even yet. The greatest difficulty, as it had been in television thirty years before, was improving definition, and we spent nearly five years over that little problem. As you will have seen in the Science Museum, the first object we transmitted was a wooden cube, which was assembled all right, only instead of being one solid block it consisted of millions of little spheres. In fact, it looked just like a solid edition of one of the early television pictures, for instead of dealing with the object molecule by molecule or better still electron by electron, our scanners took little chunks at a time.

This didn't matter for some things, but if we wanted to transmit objects of art, let alone human beings, we would have to improve the process considerably. This we managed to do by using the delta-ray scanners all round our subject, above, below, right, left, in front and behind. It was a lovely game synchronizing all six, I can tell you, but when it was done we found that the transmitted elements were ultra-microscopic in size, which was quite good enough for most purposes.

Then, when they weren't looking, we borrowed a guinea pig from the biology people on the 37th floor, and sent it through the apparatus. It came through in excellent condition, except for the fact it was dead. So we had to return it to its owner with a polite request for a post-mortem. They raved a bit at first, saying that the unfortunate creature had been inoculated with the only specimens of some germs

they'd spent months rearing from the bottle. They were so annoyed, in fact, that they flatly refused our request.

Such insubordination on the part of mere biologists was of course deplorable, and we promptly generated a high-frequency field in their laboratory and gave them all fever for a few minutes. The post-mortem results came up in half an hour, the verdict being that the creature was in perfect condition but had died of shock, with a rider to the effect that if we wanted to try the experiment again we should blindfold our victims. We were also told that a combination lock had been fitted to the 37th floor to protect it from the depredations of kleptomaniacal mechanics who should be washing cars in a garage. We could not let this pass, so we immediately X-rayed their lock and to their complete consternation told them what the key-word was.

That is the best of being in our line, you can always do what you like with the other people. The chemists on the next floor were our only serious rivals, but we generally came out on top. Yes, I remember that time they slipped some vile organic stuff into our lab. through a hole in the ceiling. We had to work in respirators for a month, but we had our revenge later. Every night after the staff had left, we used to send a dose of mild cosemics into the lab. and curdled all their beautiful precipitates, until one evening old Professor Hudson stayed behind and we nearly finished him off. But to get back to my story —

We obtained another guinea pig, chloroformed it, and sent it through the transmitter. To our delight, it revived. We immediately had it killed and stuffed for the benefit of posterity. You can see it in the museum with the rest of our apparatus.

But if we wanted to start a passenger service, this would never do — it would be too much like an operation to suit most people. However, by cutting down the transmitting time to a ten-thousandth of a second, and thus reducing the

shock, we managed to send another guinea pig in full possession of its faculties. This one was also stuffed.

The time had obviously come for one of us to try out the apparatus but as we realized what a loss it would be to humanity should anything go wrong, we found a suitable victim in the person of Professor Kingston, who teaches Greek or something foolish on the 197th floor. We lured him to the transmitter with a copy of *Homer*, switched on the field, and by the row from the receiver, we knew he'd arrived safely and in full possession of his faculties, such as they were. We would have liked to have had him stuffed as well, but it couldn't be arranged.

After that we went through in turns, found the experience quite painless, and decided to put the device on the market. I expect you can remember the excitement there was when we first demonstrated our little toy to the Press. Of course we had the dickens of a job convincing them that it wasn't a fake, and they didn't really believe it until they had been through the transporter themselves. We drew the line, though, at Lord Rosscastle, who would have blown the fuses even if we could have got him into the transmitter.

This demonstration gave us so much publicity that we had no trouble at all in forming a company. We bade a reluctant farewell to the Research Foundation, told the remaining scientists that perhaps one day we'd heap coals of fire on their heads by sending them a few millions, and started to design our first commercial senders and receivers.

The first service was inaugurated on May 10th, 1962. The ceremony took place in London, at the transmitting end, though at the Paris receiver there were enormous crowds watching to see the first passengers arrive, and probably hoping they wouldn't. Amid cheers from the assembled thousands, the Prime Minister pressed a button (which wasn't connected to anything), the chief engineer threw a switch (which was) and a large Union Jack faded

from view and appeared again in Paris, rather to the annoyance of some patriotic Frenchmen.

After that, passengers began to stream through at a rate which left the Customs officials helpless. The service was a great and instantaneous success, as we only charged £2 per person. This we considered very moderate, for the electricity used cost quite one-hundredth of a penny.

Before long we had services to all the big cities of Europe, by cable that is, not radio. A wired system was safer, though it was dreadfully difficult to lay polyaxial cables, costing £500 a mile, under the Channel. Then, in conjunction with the Post Office, we began to develop internal services between the large towns. You may remember our slogans 'Travel by Phone' and 'It's quicker by Wire' which were heard everywhere in 1963. Soon, practically everyone used our circuits and we were handling thousands of tons of freight per day.

Naturally, there were accidents, but we could point out that we had done what no Minister of Transport had ever done, reduced road fatalities to a mere ten thousand a year. We lost one client in six million, which was pretty good even to start with, though our record is even better now. Some of the mishaps that occurred were very peculiar indeed, and in fact there are quite a few cases which we haven't explained to the dependents yet, or to the insurance companies either.

One common complaint was earthing along the line. When that happened, our unfortunate passenger was just dissipated into nothingness. I suppose his or her molecules would be distributed more or less evenly over the entire earth. I remember one particularly gruesome accident when the apparatus failed in the middle of a transmission. You can guess the result . . . Perhaps even worse was what happened when two lines got crossed and the currents were mixed.

Of course, not all accidents were as bad as these. Sometimes, owing to a high resistance in the circuit, a passenger would lose anything up to five stone in transit, which generally cost us about £1000 and enough free meals to restore the missing enbonpoint. Fortunately, we were soon able to make money out of this affair, for fat people came along to be reduced to manageable dimensions. We made a special apparatus which transmitted massive dowagers round resistance coils and reassembled them where they started, minus the cause of the trouble. 'So quick, my dear, and *quite* painless! I'm *sure* they could take off that 150 pounds you want to lose in no time! Or is it 200?'

We also had a good deal of trouble through interference and induction. You see, our apparatus picked up various electrical disturbances and superimposed them on the object under transmission. As a result many people came out looking like nothing on earth and very little on Mars or Venus. They could usually be straightened out by the plastic surgeons, but some of the products had to be seen to be believed.

Fortunately these difficulties have been largely overcome now that we use the micro-beams for our carrier, though now and then accidents still occur. I expect you remember that big lawsuit we had last year with Lita Cordova, the television star, who claimed £1,000,000 damages from us for alleged loss of beauty. She asserted that one of her eyes had moved during a transmission, but I couldn't see any difference myself and nor could the jury, who had enough opportunity. She had hysterics in the court when our Chief Electrician went into the box and said bluntly, to the alarm of both side's lawyers, that if anything really *had* gone wrong with the transmission, Miss Cordova wouldn't have been able to recognize herself had any cruel person handed her a mirror.

Lots of people ask us when we'll have a service to Venus

or Mars. Doubtless that will come in time, but of course the difficulties are pretty considerable. There is so much sun static in space, not to mention the various reflecting layers everywhere. Even the micro-waves are stopped by the Appleton 'Q' layer at 100,000 km, you know. Until we can pierce that, Interplanetary shares are still safe.

Well, I see it's nearly 22, so I'd best be leaving. I have to be in New York by midnight. What's that? Oh no, I'm going by plane. *I* don't travel by wire! You see, I helped invent the thing!

Rockets for me! Good night!

RETREAT FROM EARTH

A GREAT many millions of years ago, when man was a dream of the distant future, the third ship to reach Earth in all history descended through the perpetual clouds on to what is now Africa, and the creatures it had carried across an unthinkable abyss of space looked out upon a world which would be a fit home for their weary race. But Earth was already inhabited by a great though dying people, and since both races were civilized in the true sense of the word, they did not go to war but made a mutual agreement. For those who then ruled Earth had once ruled everywhere within the orbit of Pluto, had planned always for the future and even at their end they had prepared Earth for the race that was to come after them.

So, forty million years after the last of the old ones had gone to his eternal rest, men began to rear their cities where once the architects of a greater race had flung their towers against the clouds. And in the long echoing centuries before the birth of man, the aliens had not been idle but had covered half the planet with their cities, filled with blind, fantastic slaves, and though man knew these cities, for they often caused him infinite trouble, yet he never suspected that all around him in the tropics an older civilization than his was planning busily for the day when it would once again venture forth upon the seas of space to regain its lost inheritance.

‘Gentlemen,’ said the President of the Council gravely, ‘I am sorry to say that we have received a severe setback in our plans to colonize the third planet. As you all know, we have for many years been working on that planet unknown

to its inhabitants, preparing for the day when we should take over complete control. We anticipated no resistance, for the people of Three are at a very primitive level of development, and possess no weapons which could harm us. Moreover, they are continually quarrelling among themselves owing to the extraordinary number of political groups or "nations" into which they are divided, a lack of unity which will no doubt be a considerable help to our plans.

'To obtain the fullest possible knowledge of the planet and its peoples, we have had several hundred investigators working on Three, a number in each important city. Our men have done very well, and thanks to their regular reports we now have a detailed knowledge of this strange world. In fact, until a few setas ago I would have said that we knew everything of importance concerning it, but now I find that we were very much mistaken.

'Our chief investigator in the country known as England, which has been mentioned here on a number of occasions, was that very intelligent young student, Cervac Theton, grandson of the great Vorac. He progressed splendidly with the English, a particularly guileless race it seems, and was soon accepted into their highest society. He even spent some time at one of their great seats of learning (so called) but soon left in disgust. Though it had nothing to do with his real purpose, this energetic young man also studied the wild animals of Three, for remarkable though it seems there are a great many strange and interesting creatures roaming freely over large areas of the planet. Some are actually dangerous to man, but he has conquered most of them and even exterminated some species. It was while studying these beasts that Cervac made the discovery which I fear may change our whole plan of action. But let Cervac speak for himself.'

The President threw a switch, and from concealed speakers Cervac Theton's voice rang out over that assembly

of the greatest brains of Mars.

‘— come to what is the most important part of this communication. For some time I have been studying the many wild creatures of this planet, purely for the sake of scientific knowledge. The animals of Three are divided into four main groups — mammals, fishes, reptiles and insects, and a number of lesser groups. There have been many representatives of the first three classes on our own planet, though of course there are none now, but as far as I know there have never been insects on our world at any time in its history. Consequently they attracted my attention from the first, and I made a careful study of their habits and structure.

‘You who have never seen them will have great difficulty in imagining what these creatures are like. There are millions of different types, and it would take ages to classify all of them, but they are mostly small animals with many jointed limbs and with a hard armoured body. They are usually very small, about half a zem in length, and are often winged. Most of them lay eggs and undergo a number of metamorphoses before they become perfect creatures. I am sending with this report a number of photographs and films which will give you a better idea of their infinite variety than any words of mine. I obtained most of my information on the subject from the literature which has been built up by thousands of patient students who have devoted their lives to watching insects at work. The inhabitants of Three have taken much interest in the creatures which share their world, and this, I think, is another proof that they are more intelligent than some of our scientists would have us believe.’

At this there were smiles in the audience, for the House of Theton had always been noted for its radical and unorthodox views.

‘In my studies I came across accounts of some extraordinary creatures which live in the tropical regions of the planet. They are called “termites” or “white ants” and live

in large, wonderfully organized communities. They even have cities – huge mounds, honey-combed with passages and made of exceedingly hard materials. They can perform prodigious feats of engineering, being able to bore through metals and glass, and they can destroy most of man's creations when they wish. They eat cellulose, that is, wood, and since man uses this material extensively he is always waging war on these destroyers of his possessions. Perhaps luckily for him, the termites have even deadlier enemies, the ants, which are a very similar type of creature. These two races have been at war for geological ages, and the outcome is still undecided.

'Although they are blind, the termites cannot endure light and so even when they venture from their cities they always keep under cover, making tunnels and cement tubes if they have to cross open country. They are wonderful engineers and architects and no ordinary obstacle will deflect them from their purpose. Their most remarkable achievement, however, is a biological one. From the same eggs they can produce half a dozen different types of specialized creature. Thus they can breed fighters with immense claws, soldiers which can spray poison over their opponents, workers which act as food stores by virtue of their immense distended stomachs and a number of other fantastic mutations. You will find a full account of them, as far as they are known to the naturalists of Three, in the books I am sending.

'The more I read of their achievements, the more I was impressed by the perfection of their social system. It occurred to me, as indeed it had to many previous students, that a termitary may be compared to a vast machine, whose component parts are not of metal but of protoplasm, whose wheels and cogs are separate insects, each with some pre-ordained role to perform. It was not until later that I found how near the truth this analogy was.

'Nowhere in the termitary is there any waste or disorder,

and everywhere there is mystery. As I considered the matter it seemed to me that the termites were much more worthy of our attention, from the purely scientific point of view, than man himself. After all, man is not so very different from ourselves, though I shall annoy many by saying so, yet these insects are utterly alien to us in every way. They work, live and die for the good of the state. To them the individual is nothing. With us, and with man, the state exists only for the individual. Who shall say which is right?

‘These problems so engrossed me that I eventually decided to study the little creatures myself with all the instruments at my command, instruments of which the naturalists of Three had never dreamt. So I selected a small uninhabited island in a lonely part of the Pacific, the greatest ocean of Three, where the strange mounds of the termites clustered thickly, and constructed on it a little metal building to serve as a laboratory. As I was thoroughly impressed by the creatures’ destructive powers, I cut a wide circular moat round the building, leaving enough room for my ship to land, and let the sea flow in. I thought that ten zets of water would keep them from doing any mischief. How foolish that moat looks now.

‘These preparations took several weeks for it was not very often that I was able to leave England. In my little space-yacht the journey from London to Termite Island took under half a sector so little time was lost in this way. The laboratory was equipped with everything I considered might be useful and many things for which I could see no conceivable use, but which might possibly be required. The most important instrument was a high-powered gamma-ray televisor which I hoped would reveal to me all the secrets hidden from ordinary sight by the walls of the termitary. Perhaps equally useful was a very sensitive psychometer, of the kind we use when exploring planets on which new types of mentalities may exist, and which we might not detect in

the ordinary way. The device could operate on any conceivable mind frequency, and at its highest amplification could locate a man several hundred miles away. I was certain that even if the termites possessed only the faintest glimmers of an utterly alien intelligence, I would be able to detect their mental processes.

‘At first I made relatively little progress. With the televisor I examined all the nearest termitaries, and fascinating work it was following the workers along the passages of their homes as they carried food and building materials hither and thither. I watched the enormous bloated queen in the royal nursery, laying her endless stream of eggs, one every few seconds, night and day, year after year. Although she was the centre of the colony’s activities, yet when I focused the psychometer on her the needles did not so much as flicker. The very cells of my body could do better than that! The monstrous queen was only a brainless mechanism, none the less mechanical because she was made of protoplasm, and the workers looked after her with the care we would devote to one of our useful robots.

‘For a number of reasons I had not expected the queen to be the ruling force of the colony, but when I began to explore with psychometer and televisor, nowhere could I discover any creature, any super-termite, which directed and supervised the operations of the rest. This would not have surprised the scientists of Three, for they hold that the termites are governed by instinct alone. But my instrument could have detected the nervous stimuli which constitute automatic reflex actions, and yet I found nothing. I would turn up the amplification to its utmost, put on a pair of those primitive but very useful “head-phones” and listen hour on hour. Sometimes there would be those faint characteristic cracklings we have never been able to explain, but generally the only sound was the subdued washing noise, like waves breaking on some far-off beach, caused

by the massed intellects of the planet reacting on my apparatus.

‘I was beginning to get discouraged when there occurred one of those accidents which happen so often in science. I was dismantling the instrument after another fruitless investigation when I happened to knock the little receiving loop so that it pointed to the ground. To my surprise the needles started flickering violently. By swinging the loop in the usual way I discovered that the exciting source lay almost directly underneath me, though at what distance I could not guess. In the phones was a continuous humming noise, interspersed with sudden flickerings. It sounded for all the world like any electric machine operating, and the frequency, one hundred thousand mega mega cycles, was not one on which minds have ever been known to function before. To my intense annoyance, as you can guess, I had to return to England at once, and so I could not do anything more at the time.

‘It was a fortnight before I could return to Termite Island, and in that time I had to overhaul my little space-yacht owing to an electrical fault. At some time in her history, which I know to have been an eventful one, she had been fitted with ray screens. They were, moreover, very good ray screens, much too good for a law-abiding ship to possess. I have every reason to believe, in fact, that more than once they have defied the cruisers of the Assembly. I did not much relish the task of checking over the complex automatic relay circuits, but at last it was done and I set off at top speed for the Pacific, travelling so fast that my bow wave must have been one continuous explosion. Unfortunately, I soon had to slow down again, for I found that the directional beam I had installed on the island was no longer functioning. I presumed that a fuse had blown, and had to take observations and navigate in the ordinary way. The accident was annoying but not alarming, and I finally

spiralled down over Termite Island with no premonition of danger.

‘I landed inside my little moat, and went to the door of the laboratory. As I spoke the key-word, the metal seal slid open and a tremendous blast of vapour gushed out of the room. I was nearly stupefied by the stuff, and it was some time before I recovered sufficiently to realize what had happened. When I regained my senses I recognized the smell of hydrogen cyanide, a gas which is instantly fatal to human beings but which only affects us after a considerable time.

‘At first I thought that there had been some accident in the laboratory, but I soon remembered that there were not enough chemicals to produce anything like the volume of gas that had gushed out. And in any case, what could possibly have produced such an accident?

‘When I turned to the laboratory itself, I had my second shock. One glance was sufficient to show that the place was in ruins. Not a piece of apparatus was recognizable. The cause of the damage was soon apparent – the power plant, my little atomic motor, had exploded. But why? Atomic motors do not explode without very good reason; it would be bad business if they did. I made a careful examination of the room and presently found a number of little holes coming up through the floor – holes such as the termites make when they travel from place to place. My suspicions, incredible though they were, began to be confirmed. It was not completely impossible that the creatures might flood my room with poisonous gas, but to imagine that they understood atomic motors – that was too much! To settle the matter I started hunting for the fragments of the generator, and to my consternation found that the synchronizing coils had been short-circuited. Still clinging to the shattered remnants of the osmium toroid were the jaws of the termite that had been sacrificed to wreck the motor . . .

‘For a long time I sat in the ship, considering these outstanding facts. Obviously, the damage had been wrought by the intelligence I had located for a moment on my last visit. If it were the termite ruler, and there was nothing else it could very well be, how did it come to possess its knowledge of atomic motors and the only way in which to wreck them? For some reason, possibly because I was prying too deeply into its secrets, it had decided to destroy me and my works. Its first attempt had been unsuccessful, but it might try again with better results, though I did not imagine that it could harm me inside the stout walls of my yacht.

‘Although my psychometer and televisior had been destroyed, I was determined not to be defeated so easily, and started hunting with the ship’s televisior, which though not made for this kind of work could do it very well. Since I lacked the essential psychometer it was some time before I found what I was looking for. I had to explore great sections of the ground with my instrument, focusing the view point through stratum after stratum and examining any suspicious rock that came into the field. When I was at a depth of nearly two hundred feet, I noticed a dark mass looming faintly in the distance, rather like a very large boulder embedded in the soil. But when I approached I saw with a great feeling of elation that it was no boulder, but a perfect sphere of metal, about twenty feet in diameter. My search had ended. There was a slight fading of the image as I drove the beam through the metal, and then on the screen lay revealed the lair of the super-termite.

‘I had expected to find some fantastic creature, perhaps a great naked brain with vestigial limbs, but at a glance I could see that there was no living thing in that sphere. From wall to wall that metal-enclosed space was packed with a maze of machinery, most of it very minute and almost unthinkable complex, and all of it clicking and buzzing with lightning-like rapidity. Compared to this miracle of electrical

engineering, our great television exchanges would seem the creations of children or savages. I could see myriads of tiny relays operating, director valves flashing intermittantly, and strangely shaped cams spinning among moving mazes of apparatus utterly unlike anything we have ever built. To the makers of this machinery, my atomic generator must have seemed a toy.

‘For perhaps two seconds I gazed in wonder at that amazing sight, and then, suddenly and incredibly, an obliterating veil of interference slashed down and the screen was a dancing riot of formless colour.

‘Here was something we have never been able to produce – a screen which the televisor could not penetrate. The power of this strange creature was even greater than I had imagined, and in the face of this latest revelation I no longer felt safe even in my ship. In fact, I had a sudden desire to put as many miles as possible between myself and Termite Island. This impulse was so strong that a minute later I was high over the Pacific, rising up through the stratosphere in the great ellipse which would curve down again in England.

‘Yes, you may smile or accuse me of cowardice, saying that my grandfather Vorac would not have done so – but listen.

‘I was about a hundred miles from the island, thirty miles high and already travelling at two thousand miles an hour when there came a sudden crashing of relays, and the low purr of the motors changed to a tremendous deep-throated roar as an overload was thrown on to them. A glance at the board showed me what had happened – the ray screens were on, flaring beneath the impact of a heavy induction beam. But there was comparatively little power behind the beam, though had I been nearer it would have been a very different tale, and my screens dissipated it without much trouble. Nevertheless, the occurrence gave me an unpleasant

shock for the moment, until I remembered that old trick of electrical warfare and threw the full field of my geodesic generators into the beam. I switched on the televisior just in time to see the incandescent fragments of Termite Island fall back into the Pacific . . .

‘So I returned to England, with one problem solved and a dozen greater ones formulated. How was it that the Termite-brain, as I supposed the machine to be, had never revealed itself to humans? They have often destroyed the homes of its peoples, but as far as I know it has never retaliated. Yet directly I appeared it attacked me, though I was doing it no harm! Perhaps, by some obscure means, it knew that I was not a man, but an adversary worthy of its powers. Or perhaps, though I do not put the suggestion seriously, it is a kind of guardian protecting Three from invaders such as ourselves.

‘Somewhere there is an inconsistency that I cannot understand. On the one hand we have that incredible intelligence possessing much, if not all of our knowledge, while on the other are the blind, relatively helpless insects waging an endless war with puny weapons against enemies their ruler could exterminate instantly and without effort. Behind this mad system there must be a purpose, but it is beyond my comprehension. The only rational explanation I can conceive is that for most of the time the termite brain is content to let its subjects go their own, mechanical ways, and that only very seldom, perhaps once in an age, does it take an active part in guiding them. As long as it is not seriously interfered with, it is content to let man do what he likes. It may even take a benevolent interest in him and his works.

‘Fortunately for us, the super-termite is not invulnerable. Twice it miscalculated in its dealings with me, and the second time cost it its existence – I cannot say life. I am confident that we can overcome the creature, for it, or others like it, still control the remaining billions of the race.

I have just returned from Africa, and termites there are still organized as they have always been. On this excursion I did not leave my ship, or even land. I believe I have incurred the enmity of an entire race and I am taking no chances. Until I have an armoured cruiser and a staff of expert biologists, I am leaving the termites strictly alone. Even then I shall not feel quite safe, for there may be yet more powerful intelligences on Three than the one I encountered. That is a risk we must take, for unless we can defeat these beings, Planet Three will never be safe for our kind.'

The President cut off the record and turned to the waiting assembly.

'You have heard Theton's report,' he said, 'I appreciate its importance and at once sent a heavy cruiser to Three. As soon as it arrived, Theton boarded it and left for the Pacific.

'That was two days ago. Since then I have heard from neither Theton nor the cruiser, but I do know this :

'An hour after the ship left England, we picked up the radiations from her screens, and in a very few seconds other disturbances – cosmics, ultra-cosmics, induction and tremendous long-wave, low quantum radiations such as we have never used in battle – began to come through in ever-increasing quantities. This lasted for nearly three minutes, when suddenly there came one titanic blast of energy, lasting for a fraction of a second and then – nothing. That final burst of power could have been caused by nothing less than the detonation of an entire atomic generating plant, and must have jarred Three to its core.

'I have called this meeting to put the facts of the matter before you and to ask you to vote on the subject. Shall we abandon our plans for Three, or shall we send one of our most powerful super-dreadnoughts to the planet? One ship could do as much as an entire section of the Fleet in this matter, and would be safe, in case . . . but I cannot imagine

any power which could defeat such a ship as our "Zuranther". Will you please register your votes in the usual way? It will be a great setback if we cannot colonize Three, but it is not the only planet in the system, though it is the fairest.'

There came subdued clicks and a faint humming of motors as the councillors pressed their coloured buttons, and on the television screen appeared the words: For 967; Against 233.

'Very well, the "Zuranther" will leave at once for Three. This time we will follow her movements with the televisor and then if anything does go wrong, we shall at least obtain some idea of the weapons the enemy uses.'

Hours later the tremendous mass of the flagship of the Martian fleet dropped thunderously through the outer reaches of Earth's atmosphere towards the far-off waters of the Pacific. She fell in the heart of a tornado, for her captain was taking no chances and the winds of the stratosphere were being annihilated by her flaming ray screens.

But on a tiny island far over the eastern horizon, the termites had been preparing for the attack they knew must come, and strange, fragile mechanisms had been erected by myriad blind and toiling insects. The great Martian warship was two hundred miles away when her captain located the island in his televisor. His finger reached towards the button which would start the enormous ray generators, but swift as he was the almost instant acting relays of the termite mind were far swifter. Though, in any case, the outcome would have been the same.

The great spherical screens did not flare even once as the enemy struck home. Their slim rapier of pure heat was driven by only a score of horse-power, while behind the shields of the warship were a thousand million. But the feeble heat beam of the termites never passed through those screens – it reached out through hyperspace to gnaw at the very vitals of the ship. The Martians could not check an

enemy who struck from within their defences, an enemy to whom a sphere was no more a barrier than a hollow ring.

The termite rulers, those alien beings from outer space, had kept their agreement with the old lords of earth, and had saved man from the danger his ancestors had long ago foreseen.

But the watching assembly knew only that the screens of the ship which had been blazing fiercely one moment had erupted in a hurricane of flame and a numbing concussion of sound, while for a thousand miles around fragments of white-hot metal were dropping from the heavens.

Slowly the President turned to face the Council and whispered in a low, strained voice, 'I think it had better be planet Two, after all.'

THE AWAKENING

THE Master wondered whether he would dream. That was the only thing he feared, for in a sleep that lasts no more than a night dreams may come that can shatter the mind – and he was to sleep for a hundred years.

He remembered the day, still only a few months ago, when a frightened doctor had said, ‘Sir, your heart is failing. You have less than a year to live.’ He was not afraid of death, but the thought that it had come upon him in the full flower of his intellect, while his work was still half finished, filled him with a baffled fury. ‘And there is nothing you can do?’ he asked. ‘No, Sir, we have been working on artificial hearts for a hundred years. In another century, perhaps, it might be done.’ ‘Very well,’ he had replied coldly. ‘I shall wait another century. You will build me a place where my body will not be disturbed, and then you will put me to sleep by freezing or any other means. That, at least, I know you can do.’

He had watched the building of the tomb, in a secret place above the snow-line of Everest. Only the chosen few must know where the Master was to sleep, for there were many millions in the world who would have sought out his body to destroy it. The secret would be preserved down the generations until the day when man’s science had conquered the diseases of the heart. Then the Master would be awakened from his sleep.

He was still conscious when they laid him on the couch in the central chamber, though the drugs had already dimmed his senses. He heard them close the steel doors against their rubber gaskets, and even fancied he could

hear the hiss of the pumps which would withdraw the air from around him, and replace it with sterile nitrogen. Then he slept, and in a little while the world forgot the Master.

He slept the hundred years, though rather before that time the discovery he had been awaiting was made. But no one awakened him, for the world had changed since his going and now there were none who would have wished to see him return. His followers had died and mysteriously, the secret of his resting place was lost. For a time the legend of the Master's tomb persisted, but soon it was forgotten. So he slept.

After what by some standards would have been a little while, the earth's crust decided that it had borne the weight of the Himalayas for long enough. Slowly the mountains dropped, tilting the southern plains of India towards the sky. And presently the plateau of Ceylon was the highest point on the surface of the globe, and the ocean above Everest was five and a half miles deep. The Master would not be disturbed by his enemies, or his friends.

Slowly, patiently, the silt drifted down through the towering ocean heights on to the wreck of the Himalayas. The blanket that would some day be chalk began to thicken at the rate of not a few inches every century. If one had returned some time later, one might have found that the sea bed was no longer five miles down, or even four, or three.

Then the land tilted again, and a mighty range of limestone mountains towered where once had been the oceans of Tibet. But the Master knew nothing of this, nor was his sleep disturbed when it happened again ... and again ... and again ...

Now the rain and rivers were washing away the chalk and carrying it out to the new oceans, and the surface was moving down towards the buried tomb. Slowly the miles of rock were washed away, until at last the metal sphere which housed the Master's body returned once more to the light

of day – though to a day much longer, and much dimmer, than it had been when the Master closed his eyes. And presently the scientists found him, on a pedestal of rock jutting high above an eroded plain. Because they did not know the secret of the tomb, it took them, for all their wisdom, thirty years to reach the chamber where he slept.

The Master's mind awoke before his body. As he lay powerless, unable even to lift his leaden eyelids, memory came flooding back. The hundred years were safely behind him – his desperate gamble had succeeded! He felt a strange elation, and a longing to see the new world that must have arisen while he lay within his tomb.

One by one, his senses returned. He could feel the hard surface on which he was lying: now a gentle current of air drifted across his brow. Presently he was aware of sounds – faint clickings and scratchings all around him. For a moment he was puzzled: then he realized that the surgeons must be putting their instruments away. He had not yet the strength to open his eyes, so he lay and waited, wondering.

Would men have changed much? Would his name still be remembered among them? Perhaps it would be better if it were not – though he had feared the hatred of neither men nor nations. He had never known their love. Momentarily he wondered if any of his friends might have followed him, but he knew there would be none. When he opened his eyes, all the faces before him would be strange. Yet he longed to see them, to read the expressions they would hold as he awakened from his sleep.

Strength returned. He opened his eyes. The light was gentle, and he was not dazzled, but for a while everything was blurred and misty. He could distinguish figures standing round, but though they seemed strange he could not see them clearly.

Then the Master's eyes came into focus, and as they brought their message to his mind he screamed once, feebly,

and died for ever. For in the last moment of his life, as he saw what stood around him, he knew that the long war between Man and Insect was ended – and that Man was not the victor.

WHACKY

THE telephone honked melodiously. He picked it up and after a moment's hesitation asked 'Hello - is that me?' The answer he had been fearing came back. 'You, it is. Who are you?' He sighed: argument was useless - besides he knew he was in the wrong. 'All right,' he said wearily. 'You win.' A sudden purple twinge of toothache nearly choked him for a moment and he added hopelessly: 'Don't forget to have that stopping seen to this afternoon.' 'Ouch! as if I would,' growled the voice testily. There was a pause. 'Well, what do you want me to do now?' he asked at last. The reply, though half expected, was chilling. 'Do? It doesn't matter. You just *aren't*!'

'The amazing affair of the Elastic Sided Eggwhisk,' said the Great Detective, 'would no doubt have remained unsolved to this very day, if by great misfortune it had ever occurred. The fact that it didn't I count as one of my luckiest escapes.'

Those of us who possessed heads nodded in agreement.

He paused to drain the sump of his hookah, then continued.

'But even that fades into insignificance before the horrible tragedy that occurred in the House Where the Aspidistra Ran Amok. Fortunately I was not born at the time: otherwise I should certainly have been one of the victims.'

We shuddered in assent. Some of us had been there. Some of us were still there.

'Weren't you connected with the curious case of the Camphorated Kipper?'

He coughed deprecatingly.

‘Intimately. I *was* the Camphorated Kipper.’

At this point two men arrived to carry me back to the taxidermist’s, so I cannot tell you any more.

‘Phew!’ said the man in the pink silk pyjamas. ‘I had a horrid dream last night!’

‘Oh?’ said the other disinterestedly.

‘Yes – I thought that my wife had poisoned me for the insurance. It was so vivid I was mighty glad when I woke up.’

‘Indeed?’ said his companion politely. ‘And just *where* do you think you are right now?’

CASTAWAY

‘Most of the matter in the universe is at temperatures so high that no chemical compounds can exist, and the atoms themselves are stripped of all but their inner electron screens. Only on those incredibly rare bodies known as planets can the familiar elements and their combinations exist and, in all still rarer cases, give rise to the phenomenon known as life.’ – *Practically any astronomy book of the early 20th Century.*

THE storm was still rising. He had long since ceased to struggle against it, although the ascending gas streams were carrying him into the bitterly cold regions ten thousand miles above his normal level. Dimly he was aware of his mistake: he should never have entered the area of disturbance, but the spot had developed so swiftly that there was now no chance of escape. The million-miles-an-hour wind had seized him as it rose from the depths and was carrying him up the great funnel it had torn in the photosphere – a tunnel already large enough to engulf a hundred worlds.

It was very cold. Around him carbon vapour was condensing in clouds of incandescent dust, swiftly torn away by the raging winds. This was something he had never met before, but the short-lived particles of solid matter left no sensation as they whipped through his body. Presently they were no more than glowing streamers far below, their furious movement foreshortened to a gentle undulation.

He was now at a truly enormous height, and his velocity showed no signs of slackening. The horizon was almost fifty thousand miles away, and the whole of the great spot

lay visible beneath. Although he possessed neither eyes nor organs of sight, the radiation pattern sweeping through his body built up a picture of the awesome scene below. Like a great wound through which the Sun's life was ebbing into space, the vortex was now thousands of miles deep. From one edge a long tongue of flame was reaching out to form a half-completed bridge, defying the gales sweeping vertically past it. In a few hours, if it survived, it might span the abyss and divide the spot in twain. The fragments would drift apart, the fires of the photosphere would overwhelm them, and soon the great globe would be unblemished again.

The Sun was still receding, and gradually into his slow, dim consciousness came the understanding that he could never return. The eruption that had hurled him into space had not given him sufficient velocity to escape forever, but a second giant force was beginning to exert its power. All his life he had been subjected to the fierce bombardment of solar radiation, pouring upon him from all directions. It was doing so no longer. The Sun now lay far beneath, and the force of its radiation was driving him out into space like a mighty wind. The cloud of ions that was his body, more tenuous than air, was falling swiftly into the outer darkness.

Now the Sun was a globe of fire shrinking far behind, and the great spot no more than a black stain near the centre of its disc. Ahead lay darkness, utterly unrelieved, for his senses were far too coarse ever to detect the feeble light of the stars or the pale gleam of the circling planets. The only course of light he could ever know was dwindling from him. In a desperate effort to conserve his energy, he drew his body together into a tight, spherical cloud. Now he was almost as dense as air, but the electrostatic repulsion between his billions of constituent ions was too great for further concentration. When at last his strength weakened,

they would disperse into space and no trace of his existence would remain.

He never felt the increasing gravitational pull from far ahead, and was unconscious of his changing speed. But presently the first faint intimations of the approaching magnetic field reached his consciousness and stirred it into sluggish life. He strained his senses out into the darkness, but to a creature whose home was the photosphere of the Sun the light of all other bodies was billions of times too faint even to be glimpsed, and the steadily strengthening field through which he was falling was an enigma beyond the comprehension of his rudimentary mind.

The tenuous outer fringes of the atmosphere checked his speed, and he fell slowly towards the invisible planet. Twice he felt a strange, tearing wrench as he passed through the ionosphere; then, no faster than a falling snowflake, he was drifting down through the cold, dense gas of the lower air. The descent took many hours and his strength was waning when he came to rest on a surface hard beyond anything he had ever imagined.

The waters of the Atlantic were bathed with brilliant sunlight, but to him the darkness was absolute save for the faint gleam of the infinitely distant Sun. For aeons he lay, incapable of movement, while the fires of consciousness burned lower within him and the last remnants of his energy ebbed away into the inconceivable cold.

It was long before he noticed the strange new radiation pulsing far off in the darkness – radiation of a kind he had never experienced before. Sluggishly he turned his mind towards it, considering what it might be and whence it came. It was closer than he had thought, for its movement was clearly visible and now it was climbing into the sky, approaching the Sun itself. But this was no second sun, for the strange illumination was waxing and waning, and only for a fraction of a cycle was it shining full upon him.

Nearer and nearer came that enigmatic glare; and as the throbbing rhythm of its brilliance grew fiercer he became aware of a strange, tearing resonance that seemed to shake the whole of his being. Now it was beating down upon him like a flail, tearing into his vitals and loosening his last hold on life itself. He had lost all control over the outer regions of his compressed but still enormous body.

The end came swiftly. The intolerable radiance was directly overhead, no longer pulsing but pouring down upon him in one continuous flood. Then there was neither pain nor wonder, nor the dull longing for the great golden world he had lost forever . . .

From the streamlined fairing beneath the great flying-wing, the long pencil of the radar beam was sweeping the Atlantic to the horizon's edge. Spinning in synchronism on the Plan Position Indicator, the faintly visible line of the time-base built up a picture of all that lay beneath. At the moment the screen was empty, for the coast of Ireland was more than three hundred miles away. Apart from an occasional brilliant blue spot – which was all that the greatest surface vessel became from fifty thousand feet – nothing would be visible until, in three hours' time, the eastern seaboard of America began to drift into the picture.

The navigator, checking his position continually by the North Atlantic radio lattice, seldom had any need for this part of the liner's radar. But to the passengers, the big skiatron indicator on the promenade deck was a source of constant interest, especially when the weather was bad and there was nothing to be seen below but the undulating hills and valleys of the cloud ceiling. There was still something magical, even in this age, about a radar landfall. No matter how often one had seen it before, it was fascinating to watch the pattern of the coastline forming on the screen, to pick out the harbours and the shipping and, presently, the hills

and rivers and lakes of the land beneath.

To Edward Lindsey, returning from a week's leave in Europe, the Plan Position Indicator had a double interest. Fifteen years ago, as a young Coastal Command radio observer in the War of Liberation, he had spent long and tiring hours over these same waters, peering into a primitive forerunner of the great five-foot screen before him. He smiled wryly as his mind went back to those days. What would he have thought then, he wondered, if he could have seen himself as he was now, a prosperous accountant, travelling in comfort ten miles above the Atlantic at almost the velocity of sound? He thought also of the rest of S for Sugar's crew, and wondered what had happened to them in the intervening years.

At the edge of the scan, just crossing the three-hundred-mile range circle, a faint patch of light was beginning to drift into the picture. That was strange: there was no land there, for the Azores were further to the south. Besides, this seemed too ill-defined to be an island. The only thing it could possibly be was a storm-cloud heavy with rain.

Lindsey walked to the nearest window and looked out. The weather was extraordinarily fine. Far below, the waters of the Atlantic were crawling eastward towards Europe; even down to the horizon the sky was blue and cloudless.

He went back to the P.P.I. The echo was certainly a very curious one, approximately oval and as far as he could judge about ten miles long, although it was still too far away for accurate measurement. Lindsey did some rapid mental arithmetic. In twenty-five minutes it should be almost underneath them, for it was neatly bisected by the bright line that represented the aircraft's heading. Track? Course? Lord, how quickly one forgot that sort of thing! But it didn't matter – the wind could make little difference at the speed they were travelling. He would come back and

have a look at it then, unless the gang in the bar got hold of him again.

Twenty minutes later he was even more puzzled. The tiny blue oval of light gleaming on the dark face of the screen was now only fifty miles away. If it were indeed a cloud, it was the strangest one he had ever seen. But the scale of the picture was still too small for him to make out any details.

The main controls of the indicator were safely locked away beneath the notice which read: PASSENGERS ARE REQUESTED NOT TO PLACE EMPTY GLASSES ON THE SKIATRON. However, one control had been left for the use of all comers. A massive three-position switch – guaranteed unbreakable – enabled anyone to select the tube's three different ranges: three hundred, fifty, and ten miles. Normally the three-hundred-miles picture was used, but the more restricted fifty-mile scan gave much greater detail and was excellent for sightseeing overland. The ten-mile range was quite useless and no one knew why it was there.

Lindsey turned the switch to 50, and the picture seemed to explode. The mysterious echo, which had been nearing the screen's centre, now lay at its edge once more, enlarged six-fold. Lindsey waited until the afterglow of the old picture had died away; then he leaned over and carefully examined the new.

The echo almost filled the gap between the forty- and fifty-mile range circles, and now that he could see it clearly its strangeness almost took his breath away. From its centre radiated a curious network of filaments, while at its heart glowed a bright area perhaps two miles in length. It could only be fancy – yet he could have sworn that the central spot was pulsing very slowly.

Almost unable to believe his eyes, Lindsey stared into the screen. He watched in hypnotized fascination until the

oval mist was less than forty miles away; then he ran to the nearest telephone and called for one of the ship's radio officers. While he was waiting, he went again to the observation port and looked out at the ocean beneath. He could see for at least a hundred miles – but there was absolutely nothing there but the blue Atlantic and the open sky.

It was a long walk from the control room to the promenade deck, and when Sub-Lieutenant Armstrong arrived, concealing his annoyance beneath a mask of polite but not obsequious service, the object was less than twenty miles away. Lindsey pointed to the skiatron.

'Look!' he said simply.

Sub-Lieutenant Armstrong looked. For a moment there was silence. Then came a curious, half-strangled ejaculation and he jumped back as if he had been stung. He leaned forward again and rubbed at the screen with his sleeve as if trying to remove something that shouldn't be there. Stopping himself in time, he grinned foolishly at Lindsey. Then he went to the observation window.

'There's nothing there. I've looked,' said Lindsey.

After the initial shock, Armstrong moved with commendable speed. He ran back to the skiatron, unlocked the controls with his master key and made a series of swift adjustments. At once the time-base began to whirl round at a greatly increased speed, giving a more continuous picture than before.

It was much clearer now. The bright nucleus *was* pulsating, and faint knots of light were moving slowly outward along the radiating filaments. As he stared, fascinated, Lindsey suddenly remembered a glimpse he had once of an amoeba under the microscope. Apparently the same thought had occurred to the Sub-Lieutenant.

'It – it looks alive!' he whispered incredulously.

'I know,' said Lindsey. 'What do you think it is?'

The other hesitated for a while. 'I remember reading

once that Appleton or someone had detected patches of ionization low down in the atmosphere. That's the only thing it can be.'

'But its structure! How do you explain that?'

The other shrugged his shoulders. 'I can't,' he said bluntly.

It was vertically beneath them now, disappearing into the blind area at the centre of the screen. While they were waiting for it to emerge again they had another look at the ocean below. It was uncanny; there was still absolutely nothing to be seen. But the radar could not lie. Something *must* be there —

It was fading fast when it reappeared a minute later, fading as if the full power of the radar transmitter had destroyed its cohesion. For the filaments were breaking up, and even as they watched the ten-mile-long oval began to disintegrate. There was something awe-inspiring about the sight, and for some unfathomable reason Lindsey felt a surge of pity, as though he were witnessing the death of some gigantic beast. He shook his head angrily, but he could not get the thought out of his mind.

Twenty miles away, the last traces of ionization were dispersing to the winds. Soon eye and radar screen alike saw only the unbroken waters of the Atlantic rolling endlessly eastwards as if no power could ever disturb them.

And across the screen of the great indicator, two men stared speechlessly at one another, each afraid to guess what lay in the other's mind.

HISTORY LESSON

No one could remember when the tribe had begun its long journey. The land of great rolling plains that had been its first home was now no more than a half-forgotten dream.

For many years Shann and his people had been fleeing through a country of low hills and sparkling lakes, and now the mountains lay ahead. This summer they must cross them to the southern lands. There was little time to lose. The white terror that had come down from the Poles, grinding continents to dust and freezing the very air before it, was less than a day's march behind.

Shann wondered if the glaciers could climb the mountains ahead, and within his heart he dared to kindle a little flame of hope. This might prove a barrier against which even the remorseless ice would batter in vain. In the southern lands of which the legends spoke, his people might find refuge at last.

It took weeks to discover a pass through which the tribe and the animals could travel. When midsummer came, they had camped in a lonely valley where the air was thin and the stars shone with a brilliance no one had ever seen before.

The summer was waning when Shann took his two sons and went ahead to explore the way. For three days they climbed, and for three nights slept as best they could on the freezing rocks, and on the fourth morning there was nothing ahead but a gentle rise to a cairn of grey stones built by other travellers, centuries ago.

Shann felt himself trembling, and not with cold, as they walked towards the little pyramid of stones. His sons had fallen behind. No one spoke, for too much was at stake. In

a little while they would know if all their hopes had been betrayed.

To east and west, the wall of mountains curved away as if embracing the land beneath. Below lay endless miles of undulating plain, with a great river swinging across it in tremendous loops. It was a fertile land; one in which the tribe could raise crops knowing that there would be no need to flee before the harvest.

Then Shann lifted his eyes to the south, and saw the doom of all his hopes. For there at the edge of the world glimmered that deadly light he had seen so often to the north – the glint of ice below the horizon.

There was no way forward. Through all the years of flight, the glaciers from the south had been advancing to meet them. Soon they would be crushed beneath the moving walls of ice . . .

Southern glaciers did not reach the mountains until a generation later. In that last summer the sons of Shann carried the sacred treasures of the tribe to the lonely cairn overlooking the plain. The ice that had once gleamed below the horizon was now almost at their feet. By spring it would be splintering against the mountain walls.

No one understood the treasures now. They were from a past too distant for the understanding of any man alive. Their origins were lost in the mists that surrounded the Golden Age, and how they had come at last into the possession of this wandering tribe was a story that now would never be told. For it was the story of a civilization that had passed beyond recall.

Once, all these pitiful relics had been treasured for some good reason, and now they had become sacred though their meaning had long been lost. The print in the old books had faded centuries ago though much of the lettering was still visible – if there had been any to read it. But many gen-

erations had passed since anyone had had a use for a set of seven-figure logarithms, an atlas of the world, and the score of Sibelius' Seventh Symphony printed, according to the flyleaf, by H. K. Chu and Sons, at the City of Peking in the year 2371 A.D.

The old books were placed reverently in the little crypt that had been made to receive them. There followed a motley collection of fragments – gold and platinum coins, a broken telephoto lens, a watch, a coldlight lamp, a microphone, the cutter from an electric razor, some midget radio tubes, the flotsam that had been left behind when the great tide of civilization had ebbed forever.

All these treasures were carefully stowed away in their resting place. Then came three more relics, the most sacred of all because the least understood.

The first was a strangely shaped piece of metal, showing the colouration of intense heat. It was, in its way, the most pathetic of all these symbols from the past, for it told of man's greatest achievement and of the future he might have known. The mahogany stand on which it was mounted bore a silver plate with the inscription :

Auxiliary Igniter from Starboard Jet
Spaceship 'Morning Star'
Earth-Moon, A.D. 1985

Next followed another miracle of the ancient science – a sphere of transparent plastic with strangely shaped pieces of metal imbedded in it. At its centre was a tiny capsule of synthetic radio-element, surrounded by the converting screens that shifted its radiation far down the spectrum. As long as the material remained active, the sphere would be a tiny radio transmitter, broadcasting power in all directions. Only a few of these spheres had ever been made. They had been designed as perpetual beacons to mark the orbits

of the asteroids. But man had never reached the asteroids and the beacons had never been used.

Last of all was a flat, circular tin, wide in comparison with its depth. It was heavily sealed, and rattled when shaken. The tribal lore predicted that disaster would follow if it was ever opened, and no one knew that it held one of the great works of art of nearly a thousand years before.

The work was finished. The two men rolled the stones back into place and slowly began to descend the mountain-side. Even to the last, man had given some thought to the future and had tried to preserve something for posterity.

That winter the great waves of ice began their first assault on the mountains, attacking from north and south. The foothills were overwhelmed in the first onslaught, and the glaciers ground them into dust. But the mountains stood firm, and when the summer came the ice retreated for a while.

So, winter after winter, the battle continued, and the roar of the avalanches, the grinding of rock and the explosions of splintering ice filled the air with tumult. No war of man's had been fiercer than this, and even man's battles had not quite engulfed the globe as this had done.

At last the tidal waves of ice began to subside and to creep slowly down the flanks of the mountains they had never quite subdued. The valleys and passes were still firmly in their grip. It was stalemate. The glaciers had met their match, but their defeat was too late to be of any use to man.

So the centuries passed, and presently there happened something that must occur once at least in the history of every world in the universe, no matter how remote and lonely it may be.

The ship from Venus came five thousand years too late, but its crew knew nothing of this. While still many millions of

miles away, the telescopes had seen the great shroud of ice that made Earth the most brilliant object in the sky next to the sun itself.

Here and there the dazzling sheet was marred by black specks that revealed the presence of almost buried mountains. That was all. The rolling oceans, the plains and forests, the deserts and lakes – all that had been the world of man was sealed beneath the ice, perhaps forever.

The ship closed in to Earth and established an orbit less than a thousand miles away. For five days it circled the planet, while cameras recorded all that was left to see and a hundred instruments gathered information that would give the Venusian scientists many years of work.

An actual landing was not intended. There seemed little purpose in it. But on the sixth day the picture changed. A panoramic monitor, driven to the limit of its amplification, detected the dying radiation of the five-thousand-year-old beacon. Through all the centuries, it had been sending out its signals with everfailing strength as its radioactive heart steadily weakened.

The monitor locked on the beacon frequency. In the control room, a bell clamoured for attention. A little later, the Venusian ship broke free from its orbit and slanted down towards Earth, towards a range of mountains that still towered proudly above the ice, and to a cairn of grey stones that the years had scarcely touched . . .

The great disc of the sun blazed fiercely in a sky no longer veiled with mist, for the clouds that had once hidden Venus had now completely gone. Whatever force had caused the change in the sun's radiation had doomed one civilization, but had given birth to another. Less than five thousand years before, the half-savage people of Venus had seen sun and stars for the first time. Just as the science of Earth had begun with astronomy, so had that of Venus, and on

the warm, rich world that man had never seen progress had been incredibly rapid.

Perhaps the Venusians had been lucky. They never knew the Dark Age which had held man enchained for a thousand years. They missed the long detour into chemistry and mechanics but came at once to the more fundamental laws of radiation physics. In the time that man had taken to progress from the Pyramids to the rocket-propelled spaceship, the Venusians had passed from the discovery of agriculture to antigravity itself – the ultimate secret that man had never learned.

The warm ocean that still bore most of the young planet's life rolled its breakers languidly against the sandy shore. So new was this continent that the very sands were coarse and gritty. There had not yet been time enough for the sea to wear them smooth.

The scientists lay half in the water, their beautiful reptilian bodies gleaming in the sunlight. The greatest minds of Venus had gathered on this shore from all the islands of the planet. What they were going to hear they did not know, except that it concerned the Third World and the mysterious race that had peopled it before the coming of the ice.

The Historian was standing on the land, for the instruments he wished to use had no love of water. By his side was a large machine which attracted many curious glances from his colleagues. It was clearly concerned with optics, for a lens system projected from it towards a screen of white material a dozen yards away.

The Historian began to speak. Briefly he recapitulated what little had been discovered concerning the Third Planet and its people.

He mentioned the centuries of fruitless research that had failed to interpret a single word of the writings of Earth. The planet had been inhabited by a race of great technical ability. That, at least, was proved by the few pieces of

machinery that had been found in the cairn upon the mountain.

'We do not know why so advanced a civilization came to an end,' he observed. 'Almost certainly, it had sufficient knowledge to survive an Ice Age. There must have been some other factor of which we know nothing. Possibly disease or racial degeneration may have been responsible. It has been suggested that the tribal conflicts endemic to our own species in prehistoric times may have continued on the Third Planet after the coming of technology.'

'Some philosophers maintain that knowledge of machinery does not necessarily imply a high degree of civilization, and it is theoretically possible to have wars in a society possessing mechanical power, flight, and even radio. Such a conception is alien to our thoughts, but we must admit its possibility. It would certainly account for the downfall of the lost race.'

'It has always been assumed that we should never know anything of the physical form of the creatures who lived on Planet Three. For centuries our artists have been depicting scenes from the history of the dead world, peopling it with all manner of fantastic beings. Most of these creations have resembled us more or less closely, though it has often been pointed out that because *we* are reptiles it does not follow that all intelligent life must necessarily be reptilian.'

'We now know the answer to one of the most baffling problems of history. At last, after hundreds of years of research, we have discovered the exact form and nature of the ruling life on the Third Planet.'

There was a murmur of astonishment from the assembled scientists. Some were so taken aback that they disappeared for a while into the comfort of the ocean, as all Venusians were apt to do in moments of stress. The Historian waited until his colleagues re-emerged into the element they so dis-

liked. He himself was quite comfortable, thanks to the tiny sprays that were continually playing over his body. With their help he could live on land for many hours before having to return to the ocean.

The excitement slowly subsided and the lecturer continued :

‘One of the most puzzling of the objects found on Planet Three was a flat metal container holding a great length of transparent plastic material, perforated at the edges and wound tightly into a spool. This transparent tape at first seemed quite featureless, but an examination with the new subelectronic microscope has shown that this is not the case. Along the surface material, invisible to our eyes but perfectly clear under the correct radiation, are literally thousands of tiny pictures. It is believed they were imprinted on the material by some chemical means, and have faded with the passage of time.

‘These pictures apparently form a record of life as it was on the Third Planet at the height of its civilization. They are not independent. Consecutive pictures are almost identical, differing only in the detail of movement. The purpose of such a record is obvious. It is only necessary to project the scenes in rapid succession to give an illusion of continuous movement. We have made a machine to do this, and I have here an exact reproduction of the picture sequence.

‘The scenes you are now going to witness take us back many thousands of years, to the great days of our sister planet. They show a complex civilization, many of whose activities we can only dimly understand. Life seems to have been very violent and energetic, and much that you will see is quite baffling.

‘It is clear that the Third Planet was inhabited by a number of different species, none of them reptilian. That is a blow to our pride, but the conclusion is inescapable. The dominant type of life appears to have been a two-armed

biped. It walked upright and covered its body with some flexible material, possibly for protection against the cold, since even before the Ice Age the planet was at a much lower temperature than our own world. But I will not try your patience any further. You will now see the record of which I have been speaking.'

A brilliant light flashed from the projector. There was a gentle whirring, and on the screen appeared hundreds of strange beings moving rather jerkily to and fro. The picture expanded to embrace one of the creatures, and the scientists could see that the Historian's description had been correct.

The creature possessed two eyes, set rather close together, but the other facial adornments were a little obscure. There was a large orifice in the lower portion of the head that was continually opening and closing. Possibly it had something to do with the creature's breathing.

The scientists watched spellbound as the strange being became involved in a series of fantastic adventures. There was an incredibly violent conflict with another, slightly different creature. It seemed certain that they must both be killed, but when it was all over neither seemed any the worse.

Then came a furious drive over miles of country in a four-wheeled mechanical devise which was capable of extraordinary feats of locomotion. The ride ended in a city packed with other vehicles moving in all directions at breathtaking speeds. No one was surprised to see two of the machines meet head-on with devastating results.

After that, events became even more complicated. It was now quite obvious that it would take many years of research to analyse and understand all that was happening. It was also clear that the record was a work of art, somewhat stylized, rather than an exact reproduction of life as it actually had been on the Third Planet.

Most of the scientists felt themselves completely dazed when the sequence of pictures came to an end. There was a final flurry of motion, in which the creature that had been the centre of interest became involved in some tremendous but incomprehensible catastrophe. The picture contracted to a circle, centred on the creature's head.

The last scene of all was an expanded view of its face, obviously expressing some powerful emotion. But whether it was rage, grief, defiance, resignation or some other feeling could not be guessed. The picture vanished. For a moment some lettering appeared on the screen, then it was all over.

For several minutes there was complete silence, save for the lapping of the waves upon the sand. The scientists were too stunned to speak. The fleeting glimpse of Earth's civilization had had a shattering effect on their minds. Then little groups began to start talking together, first in whispers and then more and more loudly as the implications of what they had seen became clearer. Presently the Historian called for attention and addressed the meeting again.

'We are now planning,' he said, 'a vast programme of research to extract all available knowledge from this record. Thousands of copies are being made for distribution to all workers. You will appreciate the problem involved. The psychologists in particular have an immense task confronting them.

'But I do not doubt that we shall succeed. In another generation, who can say what we may not have learned of this wonderful race? Before we leave, let us look again at our remote cousins, whose wisdom may have surpassed our own but of whom so little has survived.'

Once more the final picture flashed on the screen, motionless this time, for the projector had been stopped. With something like awe, the scientists gazed at the still figure from the past, while in turn the little biped stared

back at them with its characteristic expression of arrogant bad temper.

For the rest of time it would symbolize the human race. The psychologists of Venus would analyze its actions and watch its every movement until they could reconstruct its mind. Thousands of books would be written about it. Intricate philosophies would be contrived to account for its behaviour.

But all this labour, all this research, would be utterly in vain. Perhaps the proud and lonely figure on the screen was smiling sardonically at the scientists who were starting on their age-long fruitless quest.

Its secret would be safe as long as the universe endured, for no one now would ever read the lost language of Earth. Millions of times in the ages to come those last few words would flash across the screen, and none could ever guess their meaning:

A Walt Disney Production.

HIDE AND SEEK

WE were walking back through the woods when Kingman saw the grey squirrel. Our bag was a small but varied one – three grouse, four rabbits (one, I am sorry to say, an infant in arms) and a couple of pigeons. And contrary to certain dark forecasts, both the dogs were still alive.

The squirrel saw us at the same moment. It knew that it was marked for immediate execution as a result of the damage it had done to the trees on the estate, and perhaps it had lost close relatives to Kingman's gun. In three leaps it had reached the base of the nearest tree, and vanished behind it in a flicker of grey. We saw its face once more, appearing for a moment round the edge of its shield a dozen feet from the ground; but though we waited, with guns levelled hopefully at various branches, we never saw it again.

Kingman was very thoughtful as we walked back across the lawn to the magnificent old house. He said nothing as we handed our victims to the cook – who received them without much enthusiasm – and only emerged from his reverie when we were sitting in the smoking room and he remembered his duties as a host.

'That tree-rat,' he said suddenly (he always called them 'tree rats', on the grounds that people were too sentimental to shoot the dear little squirrels) 'it reminded me of a very peculiar experience that happened shortly before I retired. Very shortly indeed, in fact.'

'I thought it would,' said Carson dryly. I gave him a glare: he'd been in the Navy and had heard Kingman's stories before, but they were still new to me.

‘Of course,’ Kingman remarked, slightly nettled, ‘if you’d rather I didn’t ...’

‘Do go on,’ I said hastily. ‘You’ve made me curious. What connexion there can possibly be between a grey squirrel and the Second Jovian War I can’t imagine.’

Kingman seemed mollified.

‘I think I’d better change some names,’ he said thoughtfully, ‘but I won’t alter the places. The story begins about a million kilometres sunward of Mars ...’

K.15 was a military intelligence operative. It gave him considerable pain when unimaginative people called him a spy, but at the moment he had much more substantial grounds for complaint. For some days now a fast enemy cruiser had been coming up astern and though it was flattering to have the undivided attention of such a fine ship and so many highly trained men, it was an honour that K.15 would willingly have foregone.

What made the situation doubly annoying was the fact that his friends would be meeting him off Mars in about twelve hours, aboard a ship capable of dealing with a mere cruiser – from which you will gather that K.15 was a person of some importance. Unfortunately, the most optimistic calculation showed that the pursuers would be within accurate gun range in six hours. In some six hours five minutes, therefore, K.15 was likely to occupy an extensive and still expanding volume of space.

There might just be time for him to land on Mars, but that would be one of the worst things he could do. It would certainly annoy the aggressively neutral Martians, and the political complications would be frightful. Moreover, if his friends *had* to come down to the planet to rescue him, it would cost them more than ten kilometres a second in fuel – most of their operational reserve.

He had only one advantage, and that a very dubious one.

The Commander of the cruiser might guess that he was heading for a rendezvous, but he would not know how close it was or how large was the ship that was coming to meet him. If he could keep alive for only twelve hours, he would be safe. The 'if' was a somewhat considerable one.

K.15 looked moodily at his charts, wondering if it was worth while to burn the rest of his fuel in a final dash. But a dash to where? He would be completely helpless then, and the pursuing ship might still have enough in her tanks to catch him as he flashed outward into the empty darkness, beyond all hope of rescue – passing his friends as they came sunward at a relative speed so great that they could do nothing to save him.

With some people, the shorter the expectation of life, the more sluggish are the mental processes. They seem hypnotized by the approach of death, so resigned to their fate that they do nothing to avoid it. K.15, on the other hand, found that his mind worked better in such a desperate emergency. It began to work now as it had seldom done before.

Commander Smith – the name will do as well as any other – of the cruiser *Doradus* was not unduly surprised when K.15 began to decelerate. He had half expected the spy to land on Mars, on the principle that internment was better than annihilation, but when the plotting room brought the news that the little scout ship was heading for Phobos, he felt completely baffled. The inner moon was nothing but a jumble of rocks some twenty kilometres across, and not even the economical Martians had ever found any use for it. K.15 must be pretty desperate if he thought it was going to be of any greater value to him.

The tiny scout had almost come to rest when the radar operator lost it against the mass of Phobos. During the braking manoeuvre, K.15 had squandered most of his lead and the *Doradus* was now only minutes away – though she

was now beginning to decelerate lest she overrun him. The cruiser was scarcely three thousand kilometres from Phobos when she came to a complete halt: of K.15's ship, there was still no sign. It should be easily visible in the telescopes, but it was probably on the far side of the little moon.

It reappeared only a few minutes later, travelling under full thrust on a course directly away from the sun. It was accelerating at almost five gravities – and it had broken its radio silence. An automatic recorder was broadcasting over and over again this interesting message:

‘I have landed on Phobos and am being attacked by a Z-class cruiser. Think I can hold out until you come, but hurry.’

The message wasn't even in code, and it left Commander Smith a sorely puzzled man. The assumption that K.15 was still aboard the ship and that the whole thing was a ruse was just a little too naïve. But it might be a double-bluff: the message had obviously been left in plain language so that he would receive it and be duly confused. He could afford neither the time nor the fuel to chase the scout if K.15 really had landed. It was clear that reinforcements were on the way, and the sooner he left the vicinity the better. The phrase ‘Think I can hold out until you come’ might be a piece of sheer impertinence, or it might mean that help was very near indeed.

Then K.15's ship stopped blasting. It had obviously exhausted its fuel, and was doing a little better than six kilometres a second away from the sun. K.15 *must* have landed, for his ship was now speeding helplessly out of the solar system. Commander Smith didn't like the message it was broadcasting, and guessed that it was running into the track of an approaching warship at some indefinite distance, but there was nothing to be done about that. The *Doradus* began to move towards Phobos, anxious to waste no time.

On the face of it, Commander Smith seemed the master of the situation. His ship was armed with a dozen heavy guided missiles and two turrets of electro-magnetic guns. Against him was one man in a spacesuit, trapped on a moon only twenty kilometres across. It was not until the Commander had his first good look at Phobos, from a distance of less than a hundred kilometres, that he began to realize that, after all, K.15 might have a few cards up his sleeve.

To say that Phobos has a diameter of twenty kilometres, as the astronomy books invariably do, is highly misleading. The word 'diameter' implies a degree of symmetry which Phobos most certainly lacks. Like those other lumps of cosmic slag, the asteroids, it is a shapeless mass of rock floating in space with, of course, no hint of an atmosphere and not much more gravity. It turns on its axis once every seven hours thirty-nine minutes, thus keeping the same face always to Mars – which is so close that appreciably less than half the planet is visible, the poles being below the curve of the horizon. Beyond this, there is very little more to be said about Phobos.

K.15 had not time to enjoy the beauty of the crescent world filling the sky above him. He had thrown all the equipment he could carry out of the airlock, set the controls, and jumped. As the little ship went flaming out towards the stars he watched it go with feelings he did not care to analyse. He had burned his boats with a vengeance, and he could only hope that the oncoming battleship would intercept the radio message as the empty vessel went racing by into nothingness. There was also a faint possibility that the enemy cruiser might go in pursuit, but that was rather too much to hope for.

He turned to examine his new home. The only light was the ochre radiance of Mars, since the sun was below the horizon, but it was quite sufficient for his purpose and he

could see very well. He stood in the centre of an irregular plain about two kilometres across, surrounded by low hills over which he could leap rather easily if he wished. There was a story he remembered reading long ago about a man who had accidentally jumped off Phobos: that wasn't quite possible – though it was on Deimos – as the escape velocity was still about ten metres a second. But unless he was careful, he might easily find himself at such a height that it would take hours to fall back to the surface – and that would be fatal. For K.15's plan was a simple one: he must remain as close to the surface of Phobos as possible – *and diametrically opposite the cruiser*. The *Doradus* was armed with the latest in ultra-scientific weapons: moreover, the twenty kilometres which separated her from her prey represented less than a second's flight at maximum speed. But Commander Smith knew better, and was already feeling rather unhappy. He realized, only too well, that of all the machines of transport man had invented, a cruiser of space is far and away the least manoeuvrable. It was a simple fact that K.15 could make half a dozen circuits of his little world while her commander was persuading the *Doradus* to make one.

There is no need to go into technical details, but those who are still unconvinced might like to consider these elementary facts. A rocket-driven spaceship can, obviously, only accelerate along its major axis – that is, 'forward'. Any deviation from a straight course demands a physical turning of the ship, so that the motors can blast in another direction. Everyone knows that this is done by internal gyros or tangential steering jets, but very few people know just how long this simple manoeuvre takes. The average cruiser, fully fuelled, has a mass of two or three thousand tons, which does not make for rapid footwork. But things are even worse than this, for it isn't the mass, but the moment of inertia that matters here – and since a cruiser is

a long, thin object, its moment of inertia is slightly colossal. The sad fact remains (though it is seldom mentioned by astronautical engineers) that it takes a good ten minutes to rotate a spaceship through 180 degrees, with gyros of any reasonable size. Control jets aren't much quicker, and in any case their use is restricted because the rotation they produce is permanent and they are liable to leave the ship spinning like a slow motion pinwheel, to the annoyance of all inside.

In the ordinary way, these disadvantages are not very grave. One has millions of kilometres and hundreds of hours in which to deal with such minor matters as a change in the ship's orientation. It is definitely against the rules to move in ten-kilometre radius circles, and the Commander of the *Doradus* felt distinctly aggrieved. K.15 wasn't playing fair.

At the same moment that resourceful individual was taking stock of the situation, which might very well have been worse. He had reached the hills in three jumps and felt less naked than he had out in the open plain. The food and equipment he had taken from the ship he had hidden where he hoped he could find it again, but as his suit could keep him alive for over a day that was the least of his worries. The small packet that was the cause of all the trouble was still with him, in one of those numerous hiding places a well-designed space-suit affords.

There was an exhilarating loneliness about his mountain eyrie, even though he was not quite as lonely as he would have wished. Forever fixed in his sky, Mars was waning almost visibly as Phobos swept above the night side of the planet. He could just make out the lights of some of the Martian cities, gleaming pin-points marking the junctions of the invisible canals. All else was stars and silence and a line of jagged peaks so close it seemed he could almost touch them. Of the *Doradus* there was still no sign. She was

presumably carrying out a careful telescopic examination of the sunlit side of Phobos.

Mars was a very useful clock: when it was half full the sun would rise and, very probably, so would the *Doradus*. But she might approach from some quite unexpected quarter: she might even – and this was the one real danger – she might even have landed a search party.

This was the first possibility that had occurred to Commander Smith when he saw just what he was up against. Then he realized that the surface area of Phobos was over a thousand square kilometres and that he could not spare more than ten men from his crew to make a search of that jumbled wilderness. Also, K.15 would certainly be armed.

Considering the weapons which the *Doradus* carried, this last objection might seem singularly pointless. It was very far from being so. In the ordinary course of business, side-arms and other portable weapons are as much use to a space-cruiser as are cutlasses and crossbows. The *Doradus* happened, quite by chance – and against regulations at that – to carry one automatic pistol and a hundred rounds of ammunition. Any search party would therefore consist of a group of unarmed men looking for a well-concealed and very desperate individual who could pick them off at his leisure. K.15 was breaking the rules again.

The terminator of Mars was now a perfectly straight line, and at almost the same moment the sun came up, not so much like thunder as like a salvo of atomic bombs. K.15 adjusted the filters of his visor and decided to move. It was safer to stay out of the sunlight, not only because here he was less likely to be detected in the shadow but also because his eyes would be much more sensitive there. He had only a pair of binoculars to help him, whereas the *Doradus* would carry an electronic telescope of twenty centimetres aperture at least.

It would be best, K.15 decided, to locate the cruiser if

he could. It might be a rash thing to do, but he would feel much happier when he knew exactly where she was and could watch her movements. He could then keep just below the horizon, and the glare of the rockets would give him ample warning of any impending move. Cautiously launching himself along an almost horizontal trajectory, he began the circumnavigation of his world.

The narrowing crescent of Mars sank below the horizon until only one vast horn reared itself enigmatically against the stars. K.15 began to feel worried: there was still no sign of the *Doradus*. But this was hardly surprising, for she was painted black as night and might be a good hundred kilometres away in space. He stopped, wondering if he had done the right thing after all. Then he noticed that something quite large was eclipsing the stars almost vertically overhead, and was moving swiftly even as he watched. His heart stopped for a moment: then he was himself again, analysing the situation and trying to discover how he had made so disastrous a mistake.

It was some time before he realized that the black shadow slipping across the sky was not the cruiser at all, but something almost equally deadly. It was far smaller, and far nearer, than he had at first thought. The *Doradus* had sent her television-homing guided missiles to look for him.

This was the second danger he had feared, and there was nothing he could do about it except to remain as inconspicuous as possible. The *Doradus* now had many eyes searching for him, but these auxiliaries had very severe limitations. They had been built to look for sunlit spaceships against a background of stars, not to search for a man hiding in a dark jungle of rock. The definition of their television systems was low, and they could only see in the forward direction.

There were rather more men on the chessboard now, and

the game was a little deadlier, but his was still the advantage.

The torpedo vanished into the night sky. As it was travelling on a nearly straight course in this low gravitational field, it would soon be leaving Phobos behind, and K.15 waited for what he knew must happen. A few minutes later, he saw a brief stabbing of rocket exhausts and guessed the projectile was swinging slowly back on its course. At almost the same moment he saw another flare far away in the opposite quarter of the sky, and wondered just how many of these infernal machines were in action. From what he knew of Z-class cruisers – which was a good deal more than he should – there were four missile-control channels, and they were probably all in use.

He was suddenly struck by an idea so brilliant that he was quite sure it couldn't possibly work. The radio on his suit was a tunable one, covering an unusually wide band, and somewhere not far away the *Doradus* was pumping out power on everything from a thousand megacycles upward. He switched on the receiver and began to explore.

It came in quickly – the raucous whine of a pulse transmitter not far away. He was probably only picking up a subharmonic, but that was quite good enough. It D/F'ed sharply, and for the first time K.15 allowed himself to make long-range plans for the future. The *Doradus* had betrayed herself: as long as she operated her missiles, he would know exactly where she was.

He moved cautiously forward towards the transmitter. To his surprise the signal faded, then increased sharply again. This puzzled him until he realized that he must be moving through a diffraction zone. Its width might have told him something useful if he had been a good enough physicist, but he couldn't imagine what.

The *Doradus* was hanging about five kilometres above the surface, in full sunlight. Her 'non-reflecting' paint was

overdue for renewal, and K.15 could see her clearly. As he was still in darkness, and the shadow line was moving away from him, he decided that he was as safe here as anywhere. He settled down comfortably so that he could just see the cruiser and waited, feeling fairly certain that none of the guided projectiles would come so near the ship. By now, he calculated, the Commander of the *Doradus* must be getting pretty mad. He was perfectly correct.

After an hour, the cruiser began to heave herself round with all the grace of a bogged hippopotamus. K.15 guessed what was happening. Commander Smith was going to have a look at the antipodes, and was preparing for the perilous fifty-kilometre journey. He watched very carefully to see the orientation the ship was adopting, and when she came to rest again was relieved to see that she was almost broadside on to him. Then, with a series of jerks that could not have been very enjoyable aboard, the cruiser began to move down to the horizon. K.15 followed her at a comfortable walking pace – if one could use the phrase – reflecting that this was a feat very few people had ever performed. He was particularly careful not to overtake her on one of his kilometre-long glides, and kept a close watch for any missiles that might be coming up astern.

It took the *Doradus* nearly an hour to cover the fifty kilometres. This, as K.15 amused himself by calculating, represented considerably less than a thousandth of her normal speed. Once she found herself going off into space at a tangent, and rather than waste time turning end over end again fired off a salvo of shells to reduce speed. But she made it at last, and K.15 settled down for another vigil, wedged between two rocks where he could just see the cruiser and he was quite sure she couldn't see him. It occurred to him that by this time Commander Smith might have grave doubts as to whether he really was on Phobos at all, and he felt like firing off a signal flare to reassure him. How-

ever, he resisted the temptation.

There would be little point in describing the events of the next ten hours, since they differed in no important detail from those that had gone before. The *Doradus* made three other moves, and K.15 stalked her with the care of a big-game hunter following the spoor of some elephantine beast. Once, when she would have led him out into full sunlight, he let her fall below the horizon until he could only just pick up her signals. But most of the time he kept her just visible, usually low down behind some convenient hill.

Once a torpedo exploded some kilometres away, and K.15 guessed that some exasperated operator had seen a shadow he didn't like – or else that a technician had forgotten to switch off a proximity fuse. Otherwise nothing happened to enliven the proceedings: in fact, the whole affair was becoming rather boring. He almost welcomed the sight of an occasional guided missile drifting inquisitively overhead, for he did not believe that they could see him if he remained motionless and in reasonable cover. If he could have stayed on the part of Phobos exactly opposite the cruiser he would have been safe even from these, he realized, since the ship would have no control there in the moon's radio-shadow. But he could think of no reliable way in which he could be sure of staying in the safety zone if the cruiser moved again.

The end came very abruptly. There was a sudden blast of steering jets, and the cruiser's main drive burst forth in all its power and splendour. In seconds the *Doradus* was shrinking sunward, free at last, thankful to leave, even in defeat, this miserable lump of rock that had so annoyingly balked her of her legitimate prey. K.15 knew what had happened, and a great sense of peace and relaxation swept over him. In the radar room of the cruiser, someone had seen an echo of disconcerting amplitude approaching with altogether excessive speed. K.15 now had only to switch on his suit

beacon and to wait. He could even afford the luxury of a cigarette.

‘Quite an interesting story,’ I said, ‘and I see now how it ties up with that squirrel. But it does raise one or two queries in my mind.’

‘Indeed?’ said Rupert Kingman politely.

I always like to get to the bottom of things, and I knew that my host had played a part in the Jovian War about which he very seldom spoke. I decided to risk a long shot in the dark.

‘May I ask how you happen to know so much about this unorthodox military engagement? It isn’t possible, is it, that *you* were K.15?’

There was an odd sort of strangling noise from Carson. Then Kingman said, quite calmly: ‘No, I wasn’t.’

He got to his feet and went off towards the gun room.

‘If you’ll excuse me a moment, I’m going to have another shot at that tree-rat. Maybe I’ll get him this time.’ Then he was gone.

Carson looked at me as if to say: ‘This is another house you’ll never be invited to again.’ When our host was out of earshot he remarked in a coldly cynical voice:

‘You’ve done it. What did you have to say that for?’

‘Well, it seemed a safe guess. How else could he have known all that?’

‘As a matter of fact, I believe he met K.15 after the War: they must have had an interesting conversation together. But I thought you knew that Rupert was retired from the service with only the rank of lieutenant commander. The Court of Inquiry could never see his point of view. After all, it just wasn’t reasonable that the commander of the fastest ship in the Fleet couldn’t catch a man in a space-suit.’

SECOND DAWN

'HERE they come,' said Eris, rising to his forefeet and turning to look down the long valley. For a moment the pain and bitterness had left his thoughts, so that even Jeryl, whose mind was more closely tuned to his than to any other, could scarcely detect it. There was even an undertone of softness that recalled poignantly the Eris she had known in the days before the War – the old Eris who now seemed almost as remote and as lost as if he were lying with all the others out there on the plain.

A dark tide was flowing up the valley, advancing with a curious, hesitant motion, making odd pauses and little bounds forward. It was flanked with gold – the thin line of the Atheleni guards, so terrifyingly few compared with the black mass of the prisoners. But they were enough: indeed, they were only needed to guide that aimless river on its faltering way. Yet at the sight of so many thousands of the enemy, Jeryl found herself trembling and instinctively moved towards her mate, silver pelt resting against gold. Eris gave no sign that he had understood or even noticed the action.

The fear vanished as Jeryl saw how slowly the dark flood was moving forwards. She had been told what to expect, but the reality was even worse than she had imagined. As the prisoners came nearer, all the hate and bitterness ebbed from her mind, to be replaced by a sick compassion. No one of her race need ever more fear the aimless, idiot horde that was being shepherded through the pass into the valley it would never leave again.

The guards were doing little more than urge the prisoners

on with meaningless but encouraging cries, like nurses calling to infants too young to sense their thoughts. Strain as she might, Jeryl could detect no vestige of reason in any of these thousands of minds passing so near at hand. That brought home to her, more vividly than could anything else, the magnitude of the victory – and of the defeat. Her mind was sensitive enough to detect the first faint thoughts of children, hovering on the verge of consciousness. The defeated enemy had become not even children, but babies with the bodies of adults.

The tide was passing within a few feet of them now. For the first time, Jeryl realized how much larger than her own people the Mithraneans were, and how beautifully the light of the twin suns gleamed on the dark satin of their bodies. Once a magnificent specimen, towering a full head above Eris, broke loose from the main body and came blundering towards them, halting a few paces away. Then it crouched down like a lost and frightened child, the splendid head moving uncertainly from side to side as if seeking it knew not what. For a moment the great, empty eyes fell full upon Jeryl's face. She was as beautiful, she knew, to the Mithraneans as to her own race – but there was no flicker of emotion on the blank features, and no pause in the aimless movement of the questing head. Then an exasperated guard drove the prisoner back to his fellows.

'Come away,' Jeryl pleaded. 'I don't want to see any more. Why did you ever bring me here?' The last thought was heavy with reproach.

Eris began to move away over the grassy slopes in great bounds that she could not hope to match, but as he went his mind threw its message back to hers. His thoughts were still gentle, though the pain beneath them was too deep to be concealed.

'I wanted everyone – even you – to see what we had to do to win the War. Then, perhaps, we will have no more

in our lifetimes.'

He was waiting for her on the brow of the hill, undistressed by the mad violence of his climb. The stream of prisoners was now too far below for them to see the details of its painful progress. Jeryl crouched down beside Eris and began to browse on the sparse vegetation that had been exiled from the fertile valley. She was slowly beginning to recover from the shock.

'But what will happen to them?' she asked presently, still haunted by the memory of that splendid, mindless giant going into a captivity it could never understand.

'They can be taught how to eat,' said Eris. 'There is food in the valley for half a year, and then we'll move them on. It will be a heavy strain on our own resources, but we're under a moral obligation – and we've put it in the peace treaty.'

'They can never be cured?'

'No. Their minds have been totally destroyed. They'll be like this until they die.'

There was a long silence. Jeryl let her gaze wander across the hills, falling in gentle undulations to the edge of the ocean. She could just make out, beyond a gap in the hills, the distant line of blue that marked the sea – the mysterious, impassable sea. Its blue would soon be deepening into darkness, for the fierce white sun was setting and presently there would only be the red disc – hundreds of times larger but giving far less light – of its pale companion.

'I suppose we had to do it,' Jeryl said at last. She was thinking almost to herself, but she let enough of her thoughts escape for Eris to overhear.

'You've seen them,' he answered briefly. 'They were bigger and stronger than we. Though we outnumbered them, it was stalemate: in the end, I think they would have won. By doing what we did, we saved thousands from death – or mutilation.'

The bitterness came back into his thoughts, and Jeryl

dared not look at him. He had screened the depths of his mind, but she knew that he was thinking of the shattered ivory stump upon his forehead. The War had been fought, except at the very end, with two weapons only – the razor-sharp hooves of the little, almost useless forepaws, and the unicornlike horns. With one of these Eris could never fight again, and from the loss stemmed much of the embittered harshness that sometimes made him hurt even those who loved him.

Eris was waiting for someone, though who it was Jeryl could not guess. She knew better than to interrupt his thoughts while he was in his present mood, and so remained silently beside him, her shadow merging with his as it stretched far along the hill-top.

Jeryl and Eris came of a race which, in Nature's lottery, had been luckier than most – and yet had missed one of the greatest prizes of all. They had powerful bodies and powerful minds, and they lived in a world which was both temperate and fertile. By human standards, they would have seemed strange but by no means repulsive. Their sleek, fur-covered bodies tapered to a single giant rear limb that could send them leaping over the ground in thirty-foot bounds. The two forelimbs were much smaller, and served merely for support and steadying. They ended in pointed hooves that could be deadly in combat, but had no other useful purpose.

Both the Atheleni and their cousins, the Mithraneans, possessed mental powers that had enabled them to develop a very advanced mathematics and philosophy: but over the physical world they had no control at all. Houses, tools, clothes – indeed, artifacts of any kind – were utterly unknown to them. To races which possessed hands, tentacles or other means of manipulation, their culture would have seemed incredibly limited: yet such is the adaptability of the mind, and the power of the commonplace, that they

seldom realized their handicaps and could imagine no other way of life. It was natural to wander in great herds over the fertile plains, pausing where food was plentiful and moving on again when it was exhausted. This nomadic life had given them enough leisure for philosophy and even for certain arts. Their telepathic powers had not yet robbed them of their voices and they had developed a complex vocal music and an even more complex choreography. But they took the greatest pride of all in the range of their thoughts: for thousands of generations they had sent their minds roving through the misty infinities of metaphysics. Of *physics*, and indeed of all the sciences of matter, they knew nothing – not even that they existed.

‘Someone’s coming,’ said Jeryl suddenly. ‘Who is it?’

Eris did not bother to look, but there was a sense of strain in his reply.

‘It’s Aretenon. I agreed to meet him here.’

‘I’m so glad. You were such good friends once – it upset me when you quarrelled.’

Eris pawed fretfully at the turf, as he did when he was embarrassed or annoyed.

‘I lost my temper with him when he left me during the fifth battle of the Plain. Of course I didn’t know then why he had to go.’

Jeryl’s eyes widened in sudden amazement and understanding.

‘You mean – he had something to do with the Madness, and the way the War ended?’

‘Yes. There were very few people who knew more about the mind than he did. I don’t know what part he played, but it must have been an important one. I don’t suppose he’ll ever be able to tell us much about it.’

Still a considerable distance below them, Aretenon was zigzagging up the hillside in great leaps. A little later he had reached them and instinctively bent his head to touch horns

with Eris in the universal gesture of greeting. Then he stopped, horribly embarrassed, and there was an awkward pause until Jeryl came to the rescue with some conventional remarks.

When Eris spoke, Jeryl was relieved to sense his obvious pleasure at meeting his friend once again, for the first time since their angry parting at the height of the War. It had been longer still since her last meeting with Aretenon, and she was surprised to see how much he had changed. He was considerably younger than Eris – but no one would have guessed it now. Some of his once-golden pelt was turning black with age, and with a flash of his old humour Eris remarked that soon no one would be able to tell him from a Mithranean.

Aretenon smiled.

‘That would have been useful in the last few weeks. I’ve just come through their country, helping to round up the Wanderers. We weren’t very popular, as you might expect. If they’d known who I was, I don’t suppose I’d have got back alive – armistice or no armistice.’

‘You weren’t actually in charge of the Madness, were you?’ asked Jeryl, unable to control her curiosity.

She had a momentary impression of thick, defensive mists forming around Aretenon’s mind, shielding all his thoughts from the outer world. Then the reply came, curiously muffled, and with a sense of distance that was very rare in telepathic-contact.

‘No: I wasn’t in supreme charge. But there were only two others between myself and – the top.’

‘Of course,’ said Eris, rather petulantly, ‘I’m only an ordinary soldier and don’t understand these things. But I’d like to know just how you did it. Naturally,’ he added, ‘neither Jeryl nor myself would talk to anyone else.’

Again that veil seemed to descend over Aretenon’s thoughts. Then it lifted, ever so slightly.

‘There’s very little I’m allowed to tell. As you know, Eris, I was always interested in the mind and its workings. Do you remember the games we used to play, when I tried to uncover your thoughts, and you did your best to stop me? And how I sometimes made you carry out acts against your will?’

‘I still think,’ said Eris, ‘that you couldn’t have done that to a stranger, and that I was really unconsciously co-operating.’

‘That was true then – but it isn’t any longer. The proof lies down there in the valley.’ He gestured towards the last stragglers who were being rounded up by the guards. The dark tide had almost passed, and soon the entrance to the valley would be closed.

‘When I grew older,’ continued Aretenon, ‘I spent more and more of my time probing into the ways of the mind, and trying to discover why some of us can share our thoughts so easily, while others can never do so but must remain always isolated and alone, forced to communicate by sounds or gestures. And I became fascinated by those rare minds that are completely deranged, so that those who possess them seem less than children.

‘I had to abandon these studies when the War began. Then, as you know, they called for me one day during the fifth battle. Even now, I’m not quite sure who was responsible for that. I was taken to a place a long way from here, where I found a little group of thinkers many of whom I already knew.

‘The plan was simple – and tremendous. From the dawn of our race we’ve known that two or three minds, linked together, could be used to control another mind, *if it was willing*, in the way that I used to control you. We’ve employed this power for healing since ancient times. Now we planned to use it for destruction.

‘There were two main difficulties. One was bound up

with that curious limitation of our normal telepathic powers – the fact that, except in rare cases, we can only have contact over a distance *with someone we already know*, and can communicate with strangers only when we are actually in their presence.

‘The second, and greater problem, was that the massed power of many minds would be needed, and never before had it been possible to link together more than two or three. How we succeeded is our main secret: like all things, it seems easy now it has been done. And once we had started, it was simpler than we had expected. Two minds are more than twice as powerful as one, and three are much more than thrice as powerful as a single will. The exact mathematical relationship is an interesting one. You know how very rapidly the number of ways a group of objects may be arranged increases with the size of the group? Well, a similar relationship holds in this case.

‘So in the end we had our Composite Mind. At first it was unstable, and we could hold it together only for a few seconds. It’s still a tremendous strain on our mental resources, and even now we can only do it for – well, for long enough.

‘All these experiments, of course, were carried out in great secrecy. If we could do this, so could the Mithraneans, for their minds are as good as ours. We had a number of their prisoners, and we used them as subjects.’

For a moment the veil that hid Aretenon’s inner thoughts seemed to tremble and dissolve: then he regained control.

‘That was the worst part. It was bad enough to send madness into a far land, but it was infinitely worse when you could watch with your own eyes the effects of what you did.

‘When we had perfected our technique, we made the first long-distance test. Our victim was someone so well known to one of our prisoners – whose mind we had taken over – that we could identify him completely and thus the

distance between us was no objection. The experiment worked, but of course no one suspected that we were responsible.

‘We did not operate again until we were certain that our attack would be so overwhelming that it would end the War. From the minds of our prisoners we had identified about a score of Mithraneans – their friends and kindred – in such detail that we could pick them out and destroy them. As each mind fell beneath our attack, it gave up to us the knowledge of others, and so our power increased. We could have done far more damage than we did, for we took only the males.’

‘Was that,’ said Jeryl bitterly, ‘so very merciful?’

‘Perhaps not: but it should be remembered to our credit. We stopped as soon as the enemy sued for peace, and as we alone knew what had happened, we went into their country to undo what damage we could. It was little enough.’

There was a long silence. The valley was deserted now, and the white sun had set. A cold wind was blowing over the hills, passing, where none could follow it, out across the empty and untravelled sea. Then Eris spoke, his thoughts almost whispering in Aretenon’s mind.

‘You did not come to tell me this, did you? There is something more.’ It was a statement rather than a query.

‘Yes,’ replied Aretenon. ‘I have a message for you – one that will surprise you a good deal. It’s from Therodimus.’

‘Therodimus! I thought —’

‘You thought he was dead, or worse still, a traitor. He’s neither, although he’s lived in enemy territory for the last twenty years. The Mithraneans treated him as we did, and gave him everything he needed. They recognized his mind for what it was, and even during the War no one touched him. Now he wants to see you again.’

Whatever emotions Eris was feeling at this news of his old teacher, he gave no sign of them. Perhaps he was re-

calling his youth, remembering now that Therodimus had played a greater part in the shaping of his mind than any other single influence. But his thoughts were barred to Aretenon and even to Jeryl.

‘What’s he been doing all this time?’ Eris asked at length. ‘And why does he want to see me now?’

‘It’s a long and complicated story,’ said Aretenon, ‘but Therodimus has made a discovery quite as remarkable as ours, and one that may have even greater consequences.’

‘Discovery? What sort of discovery?’

Aretenon paused, looking thoughtfully along the valley. The guards were returning, leaving behind only a few who would be needed to deal with any wandering prisoners.

‘You know as much of our history as I do, Eris,’ he began. ‘It took, we believe, something like a million generations for us to reach our present level of development – and that’s a tremendous length of time! Almost all the progress we’ve made has been due to our telepathic powers: without them we’d be little different from all those other animals that show such puzzling resemblances to us. We’re very proud of our philosophy and our mathematics, of our music and dancing – but have you ever thought, Eris, that there might be other lines of cultural development which we’ve never even dreamed of? *That there might be other forces in the Universe beside mental ones?*’

‘I don’t know what you mean,’ said Eris flatly.

‘It’s hard to explain, and I won’t try – except to say this. Do you realize just how pitifully feeble is our control over the external world, and how useless these limbs of ours really are? No – you can’t, for you won’t have seen what I have. But perhaps this will make you understand.’

The pattern of Aretenon’s thoughts modulated suddenly into a minor key.

‘I remember once coming upon a bank of beautiful and curiously complicated flowers. I wanted to see what they

were like inside, so I tried to open one, steadying it between my hooves and picking it apart with my teeth. I tried again and again – and failed. In the end, half mad with rage, I trampled all those flowers into the dirt.’

Jeryl could detect the perplexity in Eris’s mind, but she could see that he was interested and curious to know more.

‘I have had that sort of feeling, too,’ he admitted. ‘But what can one do about it? And after all, is it really important? There are a good many things in this universe which are not exactly as we should like them.’

Aretenon smiled.

‘That’s true enough. But Therodimus has found how to do something about it. Will you come and see him?’

‘It must be a long journey.’

‘About twenty days from here, and we have to go across a river.’

Jeryl felt Eris give a little shudder. The Atheleni hated water, for the excellent and sufficient reason that they were too heavily boned to swim, and promptly drowned if they fell into it.

‘It’s in enemy territory: they won’t like me.’

‘They respect you, and it might be a good idea for you to go – a friendly gesture, as it were.’

‘But I’m wanted here.’

‘You can take my word that nothing you do here is as important as the message Therodimus has for you – and for the whole world.’

Eris veiled his thoughts for a moment, then uncovered them briefly.

‘I’ll think about it,’ he said.

It was surprising how little Aretenon managed to say on the many days of the journey. From time to time Eris would challenge the defences of his mind with half-playful thrusts, but always they were parried with an effortless skill. About

the ultimate weapon that had ended the War he would say nothing, but Eris knew that those who had wielded it had not yet disbanded and were still at their secret hiding-place. Yet though he would not talk about the past, Aretenon often spoke of the future, and with the urgent anxiety of one who had helped to shape it and was not sure if he had acted aright. Like many others of his race, he was haunted by what he had done, and the sense of guilt sometimes overwhelmed him. Often he made remarks which puzzled Eris at the time, but which he was to remember more and more vividly in the years ahead.

‘We’ve come to a turning-point in our history, Eris. The powers we’ve uncovered will soon be shared by the Mithraneans, and another war will mean destruction for us both. All my life I’ve worked to increase our knowledge of the mind, but now I wonder if I’ve brought something into the world that is too powerful, and too dangerous for us to handle. Yet it’s too late, now, to retrace our footsteps: sooner or later our culture was bound to come to this point, and to discover what we have found.

‘It’s a terrible dilemma: and there’s only one solution. We cannot go back, and if we go forward we may meet disaster. So we must change the very nature of our civilization, and break completely with the million generations behind us. You can’t imagine how that could be done: nor could I, until I met Therodimus and he told me of his dream.

‘The mind is a wonderful thing, Eris – but by itself it is helpless in the universe of matter. We know now how to multiply the power of our brains by an enormous factor: we can solve, perhaps, the great problems of mathematics that have baffled us for ages. But neither our unaided minds, nor the group-mind we’ve now created, can alter in the slightest the one fact that all through history has brought us and the Mithraneans into conflict – the fact that the food supply is

fixed, and our populations are not.'

Jeryl would watch them, taking little part in their thoughts, as they argued these matters. Most of their discussions took place while they were browsing, for like all active ruminants they had to spend a considerable part of each day searching for food. Fortunately the land through which they were passing was extremely fertile – indeed, its fertility had been one of the causes of the War. Eris, Jeryl was glad to see, was becoming something of his old self again. The feeling of frustrated bitterness that had filled his mind for so many months had not lifted, but it was no longer as all-pervading as it had been.

They left the open plain on the twenty-second day of their journey. For a long time they had been travelling through Mithranean territory, but those few of their enemies they had seen had been inquisitive rather than hostile. Now the grasslands were coming to an end, and the forest with all its primeval terrors lay ahead.

'Only one carnivore lives in this region,' Aretenon reassured them, 'and it's no match for the three of us. We'll be past the trees in a day and a night.'

'A night – in the forest!' gasped Jeryl, half-petrified with terror at the very thought.

Aretenon was obviously a little ashamed of himself.

'I didn't like to mention it before,' he apologized, 'but there's really no danger. I've done it by myself, several times. After all, none of the great flesh-eaters of ancient times still exists – and it won't be really dark, even in the woods. The red sun will still be up.'

Jeryl was still trembling slightly. She came of a race which, for thousands of generations, had lived on the high hills and the open plains, relying on speed to escape from danger. The thought of going among trees – and in the dim red twilight while the primary sun was down – filled her with panic. And of the three of them, only Aretenon pos-

sessed a horn with which to fight. (It was nothing like so long or sharp, thought Jeryl, as Eris's had been.)

She was still not at all happy even when they had spent a completely uneventful day moving through the woods. The only animals they saw were tiny, long-tailed creatures that ran up and down the tree-trunks with amazing speed, gibbering with anger as the intruders passed. It was entertaining to watch them, but Jeryl did not think that the forest would be quite so amusing in the night.

Her fears were well founded. When the fierce white sun passed below the trees, and the crimson shadows of the red giant lay everywhere, a change seemed to come over the world. A sudden silence swept across the forest – a silence abruptly broken by a very distant wail towards which the three of them turned instinctively, ancestral warnings shrieking in their minds.

‘What was that?’ gasped Jeryl.

Aretenon was breathing swiftly, but his reply was calm enough.

‘Never mind,’ he said. ‘It was a long way off. I don’t know what it was.’

They took turns to keep guard, and the long night wore slowly away. From time to time Jeryl would awaken from troubled dreams into the nightmare reality of the strange, distorted trees gathered threateningly around her. Once, when she was on guard, she heard the sound of a heavy body moving through the woods very far away – but it came no nearer and she did not disturb the others. So at last the longed-for brilliance of the white sun began to flood the sky, and the day had come again.

Aretenon, Jeryl thought, was probably more relieved than he pretended to be. He was almost boyish as he frisked around in the morning sunlight, snatching an occasional mouthful of foliage from an overhanging branch.

‘We’ve only half a day to go now,’ he said cheerfully. ‘We’ll be out of the forest by noon.’

There was a mischievous undertone to his thoughts that puzzled Jeryl. It seemed as if Aretenon was keeping still another secret from them, and Jeryl wondered what further obstacles they would have to overcome. By mid-day she knew, for their way was barred by a great river flowing slowly past them as if in no haste to meet the sea.

Eris looked at it with some annoyance, measuring it with a practised eye.

‘It’s much too deep to ford here. We’ll have to go a long way upstream before we can cross.’

Aretenon smiled.

‘On the contrary,’ he said cheerfully, ‘we’re going *downstream*.’

Eris and Jeryl looked at him in amazement.

‘Are you mad?’ Eris cried.

‘You’ll soon see. We’ve not far to go now – you’ve come all this way, so you might as well trust me for the rest of the journey.’

The river slowly widened and deepened. If it had been impassable before, it was doubly so now. Sometimes, Eris knew, one came upon a stream across which a tree had fallen, so that one could walk over the trunk – though it was a risky thing to do. But this river was the width of many trees, and was growing no narrower.

‘We’re nearly there,’ said Aretenon at last. ‘I recognize the place. Someone should be coming out of those woods at any moment.’ He gestured with his horn to the trees on the far side of the river, and almost as he did so three figures came bounding out on to the bank. Two of them, Jeryl saw, were Atheleni: the third was a Mithranean.

They were now nearing a great tree, standing by the water’s edge, but Jeryl had paid little attention: she was too interested in the figures on the distant bank, wondering

what they were going to do next. So when Eris's amazement exploded like a thunderclap in the depths of her own mind, she was too confused for a moment to realize its cause. Then she turned towards the tree, and saw what Eris had seen.

To some minds and some races, few things could have been more natural or more commonplace than a thick rope tied round a tree-trunk, and floating out across the water of a river to another tree on the far bank. Yet it filled both Jeryl and Eris with the terror of the unknown, and for one awful moment Jeryl thought that a gigantic snake was emerging from the water. Then she saw that it was not alive, but her fear remained. For it was the first artificial object that she had ever seen.

'Don't worry about *what* it is, or how it was put there,' counselled Aretenon. 'It's going to carry you across, and that's all that matters for the moment. Look – there's someone coming over now!'

One of the figures on the far bank had lowered itself into the water, and was working its way with its forelimbs along the rope. As it came nearer – it was the Mithranean, and a female – Jeryl saw that it was carrying a second and much smaller rope looped round the upper part of its body.

With the skill of long practice, the stranger made her way across the floating cable, and emerged dripping from the river. She seemed to know Aretenon, but Jeryl could not intercept their thoughts.

'I can go across without any help,' said Aretenon, 'but I'll show you the easy way.'

He slipped the loop over his shoulders, and, dropping into the water, hooked his forelimbs over the fixed cable. A moment later he was being dragged across at a great speed by the two others on the far bank, where, after much trepidation, Eris and Jeryl presently joined him.

It was not the sort of bridge one would expect from a race

which could quite easily have dealt with the mathematics of a reinforced concrete arch – if the possibility of such an object had ever occurred to it. But it served its purpose, and once it had been made, they could use it readily enough.

Once it had been made. But – who had made it?

When their dripping guides had rejoined them, Aretenon gave his friends a warning.

‘I’m afraid you’re going to have a good many shocks while you’re here. You’ll see some very strange sights, but when you understand them, they’ll cease to puzzle you in the slightest. In fact, you will soon come to take them for granted.’

One of the strangers, whose thoughts neither Eris nor Jeryl could intercept, was giving him a message.

‘Therodimus is waiting for us,’ said Aretenon. ‘He’s very anxious to see you.’

‘I’ve been trying to contact him,’ complained Eris, ‘but I’ve not succeeded.’

Aretenon seemed a little troubled.

‘You’ll find he’s changed,’ he said. ‘After all, you’ve not seen each other for many years. It may be some time before you can make full contact again.’

Their road was a winding one through the forest, and from time to time curiously narrow paths branched off in various directions. Therodimus, thought Eris, must have changed indeed for him to have taken up permanent residence among trees. Presently the track opened out into a large, semicircular clearing with a low white cliff lying along its diameter. At the foot of the cliff were several dark holes of varying sizes – obviously the openings of caves.

It was the first time that either Eris or Jeryl had ever entered a cave, and they did not greatly look forward to the experience. They were relieved when Aretenon told them to wait just outside the opening, and went on alone towards the puzzling yellow light that glowed in the depths.

A moment later, dim memories began to pulse in Eris's mind, and he knew that his old teacher was coming, even though he could no longer fully share his thoughts.

Something stirred in the gloom, and then Therodimus came out into the sunlight. At the sight of him, Jeryl screamed once and buried her head in Eris's mane, but Eris stood firm, though he was trembling as he had never done before battle. For Therodimus blazed with a magnificence that none of his race had ever known since history began. Around his neck hung a band of glittering objects that caught and refracted the sunlight in myriad colours, while covering his body was a sheet of some thick, many-hued material that rustled softly as he walked. And his horn was no longer the yellow of ivory: some magic had changed it to the most wonderful purple that Jeryl had ever seen.

Therodimus stood motionless for a moment, savouring their amazement to the full. Then his rich laugh echoed in their minds, and he reared up on his hind limb. The coloured garment fell whispering to the ground, and at a toss of his head the glittering necklace arched like a rainbow into a corner of the cave. But the purple horn remained unchanged.

It seemed to Eris that he stood at the brink of a great chasm, with Therodimus beckoning him on the far side. Their thoughts struggled to form a bridge, but could make no contact. Between them was the gulf of half a lifetime and many battles, of a myriad unshared experiences – Therodimus's years in this strange land, his own mating with Jeryl and the memory of their lost children. Though they stood face to face, a few feet only between them, their thoughts could never meet again.

Then Aretenon, with all the power and authority of his unsurpassed skill, did something to his mind that Eris was never quite able to recall. He only knew that the years seemed to have rolled back, that he was once more the

eager, anxious pupil – and that he could speak to Therodimus again.

It was strange to sleep underground, but less unpleasant than spending the night amid the unknown terrors of the forest. As she watched the crimson shadows deepening beyond the entrance to the little cave, Jeryl tried to collect her scattered thoughts. She had understood only a small part of what had passed between Eris and Therodimus, but she knew that something incredible was taking place. The evidence of her eyes was enough to prove that: today she had seen things for which there were no words in her language.

She had heard things, too. As they had passed one of the cave-mouths, there had come from it a rhythmic ‘whirring’ sound, unlike that made by any animal she knew. It had continued steadily without pause or break as long as she could hear it, and even now its unhurried rhythm had not left her mind. Aretenon, she believed, had also noticed it, though without any surprise: Eris had been so engrossed with Therodimus.

The old philosopher had told them very little, preferring, as he said, to show them his empire when they had had a good night’s rest. Nearly all their talk had been concerned with the events of their own land during the last few years, and Jeryl found it somewhat boring. Only one thing had interested her, and she had eyes for little else. That was the wonderful chain of coloured crystals that Therodimus had worn around his neck. What it was, or how it had been created, she could not imagine: but she coveted it. As she fell asleep, she found herself thinking idly, but more than half-seriously, of the sensation it would cause if she returned to her people with such a marvel gleaming against her own pelt. It would look so much better there than upon old Therodimus.

Aretenon and Therodimus met them at the cave soon after dawn. The philosopher had discarded his regalia – which he had obviously worn only to impress his guests – and his horn had returned to its normal yellow. That was one thing Jeryl thought she could understand, for she had come across fruits whose juices could cause colour changes.

Therodimus settled himself at the mouth of the cave. He began his narration without preliminaries, and Eris guessed that he must have told it many times before to earlier visitors.

‘I came to this place, Eris, about five years after leaving our country. As you know, I was always interested in strange lands, and from the Mithraneans I’d heard rumours that intrigued me very much. How I traced them to their source is a long story that doesn’t matter now. I crossed the river far upstream one summer, when the water was very low. There’s only one place where it can be done, and then only in the driest years. Higher still the river loses itself in the mountains, and I don’t think there’s any way through them. So this is virtually an island – almost completely cut off from Mithraean territory.

‘It’s an island, but it’s not uninhabited. The people who live here are called the Phileni, and they have a very remarkable culture – one entirely different from our own. Some of the products of that culture you’ve already seen.

‘As you know, there are many different races on our world, and quite a few of them have some sort of intelligence. But there is a great gulf between us and all other creatures. As far as we know, we are the only beings capable of abstract thought and complex logical processes.

‘The Phileni are a much younger race than ours, and they are intermediate between us and the other animals. They’ve lived here on this rather large island for several thousand generations – but their rate of development has been many, many times swifter than ours. They neither possess nor

understand our telepathic powers, but they have something else which we may well envy – something which is responsible for the whole of their civilization and its incredibly rapid progress.’

Therodimus paused, then rose slowly to his feet.

‘Follow me,’ he said. ‘I’ll take you to see the Phileni.’

He led them back to the caves from which they had come the night before, pausing at the entrance from which Jeryl had heard that strange, rhythmic whirring. It was clearer and louder now, and she saw Eris start as though he had noticed it for the first time. Then Therodimus uttered a high-pitched whistle, and at once the whirring slackened, falling octave by octave until it had ebbed into silence. A moment later something came towards them out of the semi-gloom.

It was a little creature, scarcely half their height, and it did not hop, but walked upon two jointed limbs that seemed very thin and feeble. Its large spherical head was dominated by three huge eyes, set far apart and capable of independent movement. With the best will in the world, Jeryl did not think it was very attractive.

Then Therodimus uttered another whistle, and the creature raised its forelimbs towards them.

‘Look closely,’ said Therodimus, very gently, ‘and you will see the answer to many of your questions.’

For the first time, Jeryl saw that the creature’s forelimbs did not end in hooves, or indeed after the fashion of any animal with which she was acquainted. Instead, they divided into at least a dozen thin, flexible tentacles and two hooked claws.

‘Go towards it, Jeryl,’ commanded Therodimus. ‘It has something for you.’

Hesitantly, Jeryl moved forward. She noticed that the creature’s body was crossed with bands of dark material, to which were attached unidentifiable objects. It dropped

a forelimb to one of these, and a cover opened to reveal a cavity inside which something glittered. Then the little tentacles were clutching that marvellous crystal necklace, and with a movement so swift and dexterous that Jeryl could scarcely follow it, the Phileni moved forward and clasped it round her neck.

Therodimus brushed aside her confusion and gratitude, but his shrewd old mind was well pleased. Jeryl would be his ally now in whatever he planned to do. But Eris's emotions might not be so easily swayed, and in this matter mere logic was not enough. His old pupil had changed so much, had been so deeply wounded by the past, that Therodimus could not be certain of success. Yet he had a plan that could turn even these difficulties to his advantage.

He gave another whistle, and the Phileni made a curious waving gesture with its hands and disappeared into the cave. A moment later that strange whirring ascended once more from the silence, but Jeryl's curiosity was now quite over-shadowed by her delight in her new possession.

'We'll go through the woods,' said Therodimus, 'to the nearest settlement – it's only a little way from here. The Phileni don't live in the open, as we do. In fact, they differ from us in almost every conceivable way. I'm even afraid,' he added ruefully, 'that they're much better natured than we are, and I believe that one day they'll be more intelligent. But first of all, let me tell you what I've learned about them, so that you can understand what I'm planning to do.'

The mental evolution of any race is conditioned, even dominated, by physical factors which that race almost invariably takes for granted as part of the natural order of things. The wonderfully sensitive hands of the Phileni had enabled them to find by experiment and trial facts which had taken the planet's only other intelligent species a thousand times as long to discover by pure deduction. Quite

early in their history, the Phileni had invented simple tools. From these they had proceeded to fabrics, pottery, and the use of fire. When Therodimus had discovered them, they had already invented the lathe and the potter's wheel, and were about to move into their first Metal Age – with all that that implied.

On the purely intellectual plane, their progress had been less rapid. They were clever and skilled, but they had a dislike of abstract thought and their mathematics was purely empirical. They knew, for example, that a triangle with sides in the ratio three-four-five was right-angled, but had not suspected that this was only a special case of a much more general law. Their knowledge was full of such yawning gaps, which, despite the help of Therodimus and his several score disciples, they seemed in no great hurry to fill.

Therodimus they worshipped as a god, and for two whole generations of their short-lived race they had obeyed him in everything, giving him all the products of their skill that he needed, and making at his suggestion the new tools and devices that had occurred to him. The partnership had been incredibly fertile, for it was as if both races had suddenly been released from their shackles. Great manual skill and great intellectual powers had fused in a fruitful union probably unique in all the universe – and progress that would normally have taken millennia had been achieved in less than a decade.

As Aretenon had promised them, though Eris and Jeryl saw many marvels, they came across nothing that they could not understand once they had watched the little Phileni craftsmen at work and had seen with what magic their hands shaped natural materials into lovely or useful forms. Even their tiny towns and primitive farms soon lost their wonder and became part of the accepted order of things.

Therodimus let them look their fill, until they had seen every aspect of this strangely sophisticated Stone Age culture. Because they knew no differently, they found nothing incongruous in the sight of a Phileni potter – who could scarcely count beyond ten – shaping a series of complex algebraic surfaces under the guidance of a young Mithran-ean mathematician. Like all his race, Eris possessed tremendous powers of mental visualization, but he realized how much easier geometry would be if one could actually *see* the shapes one was considering. From this beginning (though he could not guess it) would one day evolve the idea of a written language.

Jeryl was fascinated above all things by the sight of the little Phileni women weaving fabrics upon their primitive looms. She could sit for hours watching the flying shuttles and wishing that she could use them. Once one had seen it done, it seemed so simple and obvious – and so utterly beyond the powers of the clumsy, useless limbs of her own people.

They grew very fond of the Phileni, who seemed eager to please and were pathetically proud of all their manual skills. In these new and novel surroundings, meeting fresh wonders every day, Eris seemed to be recovering from some of the scars which the War had left upon his mind. Jeryl knew, however, that there was still much damage to be undone. Sometimes, before he could hide them, she would come across raw, angry wounds in the depths of Eris's mind, and she feared that many of them – like the broken stump of his horn – would never heal. Eris had hated the War, and the manner of its ending still oppressed him. Beyond this, Jeryl knew, he was haunted by the fear that it might come again.

These troubles she often discussed with Therodimus, of whom she had now grown very fond. She still did not fully understand why he had brought them here, or what he and

his followers were planning to do. Therodimus was in no hurry to explain his actions, for he wished Jeryl and Eris to draw their own conclusions as far as possible. But at last, five days after their arrival, he called them to his cave.

‘You’ve now seen,’ he began, ‘most of the things we have to show you here. You know what the Phileni can do, and perhaps you have thought how much our own lives will be enriched once we can use the products of their skill. That was my first thought when I came here, all those years ago.

‘It was an obvious and rather naïve idea, but it led to a much greater one. As I grew to know the Phileni, and found how swiftly their minds had advanced in so short a time, I realized what a fearful disadvantage our own race had always laboured under. I began to wonder how much further forward *we* would have been had we the Phileni’s control over the physical world. It is not a question of mere convenience, or the ability to make beautiful things like that necklace of yours, Jeryl, but something much more profound. It is the difference between ignorance and knowledge, between weakness and power.

‘We have developed our minds, and our minds alone, until we can go no further. As Aretenon has told you, we have now come to a danger that threatens our entire race. We are under the shadow of the irresistible weapon against which there can be no defence.

‘The solution is, quite literally, in the hands of the Phileni. We must use their skills to reshape our world, and so remove the cause of all our wars. We must go back to the beginning and re-lay the foundations of our culture. It won’t be *our* culture alone, though, for we shall share it with the Phileni. They will be the hands – we the brains. Oh, I have dreamed of the world that may come, ages ahead, when even the marvels you see around you now will be considered

childish toys! But not many are philosophers, and I need an argument more substantial than dreams. That final argument I believe I may have found, though I cannot yet be certain.

‘I have asked you here, Eris, partly because I wanted to renew our old friendship, and partly because your word will now have far greater influence than mine. You are a hero among your own people, and the Mithraneans also will listen to you. I want you to return, taking with you some of the Phileni and their products. Show them to your people, and ask them to send their young men here to help us with our work.’

There was a pause during which Jeryl could gather no hints of Eris’s thoughts. Then he replied hesitantly:

‘But I still don’t understand. These things that the Phileni make are very pretty, and some of them may be useful to us. But how can they change us as profoundly as you seem to think?’

Therodimus sighed. Eris could not see past the present into the future that was yet to be. He had not caught, as Therodimus had done, the promise that lay beyond the busy hands and tools of the Phileni – the first faint possibilities of the Machine. Perhaps he would never understand: but he could still be convinced.

Veiling his deeper thoughts, Therodimus continued:

‘Perhaps some of these things are toys, Eris – but they may be more powerful than you think. Jeryl, I know, would be loath to part with hers . . . and perhaps I can find one that would convince you.’

Eris was sceptical, and Jeryl could see that he was in one of his darker moods.

‘I doubt it very much,’ he said.

‘Well, I can try.’ Therodimus gave a whistle, and one of the Phileni came running up. There was a short exchange of conversation.

‘Would you come with me Eris? It will take some time.’

Eris followed him, the others, at Therodimus’s request, remaining behind. They left the large cave and went towards the row of smaller ones which the Phileni used for their various trades.

The strange whirring noise was sounding loudly in Eris’s ears, but for a moment he could not see its cause, the light of the crude oil lamps being too faint for his eyes. Then he made out one of the Phileni bending over a wooden table upon which something was spinning rapidly, driven by a belt from a treadle operated by another of the little creatures. He had seen the potters using a similar device, but this was different. It was shaping wood, not clay, and the potter’s fingers had been replaced by a sharp metal blade from which long, thin shavings were curling out in fascinating spirals. With their huge eyes the Phileni, who disliked full sunlight, could see perfectly in the gloom, but it was some time before Eris could discover just what was happening. Then suddenly, he understood.

‘Aretenon,’ said Jeryl when the others had left them, ‘why should the Phileni do all these things for us? Surely they’re quite happy as they are?’

The question, Aretenon thought was typical of Jeryl and would never have been asked by Eris.

‘They will do anything that Therodimus says,’ he answered, ‘but even apart from that there’s so much we can give them as well. When we turn our minds to their problems, we can see how to solve them in ways that would never have occurred to them. They’re very eager to learn, and already we must have advanced their culture by hundreds of generations. Also, they’re physically very feeble. Although we don’t possess their dexterity, our strength makes possible tasks they could never attempt.’

They had wandered to the edge of the river, and stood for

a moment watching the unhurried waters moving down to the sea. Then Jeryl turned to go upstream, but Aretenon stopped her.

'Therodimus doesn't want us to go that way, yet,' he explained. 'It's just another of his little secrets. He never likes to reveal his plans until they're ready.'

Slightly piqued, and distinctly curious, Jeryl obediently turned back. She would, of course, come this way again as soon as there was no one else about.

It was very peaceful here in the warm sunlight, among the pools of heat trapped by the trees. Jeryl had almost lost her fear of the forest, though she knew she would never be quite happy there.

Aretenon seemed very abstracted, and Jeryl knew that he wished to say something and was marshalling his thoughts. Presently he began to speak, with the freedom that is only possible between two people who are fond of each other but have no emotional ties.

'It is very hard, Jeryl,' he began, 'to turn one's back on the work of a lifetime. Once I had hoped that the great new forces we have discovered could be safely used, but now I know that it is impossible, at least for many ages. Therodimus was right – we can go no further with our minds alone. Our culture has been hopelessly one-sided, though through no fault of ours. We cannot solve the fundamental problem of peace and war without a command over the physical world such as the Phileni possess – and which we hope to borrow from them.'

'Perhaps there will be other great adventures here for our minds, to make us forget what we will have to abandon. We shall be able to learn something from Nature at last. What is the difference between fire and water, between wood and stone? What are the suns, and what are those millions of faint lights we see in the sky when both the suns are down? Perhaps the answers to all these questions may

lie at the end of the new road along which we must travel.'

He paused.

'New knowledge – new wisdom – in realms we have never dreamed of before. It may lure us away from the dangers we have encountered: for certainly nothing we can learn from Nature will ever be as great a threat as the peril we have uncovered in our own minds.'

The flow of Aretenon's thoughts was suddenly interrupted. Then he said: 'I think Eris wants to see you.'

Jeryl wondered why Eris had not sent the message to her: she wondered, too, at the undertone of amusement – or was it something else? – in Aretenon's mind.

There was no sign of Eris as they approached the caves, but he was waiting for them and came bounding out into the sunlight before they could reach the entrance. Then Jeryl gave an involuntary cry, and retreated a pace or two as her mate came towards her.

For Eris was whole again. Gone was the shattered stump on his forehead: it had been replaced by a new, gleaming horn no less splendid than the one he had lost.

In a belated gesture of greeting, Eris touched horns with Aretenon. Then he was gone into the forest in great joyous leaps – but not before his mind had met Jeryl's as it had seldom done since the days before the War.

'Let him go,' said Therodimus softly. 'He would rather be alone. When he returns I think you will find him – different.' He gave a laugh. 'The Phileni are clever, are they not? Now, perhaps, Eris will be more appreciative of their "toys".'

'I know I am impatient,' said Therodimus, 'but I am old now, and I want to see the changes begin in my own lifetime. That is why I am starting so many schemes in the hope that some at least will succeed. But this is the one, above all, in which I have put most faith.'

For a moment he lost himself in his thoughts. Not one in a hundred of his own race could fully share his dream. Even Eris, though he now believed in it, did so with his heart rather than his mind. Perhaps Aretenon – the brilliant and subtle Aretenon, so desperately anxious to neutralize the powers he had brought into the world – might have glimpsed the reality. But his was of all minds the most impenetrable, save when he wished otherwise.

‘You know as well as I do,’ continued Therodimus, as they walked upstream, ‘that our wars have only one cause – Food. We and the Mithraneans are trapped on this continent of ours with its limited resources, which we can do nothing to increase. Ahead of us we have always the nightmare of starvation, and for all our vaunted intelligence there has been nothing we can do about it. Oh yes, we have scraped some laborious irrigation ditches with our forehooves, but how slight their help has been!’

‘The Phileni have discovered how to grow crops that increase the fertility of the ground manyfold. I believe that we can do the same – once we have adapted their tools for our own use. That is our first and most important task, but it is not the one on which I have set my heart. The final solution to our problem, Eris, *must be the discovery of new, virgin lands into which our people can migrate.*’

He smiled at the other’s amazement.

‘No, don’t think I’m mad. Such lands do exist, I’m sure of it. Once I stood at the edge of the ocean and watched a great flight of birds coming inland from far out at sea. I have seen them flying outwards, too, so purposefully that I was certain they were going to some other country. And I have followed them with my thoughts.’

‘Even if your theory is true, as it probably is,’ said Eris, ‘what use is it to us?’ he gestured to the river flowing beside them. ‘We drown in the water, and you cannot build a rope to support us —’ His thoughts suddenly faded out into a

jumbled chaos of ideas.

Therodimus smiled.

‘So you have guessed what I hope to do. Well, now you can see if you are right.’

They had come to a level stretch of bank, upon which a group of the Phileni were busily at work, under the supervision of some of Therodimus’s assistants. Lying at the water’s edge was a strange object which, Eris realized, was made of many tree-trunks joined together by ropes.

They watched in fascination as the orderly tumult reached its climax. There was a great pulling and pushing, and the raft moved ponderously into the water with a mighty splash. The spray had scarcely ceased to fall when a young Mith-ranean leaped from the bank and began to dance gleefully upon the logs, which were now tugging at the moorings as if eager to break away and follow the river down to the sea. A moment later he had been joined by others, rejoicing in their mastery of a new element. The little Phileni, unable to make the leap, stood watching patiently on the bank while their masters enjoyed themselves.

There was an exhilaration about the scene that no one could fail to miss, though perhaps few of those present realized that they were at a turning-point in history. Only Therodimus stood a little apart from the rest, lost in his own thoughts. This primitive raft, he knew, was merely a beginning. It must be tested upon the river, then along the shores of the ocean. The work would take years, and he was never likely to see the first voyagers returning from those fabulous lands whose existence was still no more than a guess. But what had been begun, others would finish.

Overhead, a flight of birds was passing across the forest, Therodimus watched them go, envying their freedom to move at will over land and sea. He had begun the conquest of the water for his race, but that the skies might one day be theirs also was beyond even his imagination.

Aretenon, Jeryl and the rest of the expedition had already crossed the river when Eris said good-bye to Therodimus. This time they had done so without a drop of water touching their bodies, for the raft had come downstream and was performing valuable duties as a ferry. A new and much improved model was already under construction, as it was painfully obvious that the prototype was not exactly seaworthy. These initial difficulties would be quickly overcome by designers who, even if they were forced to work with Stone Age tools, could handle with ease the mathematics of metacentres, buoyancies and advanced hydrodynamics.

‘Your task won’t be a simple one,’ said Therodimus, ‘for you cannot show your people all the things you have seen here. At first you must be content to sow the seed, to arouse interest and curiosity – particularly among the young, who will come here to learn more. Perhaps you will meet opposition: I expect so. But every time you return to us, we shall have new things to show you and to strengthen your arguments.’

They touched horns: then Eris was gone, taking with him the knowledge that was to change the world – so slowly at first, then ever more swiftly. Once the barriers were down, once the Mithraneans and the Atheleni had been given the simple tools which they could fasten to their forelimbs and use unaided, progress would be swift. But for the present they must rely on the Phileni for everything: and there were so few of them.

Therodimus was well content. Only in one respect was he disappointed, for he had hoped that Eris, who had always been his favourite, might also be his successor. The Eris who was now returning to his own people was no longer self-obsessed or embittered, for he had a mission and hope for the future. But he lacked the keen, far-ranging vision that was needed here: it would be Aretenon who must continue

what he had begun. Still, that could not be helped, and there was no need yet to think of such matters. Therodimus was very old, but he knew that he would be meeting Eris many times again here by the river at the entrance to his land.

The ferry was gone now, and though he had expected it, Eris stopped amazed at the great span of the bridge, swaying slightly in the breeze. Its execution did not quite match its design – a good deal of mathematics had gone into its parabolic suspension – but it was still the first great engineering feat in history. Constructed though it was entirely of wood and rope, it forecast the shape of the metal giants to come.

Eris paused in mid-stream. He could see smoke rising from the shipyards facing the ocean, and thought he could just glimpse the masts of some of the new vessels that were being built for coastal trade. It was hard to believe that when he had first crossed this river he had been dragged over dangling from a rope.

Aretenon was waiting for them on the far bank. He moved rather slowly now, but his eyes were still bright with the old, eager intelligence. He greeted Eris warmly.

‘I’m glad you could come now. You’re just in time.’

That, Eris knew, could mean only one thing.

‘The ships are back?’

‘Almost: they were sighted an hour ago out on the horizon. They should be here at any moment, and then we shall know the truth at last, after all these years. If only —’

His thoughts faded out, but Eris could continue them. They had come to the great pyramid of stones beneath which Therodimus lay – Therodimus, whose brain was behind everything they saw, but who could never learn now if his most cherished dream was true or not.

There was a storm coming up from the ocean, and they

hurried along the new road that skirted the river's edge. Small boats of a kind that Eris had not seen before went past them occasionally, operated by Atheleni or Mith-raneans with wooden paddles strapped to their forelimbs. It always gave Eris great pleasure to see such new conquests, such new liberations of his people from their age-old chains. Yet sometimes they reminded him of children who had suddenly been let loose into a wonderful new world, full of exciting and interesting things that must be done, whether they were likely to be useful or not. However, anything that promised to make his race into better sailors was more than useful. In the last decade Eris had discovered that pure intelligence was sometimes not enough: there were skills that could not be acquired by any amount of mental effort. Though his people had largely overcome their fear of water, they were still quite incompetent on the ocean, and the Phileni had therefore become the first navigators of the world.

Jeryl looked nervously around her as the first peal of thunder came rolling in from the sea. She was still wearing the necklace that Therodimus had given her so long ago: but it was by no means the only ornament she carried now.

'I hope the ships will be safe,' she said anxiously.

'There's not much wind, and they will have ridden out much worse storms than this,' Aretenon reassured her, as they entered his cave. Eris and Jeryl looked round with eager interest to see what new wonders the Phileni had made during their absence: but if there were any they had, as usual, been hidden away until Aretenon was ready to show them. He was still rather childishly fond of such little surprises and mysteries.

There was an air of absentmindedness about the meeting that would have puzzled an onlooker ignorant of its cause. As Eris talked of all the changes in the outer world, of the success of the new Phileni settlements, and of the

steady growth of agriculture among his people, Aretenon listened with only half his mind. His thoughts, and those of his friends, were far out at sea, meeting the oncoming ships which might be bringing the greatest news their world had ever received.

As Eris finished his report, Aretenon got up and began to move restlessly around the chamber.

‘You have done better than we dared to hope at the beginning. At least there has been no war for a generation, and our food supply is ahead of the population for the first time in history – thanks to our new agricultural techniques.’

Aretenon glanced at the furnishings of his chamber, recalling with an effort the fact that in his own youth almost everything he saw would have appeared impossible or even meaningless to him. Not even the simplest of tools had existed then, at least in the knowledge of his people. Now there were ships and bridges and houses – and these were only the beginning.

‘I am well satisfied,’ he said. ‘We have, as we planned, diverted the whole stream of our culture, turning it away from the dangers that lay ahead. The powers that made the Madness possible will soon be forgotten: only a handful of us still know of them, and we will take our secrets with us. Perhaps when our descendants rediscover them they will be wise enough to use them properly. But we have uncovered so many new wonders that it may be a thousand generations before we turn again to look into our own minds and to tamper with the forces locked within them.’

The mouth of the cave was illuminated by a sudden flash of lightning. The storm was coming nearer, though it was still some miles away. Rain was beginning to fall in large, angry drops from the leaden sky.

‘While we’re waiting for the ships,’ said Aretenon rather abruptly, ‘come into the next cave and see some of the new things we have to show you since your last visit.’

It was a strange collection. Side by side on the same bench were tools and inventions which in other cultures had been separated by thousands of years of time. The Stone Age was past: bronze and iron had come, and already the first crude scientific instruments had been built for experiments that were driving back the frontiers of the unknown. A primitive retort spoke of the beginnings of chemistry, and by its side were the first lenses the world had seen – waiting to reveal the unsuspected universes of the infinitely small and the infinitely great.

The storm was upon them as Aretenon's description of these new wonders drew to its close. From time to time he had glanced nervously at the mouth of the cave, as if awaiting a messenger from the harbour, but they had remained undisturbed save by the occasional crash of thunder.

'I've shown you everything of importance,' he said, 'but here's something that may amuse you while we're waiting. As I said, we've sent expeditions everywhere to collect and classify all the rocks they can, in the hope of finding useful minerals. One of them brought back this.'

He extinguished the lights and the cave became completely dark.

'It will be some time before your eyes grow sensitive enough to see it,' Aretenon warned. 'Just look over there in that corner.'

Eris strained his eyes into the darkness. At first he could see nothing: then, slowly, a glimmering blue light became faintly visible. It was so vague and diffuse that he could not focus his eyes upon it, and he automatically moved forward.

'I shouldn't go too near,' advised Aretenon. 'It seems to be a perfectly ordinary mineral, but the Phileni who found it and carried it here got some very strange burns from handling it. Yet it's quite cold to the touch. One day we'll learn its secret: but I don't suppose it's anything at all important.'

A vast curtain of sheet lightning split the sky, and for a

moment the reflected glare lit up the cave, pinning weird shadows against the walls. At the same moment one of the Phileni staggered into the entrance and called something to Aretenon in its thin, reedy voice. He gave a great shout of triumph as one of his ancestors might have done on some ancient battlefield: then his thoughts came crashing into Eris's mind.

'Land! They've found land – a whole new continent waiting for us!'

Eris felt the sense of triumph and victory well up within him like water bursting from a spring. Clear ahead now into the future lay the new, the glorious road along which their children would travel, mastering the world and all its secrets as they went. The vision of Therodimus was at last sharp and brilliant before his eyes.

He felt for the mind of Jeryl, so that she could share his joy – and found that it was closed to him. Leaning towards her in the darkness, he could sense that she was still staring into the depths of the cave, as if she had never heard the wonderful news, and could not tear her eyes away from that enigmatic glow.

Out of the night came the roar of the belated thunder as it raced across the sky. Eris felt Jeryl tremble beside him, and sent out his thoughts to comfort her.

'Don't let the thunder frighten you,' he said gently. 'What is there to fear now?'

'I do not know,' replied Jeryl. 'I am frightened – but not of the thunder. Oh, Eris, it is a wonderful thing we have done, and I wish Therodimus could be here to see it. But where will it lead in the end – this new road of ours?'

Out of the past, the words that Aretenon had once spoken had risen to haunt her. She remembered their walk by the river, long ago, when he had talked of his hopes and had said: 'Certainly nothing we can learn from Nature will ever be as great a threat as the peril we have encountered in our

own minds.' Now the words seemed to mock her and to cast a shadow over the golden future: but why, she could not say.

Alone, perhaps, of all the races in the Universe, her people had reached the second cross-roads – and had never passed the first. Now they must go along the road that they had missed, and must face the challenge at its end – the challenge from which, this time, they could not escape.

In the darkness, the faint glow of dying atoms burned unwavering in the rock. It would still be burning there, scarcely dimmed, when Jeryl and Eris had been dust for centuries. It would be only a little fainter when the civilization they were building had at last unlocked its secrets.

THE SENTINEL

THE next time you see the full Moon high in the south, look carefully at its right-hand edge and let your eye travel upwards along the curve of the disc. Round about two o'clock, you will notice a small, dark oval: anyone with normal eyesight can find it quite easily. It is the great walled plain, one of the finest on the Moon, known as the Mare Crisium – the Sea of Crises. Three hundred miles in diameter – and almost completely surrounded by a ring of magnificent mountains, it had never been explored until we entered it in the late summer of 1996.

Our expedition was a large one. We had two heavy freighters which had flown our supplies and equipment from the main lunar base in the Mare Serenitatis, five hundred miles away. There were also three small rockets which were intended for short-range transport over regions which our surface vehicles could not cross. Luckily, most of the Mare Crisium is very flat. There are none of the great crevasses so common and so dangerous elsewhere, and very few craters or mountains of any size. As far as we could tell, our powerful caterpillar tractors would have no difficulty in taking us wherever we wished.

I was geologist – or selenologist, if you want to be pedantic – in charge of the group exploring the southern region of the Mare. We had crossed a hundred miles of it in a week, skirting the foothills of the mountains along the shore of what was once the ancient sea, some thousand million years before. When life was beginning on Earth, it was already dying here. The waters were retreating down the flanks of those stupendous cliffs, retreating into the empty

heart of the Moon. Over the land which we were crossing, the tideless ocean had once been half a mile deep and now the only trace of moisture was the hoar frost one could sometimes find in caves which the searing sunlight never penetrated.

We had begun our journey early in the slow lunar dawn, and still had almost a week of Earth-time before nightfall. Half a dozen times a day we would leave our vehicle and go outside in the space-suits to hunt for interesting minerals, or to place markers for the guidance of future travellers. It was an uneventful routine. There is nothing hazardous or even particularly exciting about lunar exploration. We could live comfortably for a month in our pressurized tractors, and if we ran into trouble we could always radio for help and sit tight until one of the spaceships came to our rescue. When that happened there was always a frightful outcry about the waste of rocket fuel, so a tractor sent out an SOS only in a real emergency.

I said just now that there was nothing exciting about lunar exploration, but of course that is not true. One could never grow tired of those incredible mountains, so much more rugged than the gentle hills of Earth. We never knew, as we rounded the capes and promontories of that vanished sea, what new splendours would be revealed to us. The whole southern curve of the Mare Crisium is a vast delta where a score of rivers had once found their way into the ocean, fed perhaps by the torrential rains that must have lashed the mountains in the brief volcanic age when the moon was young. Each of these ancient valleys was an invitation, challenging us to climb into the unknown uplands beyond. But we had a hundred miles still to cover, and could only look longingly at the heights which others must scale.

We kept Earth-time aboard the tractor, and precisely at 22.00 hours the final radio message would be sent out to

base and we could close down for the day. Outside, the rocks would still be burning beneath the almost vertical sun, but to us it was night until we awoke again eight hours later. Then one of us would prepare breakfast, there would be a great buzzing of electric shavers and someone would switch on the short-wave radio from Earth. Indeed, when the smell of frying bacon began to fill the cabin, it was sometimes hard to believe that we were not back on our own world – everything was so normal and homely, apart from the feeling of decreased weight and the unnatural slowness with which objects fell.

It was my turn to prepare breakfast in the corner of the main cabin that served as a galley. I can remember that moment quite vividly after all these years, for the radio had just played one of my favourite melodies, the old Welsh air, 'David of the White Rock'. Our driver was already outside in his space-suit, inspecting our caterpillar treads. My assistant, Louis Garnett, was up forward in the control position, making some belated entries in yesterday's log.

As I stood by the frying-pan, waiting, like any terrestrial housewife, for the sausages to brown, I let my gaze wander idly over the mountain walls which covered the whole of the southern horizon, marching out of sight to the east and west below the curve of the Moon. They seemed only a mile or two from the tractor, but I knew that the nearest was twenty miles away. On the Moon, of course, there is no loss of detail with distance – none of that almost imperceptible haziness which softens and sometimes transfigures all far-off things on Earth.

Those mountains were ten thousand feet high, and they climbed steeply out of the plain as if ages ago some subterranean eruption had smashed them skywards through the molten crust. The base of even the nearest was hidden from sight by the steeply curving surface of the plain, for the Moon is a very little world, and from where I was standing

the horizon was only two miles away.

I lifted my eyes towards the peaks which no man had ever climbed, the peaks which, before the coming of terrestrial life, had watched the retreating oceans sink sullenly into their graves, taking with them the hope and morning promise of a world. The sunlight was beating against those ramparts with a glare that hurt the eyes, yet only a little way above them the stars were shining steadily in a sky blacker than a winter midnight on Earth.

I was turning away when my eye caught a metallic glitter high on the ridge of a great promontory thrusting out into the sea thirty miles to the west. It was a dimensionless point of light as if a star had been clawed from the sky by one of those cruel peaks, and I imagined that some smooth rock-surface was catching the sunlight and heliographing it straight into my eyes. Such things were not uncommon. When the Moon is in her second quarter, observers on Earth can sometimes see the great ranges in the *Oceanus Procellarum* burning with a blue-white iridescence as the sunlight flashes from their slopes and leaps again from world to world. But I was curious to know what kind of rock could be shining so brightly up there, and I climbed into the observation turret and swung our four-inch telescope round to the west.

I could see just enough to tantalize me. Clear and sharp in the field of vision, the mountain peaks seemed only half a mile away, but whatever was catching the sunlight was still too small to be resolved. Yet it seemed to have an elusive symmetry, and the summit upon which it rested was curiously flat. I stared for a long time at that glittering enigma, straining my eyes into space, until presently a smell of burning from the galley told me that our breakfast sausages had made their quarter-million-mile journey in vain.

All that morning we argued our way across the Mare

Crisium while the western mountains reared higher in the sky. Even when we were out prospecting in the space-suits, the discussion would continue over the radio. It was absolutely certain, my companions argued, that there had never been any form of intelligent life on the Moon. The only living things that had ever existed there were a few primitive plants and their slightly less degenerate ancestors. I knew that as well as anyone, but there are times when a scientist must not be afraid to make a fool of himself.

‘Listen,’ I said at last, ‘I’m going up there, if only for my own peace of mind. That mountain’s less than twelve thousand feet high – that’s only two thousand under Earth gravity – and I can make the trip in twenty hours at the outside. I’ve always wanted to go up into those hills, anyway, and this gives me an excellent excuse.’

‘If you don’t break your neck,’ said Garnett, ‘you’ll be the laughing-stock of the expedition when we get back to Base. That mountain will probably be called Wilson’s Folly from now on.’

‘I won’t break my neck,’ I said firmly. ‘Who was the first man to climb Pico and Helicon?’

‘But weren’t you rather younger in those days?’ asked Louis gently.

‘That,’ I said with great dignity, ‘is as good a reason as any for going.’

We went to bed early that night, after driving the tractor to within half a mile of the promontory. Garnett was coming with me in the morning; he was a good climber, and had often been with me on such exploits before. Our driver was only too glad to be left in charge of the machine.

At first sight, those cliffs seemed completely unscalable, but to anyone with a good head for heights, climbing is easy on a world where all weights are only a sixth of their normal value. The real danger in lunar mountaineering lies in over-confidence; a six-hundred-foot drop on the Moon can kill

you just as thoroughly as a hundred-foot fall on Earth.

We made our first halt on a wide ledge about four thousand feet above the plain. Climbing had not been very difficult but my limbs were stiff with the unaccustomed effort, and I was glad of the rest. We could still see the tractor as a tiny metal insect far down at the foot of the cliff, and we reported our progress to the driver before starting on the next ascent.

Hour by hour the horizon widened and more and more of the great plain came into sight. Now we could look for fifty miles out across the Mare, and even see the peaks of the mountains on the opposite coast more than a hundred miles away. Few of the great lunar plains are as smooth as the Mare Crisium, and we could almost imagine that a sea of water and not of rock was lying there two miles below. Only a group of crater pits low down on the skyline spoiled the illusion.

Our goal was still invisible over the crest of the mountain and we were steering by maps, using the Earth as a guide. Almost due east of us, that great silver crescent hung low over the plain, already well into its first quarter. The Sun and the stars would make their slow march across the sky and would sink presently from sight, but Earth would always be there, never moving from her appointed place, waxing and waning as the years and seasons passed. In ten days' time she would be a blinding disc bathing these rocks with her midnight radiance, fifty-fold brighter than the full moon. But we must be out of the mountains long before night, or else we would remain among them forever.

Inside our suits it was comfortably cool, for the refrigeration units were fighting the fierce Sun and carrying away the body-heat of our exertions. We seldom spoke to each other, except to pass climbing instructions and to discuss our best plan of ascent. I do not know what Garnett was thinking, probably that this was the craziest goose chase he had

ever embarked upon. I more than half agreed with him, but the joy of climbing, the knowledge that no man had ever gone this way before and the exhilaration of the steadily widening landscape gave me all the reward I needed.

I do not think I was particularly excited when I saw in front of us the wall of rock I had first inspected through the telescope from thirty miles away. It would level off about fifty feet above our heads, and there on the plateau would be the thing that had lured me over these barren wastes. It was, almost certainly, nothing more than a boulder splintered ages ago by a falling meteor, and with its cleavage planes still fresh and bright in this incorruptible, unchanging silence.

There were no hand-holds on the rock face and we had to use a grapnel. My tired arms seemed to gain new strength as I swung the three-pronged metal anchor round my head and sent it sailing up towards the stars. The first time it broke loose and came falling slowly back when we pulled the rope. On the third attempt, the prongs gripped firmly and our combined weights could not shift it.

Garnett looked at me anxiously. I could tell that he wanted to go first, but I smiled back at him through the glass of my helmet and shook my head. Slowly, taking my time, I began the final ascent.

Even with my space-suit, I only weighed forty pounds here, so I pulled myself up hand over hand without bothering to use my feet. At the rim I paused and waved to my companion, then I scrambled over the edge and stood upright, staring ahead of me.

You must understand that until this very moment I had been almost completely convinced that there could be nothing strange or unusual for me to find here. Almost, but not quite; it was that haunting doubt that had driven me forwards. Well, it was a doubt no longer, but the haunting had scarcely begun.

I was standing on a plateau perhaps a hundred feet across. It had once been smooth – too smooth to be natural – but falling meteors had pitted and scored its surface through immeasurable aeons. It had been levelled to support a glittering roughly pyramidal structure, twice as high as a man, that was set in the rock like a gigantic, many-faceted jewel.

Probably no emotion at all filled my mind in those first few seconds. Then I felt a great lifting of my heart, and a strange inexpressible joy. For I loved the Moon, and now I knew that the creeping moss of Aristarchus and Eratosthenes was not the only life she had brought forth in her youth. The old, discredited dream of the first explorers was true. There had, after all, been a lunar civilization – and I was the first to find it. That I had come perhaps a hundred million years too late did not distress me; it was enough to have come at all.

My mind was beginning to function normally, to analyse and to ask questions. Was this a building, a shrine – or something for which my language had no name? If a building, then why was it erected in so uniquely inaccessible a spot? I wondered if it might be a temple, and I could picture the adepts of some strange priesthood calling on their gods to preserve them as the life of the Moon ebbed with the dying oceans, and calling on their gods in vain.

I took a dozen steps forward to examine the thing more closely, but some sense of caution kept me from going too near. I knew a little of archaeology, and tried to guess the cultural level of the civilization that must have smoothed this mountain and raised the glittering mirror surfaces that still dazzled my eyes.

The Egyptians could have done it, I thought, if their workmen had possessed whatever strange materials these far more ancient architects had used. Because of the thing's smallness, it did not occur to me that I might be looking at

the handiwork of a race more advanced than my own. The idea that the Moon had possessed intelligence at all was still almost too tremendous to grasp, and my pride would not let me take the final, humiliating plunge.

And then I noticed something that set the scalp crawling at the back of my neck – something so trivial and so innocent that many would never have noticed it at all. I have said that the plateau was scarred by meteors; it was also coated inches deep with the cosmic dust that is always filtering down upon the surface of any world where there are no winds to disturb it. Yet the dust and the meteor scratches ended quite abruptly in a wide circle enclosing the little pyramid, as though an invisible wall was protecting it from the ravages of time and the slow but ceaseless bombardment from space.

There was someone shouting in my earphones, and I realized that Garnett had been calling me for some time. I walked unsteadily to the edge of the cliff and signalled him to join me, not trusting myself to speak. Then I went back towards that circle in the dust. I picked up a fragment of splintered rock and tossed it gently towards the shining enigma. If the pebble had vanished at that invisible barrier I should not have been surprised, but it seemed to hit a smooth, hemispherical surface and slide gently to the ground.

I knew then that I was looking at nothing that could be matched in the antiquity of my own race. This was not a building, but a machine, protecting itself with forces that had challenged Eternity. Those forces, whatever they might be, were still operating, and perhaps I had already come too close. I thought of all the radiations man had trapped and tamed in the past century. For all I knew, I might be as irrevocably doomed as if I had stepped into the deadly, silent aura of an unshielded atomic pile.

I remember turning then towards Garnett, who had

joined me and was now standing motionless at my side. He seemed quite oblivious of me, so I did not disturb him but walked to the edge of the cliff in an effort to marshal my thoughts. There below me lay the Mare Crisium – Sea of Crises, indeed – strange and weird to most men, but reassuringly familiar to me. I lifted my eyes towards the crescent Earth, lying in her cradle of stars, and I wondered what her clouds had covered when these unknown builders had finished their work. Was it the steaming jungle of the Carboniferous, the bleak shoreline over which the first amphibians must crawl to conquer the land – or, earlier still, the long loneliness before the coming of life?

Do not ask me why I did not guess the truth sooner – the truth that seems so obvious now. In the first excitement of my discovery, I had assumed without question that this crystalline apparition had been built by some race belonging to the Moon's remote past, but suddenly, and with overwhelming force, the belief came to me that it was as alien to the Moon as I myself.

In twenty years we had found no trace of life but a few degenerate plants. No lunar civilization, whatever its doom, could have left but a single token of its existence.

I looked at the shining pyramid again, and the more remote it seemed from anything that had to do with the Moon. And suddenly I felt myself shaking with a foolish, hysterical laughter, brought on by excitement and over-exertion: for I had imagined that the little pyramid was speaking to me and was saying: 'Sorry, I'm a stranger here myself.'

It has taken us twenty years to crack that invisible shield and to reach the machine inside those crystal walls. What we could not understand, we broke at last with the savage might of atomic power and now I have seen the fragments of the lovely, glittering thing I found up there on the mountain.

They are meaningless. The mechanisms – if indeed they are mechanisms – of the pyramid belong to a technology

that lies far beyond our horizon, perhaps to the technology of parapsychical forces.

The mystery haunts us all the more now that the other planets have been reached and we know that only Earth has ever been the home of intelligent life. Nor could any lost civilization of our own world have built that machine, for the thickness of the meteoric dust on the plateau has enabled us to measure its age. It was set there upon its mountain before life had emerged from the seas of Earth.

When our world was half its present age, *something* from the stars swept through the Solar System, left this token of its passage, and went again upon its way. Until we destroyed it, that machine was still fulfilling the purpose of its builders; and as to that purpose, here is my guess.

Nearly a hundred thousand million stars are turning in the circle of the Milky Way, and long ago other races on the worlds of other suns must have scaled and passed the heights that we have reached. Think of such civilizations, far back in time against the fading afterglow of Creation, masters of a universe so young that life as yet had come only to a handful of worlds. Theirs would have been a loneliness we cannot imagine, the loneliness of gods looking out across infinity and finding none to share their thoughts.

They must have searched the star-clusters as we have searched the planets. Everywhere there would be worlds, but they would be empty or peopled with crawling, mindless things. Such was our own Earth, the smoke of the great volcanoes still staining the skies, when that first ship of the peoples of the dawn came sliding in from the abyss beyond Pluto. It passed the frozen outer worlds, knowing that life could play no part in their destinies. It came to rest among the inner planets, warming themselves around the fire of the Sun and waiting for their stories to begin.

Those wanderers must have looked on Earth, circling safely in the narrow zone between fire and ice, and must

have guessed that it was the favourite of the Sun's children. Here, in the distant future, would be intelligence; but there were countless stars before them still, and they might never come this way again.

So they left a sentinel, one of millions they have scattered throughout the universe, watching over all worlds with the promise of life. It was a beacon that down the ages has been patiently signalling the fact that no one had discovered it.

Perhaps you understand now why that crystal pyramid was set upon the Moon instead of on the Earth. Its builders were not concerned with races still struggling up from savagery. They would be interested in our civilization only if we proved our fitness to survive – by crossing space and so escaping from the Earth, our cradle. That is the challenge that all intelligent races must meet, sooner or later. It is a double challenge, for it depends in turn upon the conquest of atomic energy and the last choice between life and death.

Once we had passed that crisis, it was only a matter of time before we found the pyramid and forced it open. Now its signals have ceased, and those whose duty it is will be turning their minds upon Earth. Perhaps they wish to help our infant civilization. But they must be very, very old, and the old are often insanely jealous of the young.

I can never look now at the Milky Way without wondering from which of those banked clouds of stars the emissaries are coming. If you will pardon so commonplace a simile, we have broken the glass of the fire-alarm and have nothing to do but to wait.

I do not think we will have to wait for long.

THE STAR

It is three thousand light-years to the Vatican. Once, I believed that space could have no power over faith, just as I believed that the heavens declared the glory of God's handiwork. Now I have seen that handiwork, and my faith is sorely troubled. I stare at the crucifix that hangs on the cabin wall above the Mark VI Computer, and for the first time in my life I wonder if it is no more than an empty symbol.

I have told no one yet, but the truth cannot be concealed. The facts are there for all to read, recorded on the countless miles of magnetic tape and the thousands of photographs we are carrying back to Earth. Other scientists can interpret them as easily as I can, and I am not one who would condone that tampering with the truth which often gave my order a bad name in the olden days.

The crew are already sufficiently depressed: I wonder how they will take this ultimate irony. Few of them have any religious faith, yet they will not relish using this final weapon in their campaign against me – that private, good-natured, but fundamentally serious, war which lasted all the way from Earth. It amused them to have a Jesuit as chief astrophysicist: Dr. Chandler, for instance, could never get over it (why are medical men such notorious atheists?). Sometimes he would meet me on the observation deck, where the lights are always low so that the stars shine with undiminished glory. He would come up to me in the gloom and stand staring out of the great oval port, while the heavens crawled slowly around us as the ship turned end over end with the residual spin we had never bothered to correct.

‘Well, Father,’ he would say at last, ‘it goes on forever and forever, and perhaps *Something* made it. But how you can believe that *Something* has a special interest in us and our miserable little world – that just beats me.’ Then the argument would start, while the stars and nebulae would swing around us in silent, endless arcs beyond the flawlessly clear plastic of the observation port.

It was, I think, the apparent incongruity of my position that caused most amusement to the crew. In vain I would point to my three papers in the *Astrophysical Journal*, my five in the *Monthly Notices of the Royal Astronomical Society*. I would remind them that my order has long been famous for its scientific works. We may be few now, but ever since the eighteenth century we have made contributions to astronomy and geophysics out of all proportion to our numbers. Will my report on the Phoenix Nebula end our thousand years of history? It will end, I fear, much more than that.

I do not know who gave the nebula its name, which seems to me a very bad one. If it contains a prophecy, it is one that cannot be verified for several billion years. Even the word nebula is misleading: this is a far smaller object than those stupendous clouds of mist – the stuff of unborn stars – that are scattered throughout the length of the Milky Way. On the cosmic scale, indeed, the Phoenix Nebula is a tiny thing – a tenuous shell of gas surrounding a single star.

Or what is left of a star ...

The Rubens engraving of Loyola seems to mock me as it hangs there above the spectrophotometer tracings. What would *you*, Father, have made of this knowledge that has come into my keeping, so far from the little world that was all the universe you knew? Would your faith have risen to the challenge, as mine has failed to do?

You gaze into the distance, Father, but I have travelled

a distance beyond any that you could have imagined when you founded our order a thousand years ago. No other survey ship has been so far from Earth: we are at the very frontiers of the explored universe. We set out to reach the Phoenix Nebula, we succeeded, and we are homeward bound with our burden of knowledge. I wish I could lift that burden from my shoulders, but I call to you in vain across the centuries and the light-years that lie between us.

On the book you are holding the words are plain to read. AD MAIOREM DEI GLORIAM, the message runs, but it is a message I can no longer believe. Would you still believe it, if you could see what we have found?

We knew, of course, what the Phoenix Nebula was. Every year, in our galaxy alone, more than a hundred stars explode, blazing for a few hours or days with thousands of times their normal brilliance before they sink back into death and obscurity. Such are the ordinary novae – the commonplace disasters of the universe. I have recorded the spectrograms and light curves of dozens since I started working at the Lunar Observatory.

But three or four times in every thousand years occurs something beside which even a nova pales into total insignificance.

When a star becomes a *supernova*, it may for a little while outshine all the massed suns of the galaxy. The Chinese astronomers watched this happen in A.D. 1054, not knowing what it was they saw. Five centuries later, in 1572, a supernova blazed in Cassiopeia so brilliantly that it was visible in the daylight sky. There have been three more in the thousand years that have passed since then.

Our mission was to visit the remnants of such a catastrophe, to reconstruct the events that led up to it, and, if possible, to learn its cause. We came slowly in through the concentric shells of gas that had been blasted out six thousand years before, yet were expanding still. They were

immensely hot, radiating even now with a fierce violet light, but were far too tenuous to do us any damage. When the star had exploded, its outer layers had been driven upwards with such speed that they had escaped completely from its gravitational field. Now they formed a hollow shell large enough to engulf a thousand solar systems, and at its centre burned the tiny, fantastic object which the star had now become – a white dwarf, smaller than the Earth, yet weighing a million times as much.

The glowing gas shells were all around us, banishing the normal night of interstellar space. We were flying into the centre of a cosmic bomb that had detonated millennia ago and whose incandescent fragments were still hurtling apart. The immense scale of the explosion, and the fact that the debris already covered a volume of space many billions of miles across, robbed the scene of any visible movement. It would take decades before the unaided eye could detect any motion in these tortured wisps and eddies of gas, yet the sense of turbulent expansion was overwhelming.

We had checked our primary drive hours before, and were drifting slowly towards the fierce little star ahead. Once it had been a sun like our own, but it had squandered in a few hours the energy that should have kept it shining for a million years. Now it was a shrunken miser, hoarding its resources as if trying to make amends for its prodigal youth.

No one seriously expected to find planets. If there had been any before the explosion, they would have been boiled into puffs of vapour, and their substance lost in the greater wreckage of the star itself. But we made the automatic search, as we always do when approaching an unknown sun, and presently we found a single small world circling the star at an immense distance. It must have been the Pluto of this vanished solar system, orbiting on the frontiers of the night. Too far from the central sun ever to have known life,

its remoteness had saved it from the fate of all its lost companions.

The passing fires had seared its rocks and burned away the mantle of frozen gas that must have covered it in the days before the disaster. We landed, and we found the Vault.

Its builders had made sure that we should. The monolithic marker that stood above the entrance was now a fused stump, but even the first long-range photographs told us that here was the work of intelligence. A little later we detected the continent-wide pattern of radioactivity that had been buried in the rock. Even if the pylon above the Vault had been destroyed, this would have remained, an immovable and all but eternal beacon calling to the stars. Our ship fell towards this gigantic bull's-eye like an arrow into its target.

The pylon must have been a mile high when it was built, but now it looked like a candle that had melted down into a puddle of wax. It took us a week to drill through the fused rock, since we did not have the proper tools for a task like this. We were astronomers, not archaeologists, but we could improvise. Our original purpose was forgotten: this lonely monument, reared with such labour at the greatest possible distance from the doomed sun, could have only one meaning. A civilization that knew it was about to die had made its last bid for immortality.

It will take us generations to examine all the treasures that were placed in the Vault. They had plenty of time to prepare, for their sun must have given its first warnings many years before the final detonation. Everything that they wished to preserve, all the fruit of their genius, they brought here to this distant world in the days before the end, hoping that some other race would find it and that they would not be utterly forgotten. Would we have done as well, or would we have been too lost in our own misery to give thought to a future we could never see or share?

If only they had had a little more time! They could travel freely enough between the planets of their own sun, but they had not yet learned to cross the interstellar gulfs, and the nearest solar system was a hundred light-years away. Yet even had they possessed the secret of the Transfinite Drive no more than a few millions could have been saved. Perhaps it was better thus.

Even if they had not been so disturbingly human as their sculpture shows, we could not have helped admiring them and grieving for their fate. They left thousands of visual records and the machines for projecting them, together with elaborate pictorial instructions from which it will not be difficult to learn their written language. We have examined many of these records, and brought to life for the first time in six thousand years the warmth and beauty of a civilization that in many ways must have been superior to our own. Perhaps they only showed us the best, and one can hardly blame them. But their worlds were very lovely, and their cities were built with a grace that matches anything of man's. We have watched them at work and play, and listened to their musical speech sounding across the centuries. One scene is still before my eyes – a group of children on a beach of strange blue sand, playing in the waves as children play on Earth. Curious whiplike trees line the shore, and some very large animal is wading in the shallows yet attracting no attention at all.

And sinking into the sea, still warm and friendly and life-giving, is the sun that will turn traitor and obliterate all this innocent happiness.

Perhaps if we had not been so far from home and so vulnerable to loneliness, we should not have been so deeply moved. Many of us had seen the ruins of ancient civilizations on other worlds, but they had never affected us so profoundly. This tragedy was unique. It is one thing for a race to fail and die, as nations and cultures have done on

Earth. But to be destroyed so completely in the full flower of its achievement, leaving no survivors – now could that be reconciled with the mercy of God?

My colleagues have asked me that, and I have given what answers I can. Perhaps you could have done better, Father Loyola, but I have found nothing in the *Exercitia Spiritualia* that helps me here. They were not an evil people: I do not know what gods they worshipped, if indeed they worshipped any. But I have looked back at them across the centuries, and have watched while the loveliness they used their last strength to preserve was brought forth again into the light of their shrunken sun. They could have taught us much: why were they destroyed?

I know the answers that my colleagues will give when they get back to Earth. They will say that the universe has no purpose and no plan, that since a hundred suns explode every year in our galaxy, at this very moment some race is dying in the depths of space. Whether that race has done good or evil during its lifetime will make no difference in the end: there is no divine justice, for there is no God.

Yet, of course, what we have seen proves nothing of the sort. Anyone who argues thus is being swayed by emotion, not logic. God has no need to justify His actions to man. He who built the universe can destroy it when He chooses. It is arrogance – it is perilously near blasphemy – for us to say what He may or may not do.

This I could have accepted, hard though it is to look upon whole worlds and peoples thrown into the furnace. But there comes a point when even the deepest faith must falter, and now, as I look at the calculations lying before me, I know I have reached that point at last.

We could not tell, before we reached the nebula, how long ago the explosion took place. Now, from the astronomical evidence and the record in the rocks of that one surviving planet, I have been able to date it very exactly. I know in

what year the light of this colossal conflagration reached our Earth. I know how brilliantly the supernova whose corpse now dwindles behind our speeding ship once shone in terrestrial skies. I know how it must have blazed low in the east before sunrise, like a beacon in that oriental dawn.

There can be no reasonable doubt: the ancient mystery is solved at last. Yet, oh God, there were so many stars you could have used. What was the need to give these people to the fire, that the symbol of their passing might shine above Bethlehem?

REFUGEE

‘WHEN he comes aboard,’ said Captain Saunders, as he waited for the landing ramp to extrude itself, ‘what the devil shall I call him?’

There was a thoughtful silence while the navigation officer and the assistant pilot considered this problem in etiquette. Then Mitchell locked the main control panel, and the ship’s multitudinous mechanisms lapsed into unconsciousness as power was withdrawn from them.

‘The correct address,’ he drawled slowly, ‘is “Your Royal Highness”.’

‘Huh!’ snorted the captain. ‘I’ll be damned if I’ll call anyone that!’

‘In these progressive days,’ put in Chambers helpfully, ‘I believe that “Sir” is quite sufficient. But there’s no need to worry if you forget: it’s been a long time since anyone went to the Tower. Besides, this Henry isn’t as tough a proposition as the one who had all the wives.’

‘From all accounts,’ added Mitchell, ‘he’s a very pleasant young man. Quite intelligent, too. He’s often been known to ask people technical questions that they couldn’t answer.’

Captain Saunders ignored the implications of this remark, beyond resolving that if Prince Henry wanted to know how a Field Compensation Drive Generator worked, then Mitchell could do the explaining. He got gingerly to his feet – they’d been operating on half a gravity during flight, and now they were on Earth, he felt like a ton of bricks – and started to make his way along the corridors that led to the lower air lock. With an oily purring, the great curving door side-stepped out of his way. Adjusting his smile, he walked

out to meet the television cameras and the heir to the British throne.

The man who would, presumably, one day be Henry IX of England was still in his early twenties. He was slightly below average height, and had fine-drawn, regular features that really lived up to all the genealogical clichés. Captain Saunders, who came from Dallas and had no intention of being impressed by any prince, found himself unexpectedly moved by the wide, sad eyes. They were eyes that had seen too many receptions and parades, that had had to watch countless totally uninteresting things, that had never been allowed to stray far from the carefully planned official routes. Looking at that proud but weary face, Captain Saunders glimpsed for the first time the ultimate loneliness of royalty. All his dislike of that institution became suddenly trivial against its real defect: what was wrong with the Crown was the unfairness of inflicting such a burden on any human being . . .

The passageways of the *Centaurus* were too narrow to allow for general sight-seeing, and it was soon clear that it suited Prince Henry very well to leave his entourage behind. Once they had begun moving through the ship, Saunders lost all his stiffness and reserve, and within a few minutes was treating the prince exactly like any other visitor. He did not realize that one of the earliest lessons royalty has to learn is that of putting people at their ease.

‘You know, Captain,’ said the prince wistfully, ‘this is a big day for us. I’ve always hoped that one day it would be possible for spaceships to operate from England. But it still seems strange to have a port of our own here, after all these years. Tell me – did you ever have much to do with rockets?’

‘Well, I had some training on them, but they were already on the way out before I graduated. I was lucky: some older men had to go back to school and start all over again – or

else abandon space completely if they couldn't convert to the new ships.'

'It made as much difference as that?'

'Oh yes – when the rocket went, it was as big as the change from sail to steam. That's an analogy you'll often hear, by the way. There was a glamour about the old rockets, just as there was about the old windjammers, which these modern ships haven't got. When the *Centaurus* takes off, she goes up as quietly as a balloon – and as slowly, if she wants to. But a rocket blast-off shook the ground for miles, and you'd be deaf for days if you were too near the launching apron. Still, you'll know all that from the old news recordings.'

The prince smiled.

'Yes,' he said. 'I've often run through them at the Palace. I think I've watched every incident in all the pioneering expeditions. I was sorry to see the end of the rockets, too. But we could never have had a spaceport here on Salisbury Plain – the vibration would have shaken down Stonehenge!'

'Stonehenge?' queried Saunders as he held open a hatch and let the prince through into Hold Number 3.

'Ancient monument – one of the most famous stone circles in the world. It's really impressive, and about three thousand years old. See it if you can – it's only ten miles from here.'

Captain Saunders had some difficulty in suppressing a smile. What an odd country this was: where else, he wondered, would you find contrasts like this? It made him feel very young and raw when he remembered that back home Billy the Kid was ancient history, and there was hardly anything in the whole of Texas as much as five hundred years old. For the first time he began to realize what tradition meant: it gave Prince Henry something that he could never possess. Poise – self-confidence, yes, that was it. And a

pride that was somehow free from arrogance because it took itself so much for granted that it never had to be asserted.

It was surprising how many questions Prince Henry managed to ask in the thirty minutes that had been allotted for his tour of the freighter. They were not the routine questions that people asked out of politeness, quite uninterested in the answers. H.R.H. Prince Henry knew a lot about spaceships, and Captain Saunders felt completely exhausted when he handed his distinguished guest back to the reception committee, which had been waiting outside the *Centaurus* with well-simulated patience.

'Thank you very much, Captain,' said the prince as they shook hands in the air lock. 'I've not enjoyed myself so much for ages. I hope you have a pleasant stay in England, and a successful voyage.' Then his retinue whisked him away, and the port officials frustrated until now, came aboard to check the ship's papers.

'Well,' said Mitchell when it was all over, 'what did you think of our Prince of Wales?'

'He surprised me,' answered Saunders frankly. 'I'd never have guessed he was a prince. I always thought they were rather dumb. But heck, he *knew* the principles of the Field Drive! Has he ever been up in space?'

'Once, I think. Just a hop above the atmosphere in a Space Force ship. It didn't even reach orbit before it came back again – but the Prime Minister nearly had a fit. There were questions in the House and editorials in *The Times*. Everyone decided that the heir to the throne was too valuable to risk in these newfangled inventions. So though he has the rank of commodore in the Royal Space Force, he's never even been to the moon.'

'The poor guy,' said Captain Saunders.

He had three days to burn, since it was not the captain's

job to supervise the loading of the ship or the preflight maintenance. Saunders knew skippers who hung around breathing heavily on the necks of the servicing engineers, but he wasn't that type. Besides, he wanted to see London. He had been to Mars and Venus and the moon, but this was his first visit to England. Mitchell and Chambers filled him with useful information and put him on the monorail to London before dashing off to see their own families. They would be returning to the spaceport a day before he did, to see that everything was in order. It was a great relief having officers one could rely on so implicitly: they were unimaginative and cautious, but thorough going almost to a fault. If *they* said that everything was ship-shape, Saunders knew he could take off without qualms.

The sleek, streamlined cylinder whistled across the carefully tailored landscape. It was so close to the ground, and travelling so swiftly, that one could only gather fleeting impressions of the towns and fields that flashed by. Everything, thought Saunders, was so incredibly compact, and on such a Lilliputian scale. There were no open spaces, no fields more than a mile long in any direction. It was enough to give a Texan claustrophobia – particularly a Texan who also happened to be a space pilot.

The sharply defined edge of London appeared like the bulwark of some walled city on the horizon. With few exceptions, the buildings were quite low – perhaps fifteen or twenty storeys in height. The monorail shot through a narrow canyon, over a very attractive park, across a river that was presumably the Thames, and then came to rest with a steady, powerful surge of deceleration. A loudspeaker announced, in a modest voice that seemed afraid of being overheard: 'This is Paddington. Passengers for the North please remain seated.' Saunders pulled his baggage down from the rack and headed out into the station.

As he made for the entrance to the Underground, he

passed a bookstall and glanced at the magazines on display. About half of them, it seemed, carried photographs of Prince Henry or other members of the royal family. This, thought Saunders, was altogether too much of a good thing. He also noticed that all the evening papers showed the prince entering or leaving the *Centaurus*, and bought copies to read in the subway – he begged its pardon, the ‘Tube’.

The editorial comments had a monotonous similarity. At last, they rejoiced, England need no longer take a back seat among the space-going nations. Now it was possible to operate a space fleet without having a million square miles of desert: the silent, gravity-defying ships of today could land, if need be, in Hyde Park, without even disturbing the ducks on the Serpentine. Saunders found it odd that this sort of patriotism had managed to survive into the age of space, but he guessed that the British had felt it pretty badly when they’d had to borrow launching sites from the Australians, the Americans and the Russians.

The London Underground was still, after a century and a half, the best transport system in the world, and it deposited Saunders safely at his destination less than ten minutes after he had left Paddington. In ten minutes the *Centaurus* could have covered fifty thousand miles; but space, after all, was not quite so crowded as this. Nor were the orbits of space craft so tortuous as the streets Saunders had to negotiate to reach his hotel. All attempts to straighten out London had failed dismally, and it was fifteen minutes before he completed the last hundred yards of his journey.

He stripped off his jacket and collapsed thankfully on his bed. Three quiet, carefree days all to himself: it seemed too good to be true.

It was. He had barely taken a deep breath when the phone rang.

‘Captain Saunders? I’m so glad we found you. This is

the B.B.C. We have a programme called "In Town Tonight" and we were wondering ...'

The thud of the air-lock door was the sweetest sound Saunders had heard for days. Now he was safe: nobody could get at him here in his armoured fortress, which would soon be far out in the freedom of space. It was not that he had been treated badly: on the contrary, he had been treated altogether too well. He had made four (or was it five?) appearances on various TV programmes; he had been to more parties than he could remember; he had acquired several hundred new friends and (the way his head felt now) forgotten all his old ones.

'Who started the rumour,' he said to Mitchell as they met at the port, 'that the British were reserved and stand-offish? Heaven help me if I ever meet a *demonstrative* Englishman.'

'I take it,' replied Mitchell, 'that you had a good time.'

'Ask me tomorrow,' Saunders replied. 'I may have re-integrated my psyche by then.'

'I saw you on that quiz programme last night,' remarked Chambers. 'You looked pretty ghastly.'

'Thank you: that's just the sort of sympathetic encouragement I need at the moment. I'd like to see you think of a synonym for "jejune" after you'd been up until three in the morning.'

'Vapid,' replied Chambers promptly.

'Insipid,' said Mitchell, not to be outdone.

'You win. Let's have those overhaul schedules and see what the engineers have been up to.'

Once seated at the control desk, Captain Saunders quickly became his usual efficient self. He was home again, and his training took over. He knew exactly what to do, and would do it with automatic precision. To right and left of him, Mitchell and Chambers were checking their instruments

and calling the control tower.

It took them an hour to carry out the elaborate pre-flight routine. When the last signature had been attached to the last sheet of instructions, and the last red light on the monitor panel had turned to green, Saunders flopped back in his seat and lit a cigarette. They had ten minutes to spare before take-off.

‘One day,’ he said, ‘I’m going to come to England incognito to find what makes the place tick. I don’t understand how you can crowd so many people on to one little island without it sinking.’

‘Huh,’ snorted Chambers. ‘You should see Holland. That makes England look as wide open as Texas.’

‘And then there’s this royal family business. Do you know, wherever I went everybody kept asking me how I got on with Prince Henry – what we’d talked about – didn’t I think he was a fine guy, and so on. Frankly, I got fed up with it. I can’t imagine how you’ve managed to stand it for a thousand years.’

‘Don’t think that the royal family’s been popular all the time,’ replied Mitchell. ‘Remember what happened to Charles the First? And some of the things we said about the early Georges were quite as rude as the remarks your people made later.’

‘We just happen to like tradition,’ said Chambers. ‘We’re not afraid to change when the time comes, but as far as the royal family is concerned – well, it’s unique and we’re rather fond of it. Just the way you feel about the Statue of Liberty.’

‘Not a fair example. I don’t think it’s right to put human beings up on a pedestal and treat them as if they’re – well, minor deities. Look at Prince Henry, for instance. Do you think he’ll ever have a chance of doing the things he really wants to do? I saw him three times on TV when I was in London. The first time he was opening a new school some-

where; then he was giving a speech to the Worshipful Company of Fishmongers at the Guildhall (I swear I'm not making *that* up), and finally he was receiving an address of welcome from the mayor of Podunk, or whatever your equivalent is.' ('Wigan,' interjected Mitchell.) 'I think I'd rather be in jail than live that sort of life. Why can't you leave the poor guy alone?'

For once, neither Mitchell nor Chambers rose to the challenge. Indeed, they maintained a somewhat frigid silence. That's torn it, thought Saunders. I should have kept my big mouth shut; now I've hurt their feelings. I should have remembered that advice I read somewhere: 'The British have two religions – cricket and the royal family. Never attempt to criticize either.'

The awkward pause was broken by the radio and the voice of the spaceport controller.

'Control to *Centaurus*. Your flight lane clear. O.K. to lift.'

'Take-off programme starting – *now!*' replied Saunders, throwing the master switch. Then he leaned back, his eyes taking in the entire control panel, his hands clear of the board but ready for instant action.

He was tense but completely confident. Better brains than his – brains of metal and crystal and flashing electron streams – were in charge of the *Centaurus* now. If necessary, he could take command, but he had never yet lifted a ship manually and never expected to do so. If the automatics failed, he would cancel the take-off and sit here on Earth until the fault had been cleared up.

The main field went on, and weight ebbed from the *Centaurus*. There were protesting groans from the ship's hull and structure as the strains redistributed themselves. The curved arms of the landing cradle were carrying no load now; the slightest breath of wind would carry the freighter away into the sky.

Control called from the tower: 'Your weight now zero: check calibration.'

Saunders looked at his meters. The upthrust of the field would now exactly equal the weight of the ship, and the meter readings should agree with the totals on the loading schedules. In at least one instance this check had revealed the presence of a stowaway on board a spaceship – the gauges were as sensitive as that.

'One million, five hundred and sixty thousand, four hundred and twenty kilograms,' Saunders read off from the thrust indicators. 'Pretty good – it checks to within fifteen kilos. The first time I've been underweight, though. You could have taken on some more candy for that plump girl friend of yours in Port Lowell, Mitch.'

The assistant pilot gave a rather sickly grin. He had never quite lived down a blind date on Mars which had given him a completely unwarranted reputation for preferring statuesque blondes.

There was no sense of motion, but the *Centaurus* was now falling up into the summer sky as her weight was not only neutralized but reversed. To the watchers below, she would be a swiftly mounting star, a silver globule climbing through and beyond the clouds. Around her, the blue of the atmosphere was deepening into the eternal darkness of space. Like a bead moving along an invisible wire, the freighter was following the pattern of radio waves that would lead her from world to world.

This, thought Captain Saunders, was his twenty-sixth take-off from Earth. But the wonder would never die, nor would he ever outgrow the feeling of power it gave him to sit here at the control panel, the master of forces beyond even the dreams of mankind's ancient gods. No two departures were ever the same: some were into the dawn, some towards the sunset, some above a cloud-veiled Earth, some through clear and sparkling skies. Space itself might

be unchanging, but on Earth the same pattern never recurred, and no man ever looked twice at the same landscape or the same sky. Down there the Atlantic waves were marching eternally towards Europe, and high above them – but so far below the *Centaurus*! – the glittering bands of cloud were advancing before the same winds. England began to merge into the Continent, and the European coastline became foreshortened and misty as it sank hull down beyond the curve of the world. At the frontier of the west, a fugitive stain on the horizon was the first hint of America. With a single glance, Captain Saunders could span all the leagues across which Columbus had laboured half a thousand years ago.

With the silence of limitless power, the ship shook itself free from the last bonds of Earth. To an outside observer, the only sign of the energies it was expending would have been the dull red glow from the radiation fins around the vessel's equator, as the heat loss from the mass-converters was dissipated into space.

'14:03:45,' wrote Captain Saunders neatly in the log. 'Escape velocity attained. Course deviation negligible.'

There was little point in making the entry. The modest 25,000 miles an hour that had been the almost unattainable goal of the first astronauts had no practical significance now, since the *Centaurus* was still accelerating and would continue to gain speed for hours. But it had a profound psychological meaning. Until this moment, if power had failed, they would have fallen back to Earth. But now gravity could never recapture them: they had achieved the freedom of space, and could take their pick of the planets. In practice, of course, there would be several kinds of hell to pay if they did not pick Mars and deliver their cargo according to plan. But Captain Saunders, like all spacemen, was fundamentally a romantic. Even on a milk run like this he would sometimes dream of the ringed glory of Saturn or the sombre

Neptunian wastes, lit by the distant fires of the shrunken sun.

An hour after take-off, according to the hallowed ritual, Chambers left the course computer to its own devices and produced the three glasses that lived beneath the chart table. As he drank the traditional toast to Newton, Oberth and Einstein, Saunders wondered how this little ceremony had originated. Space crews had certainly been doing it for at least sixty years: perhaps it could be traced back to the legendary rocket engineer who made the remark, 'I've burned more alcohol in sixty seconds than you've ever sold across this lousy bar.'

Two hours later, the last course correction that the tracking stations on Earth could give them had been fed into the computer. From now on, until Mars came sweeping up ahead, they were on their own. It was a lonely thought, yet a curiously exhilarating one. Saunders savoured it in his mind. There were just the three of them here – and no one else within a million miles.

In the circumstances, the detonation of an atomic bomb could hardly have been more shattering than the modest knock on the cabin door ...

Captain Saunders had never been so startled in his life. With a yelp that had already left him before he had a chance to suppress it, he shot out of his seat and rose a full yard before the ship's residual gravity field dragged him back. Chambers and Mitchell, on the other hand, behaved with traditional British phlegm. They swivelled in their bucket seats, stared at the door, and then waited for their captain to take action.

It took Saunders several seconds to recover. Had he been confronted with what might be called a normal emergency, he would already have been halfway into a space-suit. But a diffident knock on the door of the control cabin, when

everybody else in the ship was sitting beside him, was not a fair test.

A stowaway was simply impossible. The danger had been so obvious, right from the beginning of commercial space flight, that the most stringent precautions had been taken against it. One of his officers, Saunders knew, would always have been on duty during loading; no one could possibly have crept in unobserved. Then there had been the detailed pre-flight inspection, carried out by both Mitchell and Chambers. Finally, there was the weight check at the moment before take-off; *that* was conclusive. No, a stowaway was totally . . .

The knock on the door sounded again. Captain Saunders clenched his fists and squared his jaw. In a few minutes, he thought, some romantic idiot was going to be very, very sorry.

'Open the door, Mr. Mitchell,' Saunders growled. In a single long stride, the assistant pilot crossed the cabin and jerked open the hatch.

For an age, it seemed, no one spoke. Then the stowaway, wavering slightly in the low gravity, came into the cabin. He was completely self-possessed, and looked very pleased with himself.

'Good afternoon, Captain Saunders,' he said, 'I must apologize for this sudden intrusion.'

Saunders swallowed hard. Then, as the pieces of the jigsaw fell into place, he looked first at Mitchell, then at Chambers. Both of his officers stared guilelessly back at him with expressions of ineffable innocence. 'So *that's* it,' he said bitterly. There was no need for any explanations: everything was perfectly clear. It was easy to picture the complicated negotiations, the midnight meetings, the falsification of records, the off-loading of non-essential cargoes that his trusted colleagues had been conducting behind his back. He was sure it was a most interesting story, but he didn't

want to hear about it now. He was too busy wondering what the *Manual of Space Law* would have to say about a situation like this, though he was already gloomily certain that it would be of no use to him at all.

It was too late to turn back, of course: the conspirators wouldn't have made an elementary miscalculation like that. He would just have to make the best of what looked to be the trickiest voyage in his career.

He was still trying to think of something to say when the PRIORITY signal started flashing on the radio board. The stowaway looked at his watch.

'I was expecting that,' he said. 'It's probably the Prime Minister. I think I'd better speak to the poor man.'

Saunders thought so too.

'Very well, Your Royal Highness,' he said sulkily, and with such emphasis that the title sounded almost like an insult. Then, feeling much put upon, he retired into a corner.

It was the Prime Minister all right, and he sounded very upset. Several times he used the phrase 'your duty to your people' and once there was a distinct catch in his throat as he said something about 'devotion of your subjects to the Crown.' Saunders realized, with some surprise, that he really meant it.

While this emotional harangue was in progress, Mitchell leaned over to Saunders and whispered in his ear:

'The old boy's on a sticky wicket, and he knows it. The people will be behind the prince when they hear what's happened. Everybody knows he's been trying to get into space for years.'

'I wish he hadn't chosen *my* ship,' said Saunders. 'And I'm not sure that this doesn't count as mutiny.'

'The heck it does. Mark my words – when this is all over you'll be the only Texan to have the Order of the Garter. Won't that be nice for you?'

'Shush!' said Chambers. The prince was speaking, his

words winging back across the abyss that now sundered him from the island he would one day rule.

‘I am sorry, Mr. Prime Minister,’ he said, ‘if I’ve caused you any alarm. I will return as soon as it is convenient. Someone has to do everything for the first time, and I felt the moment had come for a member of my family to leave Earth. It will be a valuable part of my education, and will make me more fitted to carry out my duty. Good-bye.’

He dropped the microphone and walked over to the observation window – the only spaceward-looking port on the entire ship. Saunders watched him standing there, proud and lonely – but contented now. And as he saw the prince staring out at the stars which he had at last attained, all his annoyance and indignation slowly evaporated.

No one spoke for a long time. Then Prince Henry tore his gaze away from the blinding splendour beyond the port, looked at Captain Saunders, and smiled.

‘Where’s the galley, Captain?’ he asked. ‘I may be out of practice, but when I used to go scouting I was the best cook in my patrol.’

Saunders slowly relaxed, then smiled back. The tension seemed to lift from the control room. Mars was still a long way off, but he knew now that this wasn’t going to be such a bad trip after all . . .

VENTURE TO THE MOON

THE STARTING LINE

THE story of the first lunar expedition has been written so many times that some people will doubt if there is anything fresh to be said about it. Yet all the official reports and eye-witness accounts, the on-the-spot recordings and broadcasts never, in my opinion, gave the full picture. They said a great deal about the discoveries that were made – but very little about the men who made them.

As captain of the *Endeavour* and thus commander of the British party, I was able to observe a good many things you will not find in the history books, and some – though not all – of them can now be told. One day, I hope, my opposite numbers on the *Goddard* and the *Ziolkovski* will give their points of view. But as Commander Vandenburg is still on Mars and Commander Krasnin is somewhere inside the orbit of Venus, it looks as if we will have to wait a few more years for *their* memoirs.

Confession, it is said, is good for the soul. I shall certainly feel much happier when I have told the true story behind the timing of the first lunar flight, about which there has always been a good deal of mystery.

As everyone knows, the American, Russian and British ships were assembled in the orbit of Space Station Three, five hundred miles above the Earth, from components flown up by relays of freight rockets. Though all the parts had been prefabricated, the assembly and testing of the ships took over two years, by which time a great many people – who did not realize the complexity of the task – were be-

ginning to get slightly impatient. They had seen dozens of photos and telecasts of the three ships floating there in space beside Station Three, apparently quite complete and ready to pull away from Earth at a moment's notice. What the pictures didn't show was the careful and tedious work still in progress as thousands of pipes, wires, motors and instruments were fitted and subjected to every conceivable test.

There was no definite target date for departure; since the moon is always at approximately the same distance, you can leave for it at almost any time you like – once you are ready. It makes practically no difference, from the point of view of fuel consumption, if you blast-off at full moon or new moon or at any time in between. We were very careful to make no predictions about blast-off, though everyone was always trying to get us to fix the time. So many things can go wrong in a spaceship, and we were not going to say good-bye to Earth until we were ready down to the last detail.

I shall always remember the last commanders' conference, aboard the space station, when we all announced that we were ready. Since it was a co-operative venture, each party specializing in some particular task, it had been agreed that we should all make our landings within the same twenty-four-hour period, on the preselected site in the Mare Imbrium. The details of the journey, however, had been left to the individual commanders, presumably in the hope that we would not copy each other's mistakes.

'I'll be ready,' said Commander Vandenburg, 'to make my first dummy take-off at 0900 tomorrow. What about you, gentlemen? Shall we ask Earth Control to stand by for all three of us?'

'That's O.K. by me,' said Krasnin, who could never be convinced that his American slang was twenty years out of date.

I nodded my agreement. It was true that one bank of

fuel gauges was still misbehaving, but that didn't really matter; they would be fixed by the time the tanks were filled.

The dummy run consisted of an exact replica of a real blast-off, with everyone carrying out the job he would do when the time came for the genuine thing. We had practised, of course, in mock-ups down on Earth, but this was a perfect imitation of what would happen to us when we finally took off for the moon. All that was missing was the roar of the motors that would tell us that the voyage had begun.

We did six complete imitations of blast-off, took the ships to pieces to eliminate anything that hadn't behaved perfectly, then did six more. The *Endeavour*, the *Goddard* and the *Ziolkovski* were all in the same state of service-ability. There now only remained the job of fuelling up, and we would be ready to leave.

The suspense of those last few hours is not something I would care to go through again. The eyes of the world were upon us; departure time had now been set, with an uncertainty of only a few hours. All the final tests had been made, and we were convinced that our ships were as ready as humanly possible.

It was then that I had an urgent and secret personal radio call from a very high official indeed, and a suggestion was made which had so much authority behind it that there was little point in pretending that it wasn't an order. The first flight to the moon, I was reminded, was a co-operative venture – but think of the prestige if we got there first. It need only be by a couple of hours . . .

I was shocked at the suggestion, and said so. By this time Vandenburg and Krasnin were good friends of mine, and we were all in this together. I made every excuse I could and said that since our flight paths had already been computed there wasn't anything that could be done about

it. Each ship was making the journey by the most economical route, to conserve fuel. If we started together, we should arrive together – within seconds.

Unfortunately, someone had thought of the answer to that. Our three ships, fuelled up and with their crews standing by, would be circling Earth in a state of complete readiness for several hours before they actually pulled away from their satellite orbits and headed out to the moon. At our five-hundred-mile altitude, we took ninety-five minutes to make one circuit of the Earth, and only once every revolution would the moment be ripe to begin the voyage. If we could jump the gun by one revolution, the others would have to wait the ninety-five minutes before they could follow. And so they would land on the moon ninety-five minutes behind us ...

I won't go into the arguments, and I'm still a little ashamed that I yielded and agreed to deceive my two colleagues. We were in the shadow of Earth, in momentary eclipse, when the carefully calculated moment came. Vandenburg and Krasnin, honest fellows, thought I was going to make one more round trip with them before we all set off together. I have seldom felt a bigger heel in my life than when I pressed the firing key and felt the sudden thrust of the motors as they swept me away from my mother world.

For the next ten minutes we had no time for anything but our instruments, as we checked to see that the *Endeavour* was forging ahead along her precomputed orbit. Almost at the moment that we finally escaped from Earth and could cut the motors, we burst out of shadow into the full blaze of the sun. There would be no more night until we reached the moon, after five days of effortless and silent coasting through space.

Already Space Station Three and the two other ships must be a thousand miles behind. In eight-five more minutes Vandenburg and Krasnin would be back at the correct

starting point and could take off after me, as we had all planned. But they could never overcome my lead, and I hoped they wouldn't be too mad at me when we met again on the moon.

I switched on the rear camera and looked back at the distant gleam of the space station, just emerging from the shadow of Earth. It was some moments before I realized that the *Goddard* and the *Ziolkovski* weren't still floating beside it where I'd left them ...

No; they were just half a mile away, neatly matching my velocity. I stared at them in utter disbelief for a second, before I realized that every one of us had had the same idea. 'Why, you pair of double-crossers!' I gasped. Then I began to laugh so much that it was several minutes before I dared call up a very worried Earth Control and tell them that everything had gone according to plan – though in no case was it the plan that had been originally announced ...

We were all very sheepish when we radioed each other to exchange mutual congratulations. Yet at the same time, I think everyone was secretly pleased that it had turned out this way. For the rest of the trip, we were never more than a few miles apart, and the actual landing manoeuvres were so well synchronized that our three braking jets hit the moon simultaneously.

Well, almost simultaneously. I might make something of the fact that the recorder tape shows I touched down two-fifths of a second ahead of Krasnin. But I'd better not, for Vandenburg was precisely the same amount ahead of me.

On a quarter-of-a-million-mile trip, I think you could call that a photo finish ...

We had landed early in the dawn of the long lunar day, and the slanting shadows lay all around us, extending for miles across the plain. They would slowly shorten as the sun rose higher in the sky, until at noon they would almost vanish – but noon was still five days away, as we measured time on Earth, and nightfall was seven days later still. We had almost two weeks of daylight ahead of us before the sun set and the bluely gleaming Earth became the mistress of the sky.

There was little time for exploration during those first hectic days. We had to unload the ships, grow accustomed to the alien conditions surrounding us, learn to handle our electrically powered tractors and scooters, and erect the igloos that would serve as homes, offices, and labs until the time came to leave. At a pinch, we could live in the space-ships, but it would be excessively uncomfortable and cramped. The igloos were not exactly commodious, but they were luxury after five days in space. Made of tough, flexible plastic, they were blown up like balloons, and their interiors were then partitioned into separate rooms. Air locks allowed access to the outer world, and a good deal of plumbing linked to the ships' air-purification plants kept the atmosphere breathable. Needless to say, the American igloo was the biggest one, and had come complete with everything, *including* the kitchen sink – not to mention a washing machine, which we and the Russians were always borrowing.

It was late in the 'afternoon' – about ten days after we had landed – before we were properly organized and could think about serious scientific work. The first parties made nervous little forays out into the wilderness around the base, familiarizing themselves with the territory. Of course, we

already possessed minutely detailed maps and photographs of the region in which we had landed, but it was surprising how misleading they could sometimes be. What had been marked as a small hill on a chart often looked like a mountain to a man toiling along in a space-suit, and apparently smooth plains were often covered knee-deep with dust, which made progress extremely slow and tedious.

These were minor difficulties, however, and the low gravity – which gave all objects only a sixth of their terrestrial weight – compensated for much. As the scientists began to accumulate their results and specimens, the radio and TV circuits with Earth became busier and busier, until they were in continuous operation. We were taking no chances; even if *we* didn't get home, the knowledge we were gathering would do so.

The first of the automatic supply rockets landed two days before sunset, precisely according to plan. We saw its braking jets flame briefly against the stars, then blast again a few seconds before touchdown. The actual landing was hidden from us, since for safety reasons the dropping ground was three miles from the base. And on the moon, three miles is well over the curve of the horizon.

When we got to the robot, it was standing slightly askew on its tripod shock absorbers, but in perfect condition. So was everything aboard it, from instruments to food. We carried the stores back to base in triumph, and had a celebration that was really rather overdue. The men had been working too hard, and could do with some relaxation.

It was quite a party; the highlight, I think, was Commander Krasnin trying to do a Cossack dance in a space-suit. Then we turned our minds to competitive sports, but found that, for obvious reasons, outdoor activities were somewhat restricted. Games like croquet or bowls would have been practical had we had the equipment; but cricket and football were definitely out. In that gravity, even a

football would go half a mile if it were given a good kick – and a cricket ball would never be seen again.

Professor Trevor Williams was the first person to think of a practical lunar sport. He was our astronomer, and also one of the youngest men ever to be made a Fellow of the Royal Society, being only thirty when this ultimate accolade was conferred upon him. His work on methods of interplanetary navigation had made him world famous; less well known, however, was his skill as a toxophilite. For two years in succession he had been archery champion for Wales. I was not surprised, therefore, when I discovered him shooting at a target propped up on a pile of lunar slag.

The bow was a curious one, strung with steel control wire and shaped from a laminated plastic bar. I wondered where Trevor had got hold of it, then remembered that the robot freight rocket had now been cannibalized and bits of it were appearing in all sorts of unexpected places. The arrows, however, were the really interesting feature. To give them stability on the airless moon, where, of course, feathers would be useless, Trevor had managed to rifle them. There was a little gadget on the bow that set them spinning, like bullets, when they were fired, so that they kept on course when they left the bow.

Even with this rather makeshift equipment, it was possible to shoot a mile if one wished to. However, Trevor didn't want to waste arrows, which were not easy to make; he was more interested in seeing the sort of accuracy he could get. It was uncanny to watch the almost flat trajectory of the arrows: they seemed to be travelling parallel with the ground. If he wasn't careful, someone warned Trevor, his arrows might become lunar satellites and would hit him in the back when they completed their orbit.

The second supply rocket arrived the next day, but this time things didn't go according to plan. It made a perfect touchdown, but unfortunately the radar-controlled auto-

matic pilot made one of those mistakes that such simple-minded machines delight in doing. It spotted the only really unclimbable hill in the neighbourhood, locked its beam on to the summit of it, and settled down there like an eagle descending upon its mountain eyrie.

Our badly needed supplies were five hundred feet above our heads, and in a few hours night would be falling. What was to be done?

About fifteen people made the same suggestion at once, and for the next few minutes there was a great scurrying about as we rounded up all the nylon line on the base. Soon there was more than a thousand yards of it coiled in neat loops at Trevor's feet while we all waited expectantly. He tied one end to his arrow, drew the bow, and aimed it experimentally straight towards the stars. The arrow rose a little more than half the height of the cliff; then the weight of the line pulled it back.

'Sorry,' said Trevor. 'I just can't make it. And don't forget – we'd have to send up some kind of grapnel as well, if we want the end to stay up there.'

There was much gloom for the next few minutes, as we watched the coils of line fall slowly back from the sky. The situation was really somewhat absurd. In our ships we had enough energy to carry us a quarter of a million miles from the moon – yet we were baffled by a puny little cliff. If we had time, we could probably find a way up to the top from the other side of the hill, but that would mean travelling several miles. It would be dangerous, and might well be impossible, during the few hours of daylight that were left.

Scientists were never baffled for long, and too many ingenious (sometimes overingenious) minds were working on the problem for it to remain unresolved. But this time it was a little more difficult, and only three people got the answer simultaneously. Trevor thought it over, then said non-committally, 'Well, it's worth trying.'

The preparations took a little while, and we were all watching anxiously as the rays of the sinking sun crept higher and higher up the sheer cliff looming above us. Even if Trevor could get a line and grapnel up there, I thought to myself, it would not be easy making the ascent while encumbered with a space-suit. I have no head for heights, and was glad that several mountaineering enthusiasts had already volunteered for the job.

At last everything was ready. The line had been carefully arranged so that it would lift from the ground with the minimum of hindrance. A light grapnel had been attached to the line a few feet behind the arrow; we hoped that it would catch in the rocks up there and wouldn't let us down – all too literally – when we put our trust in it.

This time, however, Trevor was not using a single arrow. He attached four to the line, at two-hundred-yard intervals. And I shall never forget that incongruous spectacle of the space-suited figure, gleaming in the last rays of the setting sun, as it drew its bow against the sky.

The arrow sped towards the stars, and before it had lifted more than fifty feet Trevor was already fitting the second one to his improvised bow. It raced after its predecessor, carrying the other end of the long loop that was now being hoisted into space. Almost at once the third followed, lifting its section of line – and I swear that the fourth arrow, with its section, was on the way before the first had noticeably slackened its momentum.

Now that there was no question of a single arrow lifting the entire length of line, it was not hard to reach the required altitude. The first two times the grapnel fell back; then it caught firmly somewhere up on the hidden plateau – and the first volunteer began to haul himself up the line. It was true that he weighed only about thirty pounds in this low gravity, but it was still a long way to fall.

He didn't. The stores in the freight rocket started coming

down the cliff within the next hour, and everything essential had been lowered before nightfall. I must confess, however, that my satisfaction was considerably abated when one of the engineers proudly showed me the mouth organ he had had sent from Earth. Even then I felt certain that we would all be very tired of that instrument before the long lunar night had ended . . .

But that, of course, was hardly Trevor's fault. As we walked back to the ship together, through the great pools of shadow that were flowing swiftly over the plain, he made a proposal that, I am sure, has puzzled thousands of people ever since the detailed maps of the first lunar expedition were published.

After all, it does seem a little odd that a flat and lifeless plain, broken by a single small mountain, should now be labelled on all the charts of the moon as Sherwood Forest.

GREEN FINGERS

I am very sorry, now that it's too late, that I never got to know Vladimir Surov. As I remember him, he was a quiet little man who could understand English but couldn't speak it well enough to make conversation. Even to his colleagues, I suspect he was a bit of an enigma. Whenever I went aboard the *Ziolkovski*, he would be sitting in a corner working on his notes or peering through a microscope, a man who clung to his privacy even in the tight and tiny world of a spaceship. The rest of the crew did not seem to mind his aloofness; when they spoke to him, it was clear that they regarded him with tolerant affection, as well as with respect. That was hardly surprising; the work he had done developing plants and trees that could flourish far inside the Arctic Circle had already made him the most famous botanist in Russia.

The fact that the Russian expedition had taken a botanist

to the moon had caused a good deal of amusement, though it was really no odder than the fact that there were biologists on both the British and American ships. During the years before the first lunar landing, a good deal of evidence had accumulated hinting that some form of vegetation might exist on the moon, despite its airlessness and lack of water. The president of the U.S.S.R. Academy of Science was one of the leading proponents of this theory, and being too old to make the trip himself had done the next best thing by sending Surov.

The complete absence of any such vegetation, living or fossil, in the thousand or so square miles explored by our various parties was the first big disappointment the moon had reserved for us. Even those sceptics who were quite certain that no form of life could exist on the moon would have been very glad to have been proved wrong – as of course they were, five years later, when Richard and Shannon made their astonishing discovery inside the great walled plain of Eratosthenes. But *that* revelation still lay in the future; at the time of the first landing, it seemed that Surov had come to the moon in vain.

He did not appear unduly depressed, but kept himself as busy as the rest of the crew studying soil samples and looking after a little hydroponic farm whose pressurized, transparent tubes formed a gleaming network around the *Ziolkovski*. Neither we nor the Americans had gone in for this sort of thing, having calculated that it was better to ship food from Earth than to grow it on the spot – at least until the time came to set up a permanent base. We were right in terms of economics, but wrong in terms of morale. The tiny airtight greenhouses inside which Surov grew his vegetables and dwarf fruit trees were an oasis upon which we often feasted our eyes when we had grown tired of the immense desolation surrounding us.

One of the many disadvantages of being commander was

that I seldom had much chance to do any active exploring; I was too busy preparing reports for Earth, checking stores, arranging programmes and duty rosters, conferring with my opposite numbers in the American and Russian ships, and trying – not always successfully – to guess what would go wrong next. As a result, I sometimes did not go outside the base for two or three days at a time, and it was a standing joke that my space-suit was a haven for moths.

Perhaps it is because of this that I can remember all my trips outside so vividly; certainly I can recall my only encounter with Surov. It was near noon, with the sun high above the southern mountains and the new Earth a barely visible thread of silver a few degrees away from it. Henderson, our geophysicist, wanted to take some magnetic readings at a series of check points a couple of miles to the east of the base. Everyone else was busy, and I was momentarily on top of my work, so we set off together on foot.

The journey was not long enough to merit taking one of the scooters, especially because the charges in the batteries were getting low. In any case, I always enjoyed walking out in the open on the moon. It was not merely the scenery, which even at its most awe-inspiring one can grow accustomed to after a while, No – what I never tired of was the effortless, slow-motion way in which every step took me bounding over the landscape, giving me the freedom that before the coming of space flight men only knew in dreams.

We had done the job and were halfway home when I noticed a figure moving across the plain about a mile to the south of us – not far, in fact, from the Russian base. I snapped my field glasses down inside my helmet and took a careful look at the other explorer. Even at close range, of course, you can't identify a man in a space-suit, but because the suits are always coded by colour and number that makes no practical difference.

'Who is it?' asked Henderson over the short-range radio channel to which we were both tuned.

'Blue suit, Number 3 – that would be Surov. But I don't understand. *He's by himself.*'

It is one of the most fundamental rules of lunar exploration that no one goes anywhere alone on the surface of the moon. So many accidents can happen, which would be trivial if you were with a companion – but fatal if you were by yourself. How would you manage, for example, if your space-suit developed a slow leak in the small of the back and you couldn't put on a repair patch? That may sound funny; but it's happened.

'Perhaps his buddy has had an accident and he's going to fetch help,' suggested Henderson. 'Maybe we had better call him.'

I shook my head. Surov was obviously in no hurry. He had been out on a trip of his own, and was making his leisurely way back to the *Ziolkovski*. It was no concern of mine if Commander Krasnin let his people go out on solo trips, though it seemed a deplorable practice. And if Surov was breaking regulations, it was equally no concern of mine to report him.

During the next two months, my men often spotted Surov making his lone way over the landscape, but he always avoided them if they got too near. I made some discreet inquiries, and found that Commander Krasnin had been forced, owing to shortage of men, to relax some of his safety rules. But I couldn't find out what Surov was up to, though I never dreamed that his commander was equally in the dark.

It was with an 'I told you so' feeling that I got Krasnin's emergency call. We had all had men in trouble before and had had to send out help, but this was the first time anyone had been lost and had not replied when his ship had sent out the recall signal. There was a hasty radio conference,

a line of action was drawn up, and search parties fanned out from each of the three ships.

Once again I was with Henderson, and it was only common sense for us to backtrack along the route that we had seen Surov following. It was in what we regarded as 'our' territory, quite some distance away from Surov's own ship, and as we scrambled up the low foothills it occurred to me for the first time that the Russian might have been doing something he wanted to keep from his colleagues. What it might be, I could not imagine.

Henderson found him, and yelled for help over his suit radio. But it was much too late; Surov was lying, face down, his deflated suit crumpled around him. He had been kneeling when something had smashed the plastic globe of his helmet; you could see how he had pitched forward and died instantaneously.

When Commander Krasnin reached us, we were still staring at the unbelievable object that Surov had been examining when he died. It was about three feet high, a leathery greenish oval rooted to the rocks with a widespread network of tendrils. Yes – rooted; for it was a plant. A few yards away were two others, much smaller and apparently dead, since they were blackened and withered.

My first reaction was: 'So there *is* life on the moon, after all!' It was not until Krasnin's voice spoke in my ears that I realized how much more marvellous was the truth.

'Poor Vladimir!' he said. 'We knew he was a genius, yet we laughed at him when he told us of his dream. So he kept his greatest work a secret. He conquered the Arctic with his hybrid wheat, but *that* was only a beginning. He has brought life to the moon – and death as well.'

As I stood there, in that first moment of astonished revelation, it still seemed a miracle. Today, all the world knows the history of 'Surov's cactus,' as it was inevitably if quite inaccurately christened, and it has lost much of its wonder.

His notes have told the full story, and have described the years of experimentation that finally led him to a plant whose leathery skin would enable it to survive in vacuum, and whose far-ranging, acid-secreting roots would enable it to grow upon rocks where even lichens would be hard put to thrive. And we have seen the realization of the second stage of Surov's dream, for the cactus which will forever bear his name has already broken up vast areas of the lunar rock and so prepared a way for the more specialized plants that now feed every human being upon the moon.

Krasnin bent down beside the body of his colleague and lifted it effortlessly against the low gravity. He fingered the shattered fragments of the plastic helmet, and shook his head in perplexity.

'What could have happened to him?' he said. 'It almost looks as if the plant did it, but that's ridiculous.'

The green enigma stood there on the no-longer barren plain, tantalizing us with its promise and its mystery. Then Henderson said slowly, as if thinking aloud:

'I believe I've got the answer; I've just remembered some of the botany I did at school. If Surov designed this plant for lunar conditions, how would he arrange for it to propagate itself? The seeds would have to be scattered over a very wide area in the hope of finding suitable places to grow. There are no birds or animals here to carry them, in the way that happens on Earth. I can only think of one solution – and some of our terrestrial plants have already used it.'

He was interrupted by my yell. Something had hit with a resounding clang against the metal waistband of my suit. It did no damage, but it was so sudden and unexpected that it took me utterly by surprise.

A seed lay at my feet, about the size and shape of a plum stone. A few yards away, we found the one that had shattered Surov's helmet as he bent down. He must have known that the plant was ripe, but in his eagerness to ex-

amine it he had forgotten what that implied. I have seen a cactus throw its seed a quarter of a mile under the low lunar gravity. Surov had been shot at point-blank range by his own creation.

ALL THAT GLITTERS

This is really Commander Vandenburg's story, but he is too many millions of miles away to tell it. It concerns his geophysicist, Dr. Paynter, who was generally believed to have gone to the moon to get away from his wife.

At one time or another, we were all supposed (often by our wives) to have done just that. However, in Paynter's case, there was just enough truth to make it stick.

It was not that he disliked his wife; one could almost say the contrary. He would do anything for her, but unfortunately the things that she wanted him to do cost rather too much. She was a lady of extravagant tastes, and such ladies are advised not to marry scientists – even scientists who go to the moon.

Mrs. Paynter's weakness was for jewellery, particularly diamonds. As might be expected, this was a weakness that caused her husband a good deal of worry. Being a conscientious as well as an affectionate husband, he did not merely worry about it – he did something about it. He became one of the world's leading experts on diamonds, from the scientific rather than the commercial point of view, and probably knew more about their composition, origin, and properties than any other man alive. Unfortunately, you may know a lot about diamonds without ever possessing any, and her husband's erudition was not something that Mrs. Paynter could wear around her neck when she went to a party.

Geophysics, as I have mentioned, was Dr. Paynter's real

business; diamonds were merely a side line. He had developed many remarkable surveying instruments which could probe the interior of the Earth by means of electric impulses and magnetic waves, so giving a kind of X-ray picture of the hidden strata far below. It was hardly surprising, therefore, that he was one of the men chosen to pry into the mysterious interior of the moon.

He was quite eager to go, but it seemed to Commander Vandenburg that he was reluctant to leave Earth at this particular moment. A number of men had shown such symptoms; sometimes they were due to fears that could not be eradicated, and an otherwise promising man had to be left behind. In Paynter's case, however, the reluctance was quite impersonal. He was in the middle of a big experiment – something he had been working on all his life – and he didn't want to leave Earth until it was finished. However, the first lunar expedition could not wait for him, so he had to leave his project in the hands of his assistants. He was continually exchanging cryptic radio messages with them, to the great annoyance of the signals section of Space Station Three.

In the wonder of a new world waiting to be explored, Paynter soon forgot his earthly preoccupations. He would dash hither and yon over the lunar landscape on one of the neat little electric scooters the Americans had brought with them, carrying seismographs, magnetometers, gravity meters, and all the other esoteric tools of the geophysicist's trade. He was trying to learn, in a few weeks, what it had taken men hundreds of years to discover about their own planet. It was true that he had only a small sample of the moon's fourteen million square miles of territory to explore, but he intended to make a thorough job of it.

From time to time he continued to get messages from his colleagues back on Earth, as well as brief but affectionate signals from Mrs. P. Neither seemed to interest him very

much; even when you are not so busy that you hardly have time to sleep, a quarter of a million miles puts most of your personal affairs in a different perspective. I think that on the moon Dr. Paynter was really happy for the first time in his life; if so, he was not the only one.

Not far from our base there was a rather fine crater pit, a great blowhole in the lunar surface almost two miles from rim to rim. Though it was fairly close at hand, it was outside the normal area of our joint operations, and we had been on the moon for six weeks before Paynter led a party of three men off in one of the baby tractors to have a look at it. They disappeared from radio range over the edge of the moon, but we weren't worried about that because if they ran into trouble they could always call Earth and get any message relayed back to us.

Paynter and his men were gone forty-eight hours, which is about the maximum for continuous working on the moon, even with booster drugs. At first their little expedition was quite uneventful and therefore quite unexciting; everything went according to plan. They reached the crater, inflated their pressurized igloo and unpacked their stores, took their instrument readings, and then set up a portable drill to get core samples. It was while he was waiting for the drill to bring him up a nice section of the moon that Paynter made his second great discovery. He had made his first about ten hours before, but he didn't know it yet.

Around the lip of the crater, lying where they had been thrown up by the great explosions that had convulsed the lunar landscape three hundred million years before, were immense piles of rock which must have come from many miles down in the moon's interior. Anything he could do with his little drill, thought Paynter, could hardly compare with *this*. Unfortunately, the mountain-sized geological specimens that lay all around him were not neatly arranged in their correct order; they had been scattered over the

landscape, much farther than the eye could see, according to the arbitrary violence of the eruptions that had blasted them into space.

Paynter climbed over these immense slag heaps, taking a swing at likely samples with his little hammer. Presently his colleagues heard him yell, and saw him come running back to them carrying what appeared to be a lump of rather poor quality glass. It was some time before he was sufficiently coherent to explain what all the fuss was about – and some time later still before the expedition remembered its real job and got back to work.

Vandenburg watched the returning party as it headed back to the ship. The four men didn't seem as tired as one would have expected, considering the fact that they had been on their feet for two days. Indeed, there was a certain jauntiness about their movements which even the space-suits couldn't wholly conceal. You could see that the expedition had been a success. In that case, Paynter would have two causes for congratulation. The priority message that had just come from Earth was very cryptic, but it was clear that Paynter's work there – whatever it was – had finally reached a triumphant conclusion.

Commander Vandenburg almost forgot the message when he saw what Paynter was holding in his hand. He knew what a raw diamond looked like, and this was the second largest that anyone had ever seen. Only the Cullinan, tipping the scales at 3.026 carats, beat it by a slender margin. 'We ought to have expected it,' he heard Paynter babble happily. 'Diamonds are always found associated with volcanic vents. But somehow I never thought the analogy would hold here.'

Vandenburg suddenly remembered the signal, and handed it over to Paynter. He read it quickly, and his jaw dropped. Never in his life, Vandenburg told me, had he seen a man so instantly deflated by a message of congratulation. The

signal read: WE'VE DONE IT. TEST 541 WITH MODIFIED PRESSURE CONTAINER COMPLETE SUCCESS. NO PRACTICAL LIMIT TO SIZE. COSTS NEGLIGIBLE.

'What's the matter?' said Vandenburg, when he saw the stricken look on Paynter's face. 'It doesn't seem bad news to me, whatever it means.'

Paynter gulped two or three times like a stranded fish, then stared helplessly at the great crystal that almost filled the palm of his hand. He tossed it into the air, and it floated back in that slow-motion way everything has under lunar gravity.

Finally he found his voice.

'My lab's been working for years,' he said, 'trying to synthesize diamonds. Yesterday this thing was worth a million dollars. Today it's worth a couple of hundred. I'm not sure I'll bother to carry it back to Earth.'

Well, he *did* carry it back; it seemed a pity not to. For about three months, Mrs. P. had the finest diamond necklace in the world, worth every bit of a thousand dollars – mostly the cost of cutting and polishing. Then the Paynter Process went into commercial production, and a month later she got a divorce. The grounds were extreme mental cruelty; and I suppose you could say it was justified.

WATCH THIS SPACE

It was quite a surprise to discover, when I looked it up, that the most famous experiment we carried out while we were on the moon had its beginnings way back in 1955. At that time, high-altitude rocket research had been going for only about ten years, mostly at White Sands, New Mexico. Nineteen fifty-five was the date of one of the most spectacular of those early experiments, one that involved the ejection of sodium on to the upper atmosphere.

On Earth, even on the clearest night, the sky between the stars isn't completely dark. There's a very faint background glow, and part of it is caused by the fluorescence of sodium atoms a hundred miles up. Since it would take the sodium in a good many cubic miles of the upper atmosphere to fill a single matchbox, it seemed to the early investigators that they could make quite a fireworks display if they used a rocket to dump a few pounds of the stuff into the ionosphere.

They were right. The sodium squirted out of a rocket above White Sands early in 1955 produced a great yellow glow in the sky which was visible, like a kind of artificial moonlight, for over an hour, before the atoms dispersed. This experiment wasn't done for fun (though it *was* fun) but for a serious scientific purpose. Instruments trained on this glow were able to gather new knowledge about the upper air – knowledge that went into the stockpile of information without which space flight would never have been possible.

When they got to the moon, the Americans decided that it would be a good idea to repeat the experiment there, on a much larger scale. A few hundred kilograms of sodium fired up from the surface would produce a display that would be visible from Earth, with a good pair of field glasses, as it fluoresced its way up through the lunar atmosphere.

(Some people, by the way, still don't realize that the moon *has* an atmosphere. It's about a million times too thin to be breathable, but if you have the right instruments you can detect it. As a meteor shield, it's first-rate for though it may be tenuous it's hundreds of miles deep.)

Everyone had been talking about the experiment for days. The sodium bomb had arrived from Earth in the last supply rocket, and a very impressive piece of equipment it looked. Its operation was extremely simple; when ignited, an incendiary charge vaporized the sodium until a high

pressure was built up, then a diaphragm burst and the stuff was squirted up into the sky through a specially shaped nozzle. It would be shot off soon after nightfall, and when the cloud of sodium rose out of the moon's shadow into direct sunlight it would start to glow with tremendous brilliance.

Nightfall, on the moon, is one of the most awe-inspiring sights in the whole of nature, made doubly so because as you watch the sun's flaming disc creep so slowly below the mountains you know that it will be fourteen days before you see it again. But it does not bring darkness – at least, not on this side of the moon. There is always the Earth, hanging motionless in the sky, the one heavenly body that neither rises nor sets. The light pouring back from her clouds and seas floods the lunar landscape with a soft, blue-green radiance, so that it is often easier to find your way around at night than under the fierce glare of the sun.

Even those who were not supposed to be on duty had come out to watch the experiment. The sodium bomb had been placed at the middle of the big triangle formed by the three ships, and stood upright with its nozzle pointing at the stars. Dr. Anderson, the astronomer of the American team, was testing the firing circuits, but everyone else was at a respectful distance. The bomb looked perfectly capable of living up to its name, though it was really about as dangerous as a soda-water siphon.

All the optical equipment of the three expeditions seemed to have been gathered together to record the performance. Telescopes, spectroscopes, motion-picture cameras and everything else one could think of were lined up ready for action. And this, I knew, was nothing compared with the battery that must be zeroed on us from Earth. Every amateur astronomer who could see the moon tonight would be standing by in his back garden, listening to the radio commentary that told him of the progress of the experiment.

I glanced up at the gleaming planet that dominated the sky above me; the land areas seemed to be fairly free from cloud, so the folks at home should have a good view. That seemed only fair; after all, they were footing the bill.

There were still fifteen minutes to go. Not for the first time, I wished there was a reliable way of smoking a cigarette inside a space-suit without getting the helmet so badly fogged that you couldn't see. Our scientists had solved so many much more difficult problems. It seemed a pity that they couldn't do something about that one.

To pass the time – for this was an experiment where I had nothing to do – I switched on my suit radio and listened to Dave Bolton, who was making a very good job of the commentary. Dave was our chief navigator, and a brilliant mathematician. He also had a glib tongue and a picturesque turn of speech, and sometimes his recordings had to be censored by the B.B.C. There was nothing they could do about this one, however, for it was going out live from the relay stations on Earth.

Dave had finished a brief and lucid explanation of the purpose of the experiment, describing how the cloud of glowing sodium would enable us to analyse the lunar atmosphere as it rose through it at approximately a thousand miles an hour. 'However,' he went on to tell the waiting millions on Earth, 'let's make one point clear. Even when the bomb has gone off, you won't see a darn thing for ten minutes – and neither will we. The sodium cloud will be completely invisible while it's rising up through the darkness of the moon's shadow. Then, quite suddenly, it will flash into brilliance as it enters the sun's rays, which are streaming past over our heads right now as we stare up into space. No one is quite sure how bright it will be, but it's a pretty safe guess that you'll be able to see it in any telescope bigger than a two-inch. So it should just be within the range of a good pair of binoculars.'

He had to keep this sort of thing up for another ten minutes, and it was a marvel to me how he managed to do it. Then the great moment came, and Anderson closed the firing circuit. The bomb started to cook, building up pressure inside as the sodium volatilized. After thirty seconds, there was a sudden puff of smoke from the long, slender nozzle pointing up at the sky. And then we had to wait for another ten minutes while the invisible cloud rose to the stars. After all this build-up, I told myself, the result had better be good.

The seconds and minutes ebbed away. Then a sudden yellow glow began to spread across the sky, like a vast and unwavering aurora that became brighter even as we watched. It was as if an artist was sprawling strokes across the stars with a flame-filled brush. And as I stared at those strokes, I suddenly realized that someone had brought off the greatest advertising coup in history. For the strokes formed letters, and the letters formed two words – the name of a certain soft drink too well known to need any further publicity from me.

How had it been done? The first answer was obvious. Someone had placed a suitably cut stencil in the nozzle of the sodium bomb, so that the stream of escaping vapour had shaped itself to the words. Since there was nothing to distort it, the pattern had kept its shape during its invisible ascent to the stars. I had seen skywriting on Earth, but this was something on a far larger scale. Whatever I thought of them, I couldn't help admiring the ingenuity of the men who had perpetrated the scheme. The O's and A's had given a bit of trouble, but the C's and L's were perfect.

After the initial shock, I am glad to say that the scientific programme proceeded as planned. I wish I could remember how Dave Bolton rose to the occasion in his commentary; it must have been a strain even for his quick wits. By this time, of course, half the Earth could see what he was de-

scribing. The next morning, every newspaper on the planet carried that famous photo of the crescent moon with the luminous slogan painted across its darkened sector.

The letters were visible, before they finally dispersed into space, for over an hour. By that time the words were almost a thousand miles long, and were beginning to get blurred. But they were still readable until they at last faded from sight in the ultimate vacuum between the planets.

Then the real fireworks began. Commander Vandenburg was absolutely furious, and promptly started to grill all his men. However, it was soon clear that the saboteur – if you could call him that – had been back on Earth. The bomb had been prepared there and shipped ready for immediate use. It did not take long to find, and fire, the engineer who had carried out the substitution. He couldn't have cared less, since his financial needs had been taken care of for a good many years to come.

As for the experiment itself, it was completely successful from the scientific point of view; all the recording instruments worked perfectly as they analyzed the light from the unexpectedly shaped cloud. But we never let the Americans live it down, and I am afraid poor Captain Vandenburg was the one who suffered most. Before he came to the moon he was a confirmed teetotaller, and much of his refreshment came from a certain wasp-waisted bottle. But now, as a matter of principle, he can only drink beer – and he hates the stuff.

A QUESTION OF RESIDENCE

I have already described the – shall we say – jockeying for position before take-off on the first flight to the moon. As it turned out, the American, Russian, and British ships landed just about simultaneously. No one has ever ex-

plained, however, why the British ship came back nearly two weeks after the others.

Oh, I know the official story; I ought to, for I helped to concoct it. It is true as far as it goes, but it scarcely goes far enough.

On all counts, the joint expedition had been a triumphant success. There had been only one casualty, and in the manner of his death Vladimir Surov had made himself immortal. We had gathered knowledge that would keep the scientists of Earth busy for generations, and that would revolutionize almost all our ideas concerning the nature of the universe around us. Yes, our five months on the moon had been well spent, and we could go home to such welcomes as few heroes had ever had before.

However, there was still a good deal of tidying up to be done. The instruments that had been scattered all over the lunar landscape were still busily recording, and much of the information they gathered could not be automatically radioed back to Earth. There was no point in all three of the expeditions staying on the moon to the last minute; the personnel of one would be sufficient to finish the job. But who would volunteer to be caretaker while the others went back to gain the glory? It was a difficult problem, but one that would have to be solved very soon.

As far as supplies were concerned, we had little to worry about. The automatic freight rockets could keep us provided with air, food, and water for as long as we wished to stay on the moon. We were all in good health, though a little tired. None of the anticipated psychological troubles had cropped up, perhaps because we had all been so busy on tasks of absorbing interest that we had had no time to worry about going crazy. But, of course, we all looked forward to getting back to Earth and seeing our families again.

The first change of plan was forced upon us by the *Ziolkovski* being put out of commission when the ground be-

neath one of her landing legs suddenly gave way. The ship managed to stay upright, but the hull was badly twisted and the pressure cabin sprang dozens of leaks. There was much debate about on-the-spot repairs, but it was decided that it would be far too risky for her to take off in this condition. The Russians had no alternative but to thumb lifts back in the *Goddard* and the *Endeavour*; by using the *Ziolkovski's* unwanted fuel, our ships would be able to manage the extra load. However, the return flight would be extremely cramped and uncomfortable for all concerned because everyone would have to eat and sleep in shifts.

Either the American or the British ship, therefore, would be the first back to Earth. During those final weeks, as the work of the expedition was brought to its close, relations between Commander Vandenburg and myself were somewhat strained. I even wondered if we ought to settle the matter by tossing for it . . .

Another problem was also engaging my attention – that of crew discipline. Perhaps this is too strong a phrase; I would not like it to be thought that a mutiny ever seemed probable. But all my men were now a little abstracted and liable to be found, if off duty, scribbling furiously in corners. I knew exactly what was going on, for I was involved in it myself. There wasn't a human being on the moon who had not sold exclusive rights to some newspaper or magazine, and we were all haunted by approaching deadlines. The radio-teletype to Earth was in continuous operation, sending tens of thousands of words a day, while even larger slabs of deathless prose were being dictated over the speech circuits.

It was Professor Williams, our very practical-minded astronomer, who came to me one day with the answer to my main problem.

'Skipper,' he said, balancing himself precariously on the all-too-collapsible table I used as my working desk inside

the igloo, 'there's no technical reason, is there, why we should get back to Earth first?'

'No,' I said, 'merely a matter of fame, fortune, and seeing our families again. But I admit those aren't technical reasons. We could stay here another year if Earth kept sending supplies. If you want to suggest that, however, I shall take great pleasure in strangling you.'

'It's not as bad as that. Once the main body has gone back, whichever party is left can follow in two or three weeks at the latest. They'll get a lot of credit, in fact, for self-sacrifice, modesty, and similar virtues.'

'Which will be very poor compensation for being second home.'

'Right – we need something else to make it worth while. Some more material reward.'

'Agreed. What do you suggest?'

Williams pointed to the calendar hanging on the wall in front of me, between the two pin-ups we had stolen from the *Goddard*. The length of our stay was indicated by the days that had been crossed off in red ink; a big question mark in two weeks' time showed when the first ship would be heading back to Earth.

'There's your answer,' he said. 'If we go back then, do you realize what will happen? I'll tell you.'

He did, and I kicked myself for not having thought of it first.

The next day, I explained my decision to Vandenburg and Krasnin.

'We'll stay behind and do the mopping up,' I said. 'It's a matter of common sense. The *Goddard*'s a much bigger ship than ours and can carry an extra four people, while we can only manage two more, and even then it will be a squeeze. If you go first, Van, it will save a lot of people from eating their hearts out here for longer than necessary.'

'That's very big of you,' replied Vandenburg. 'I won't

hide the fact that we'll be happy to get home. And it's logical, I admit, now that the *Ziolkovski's* out of action. Still, it means quite a sacrifice on your part, and I don't really like to take advantage of it.'

I gave an expansive wave.

'Think nothing of it,' I answered. 'As long as you boys don't grab all the credit, we'll take our turn. After all, we'll have the show here to ourselves when you've gone back to Earth.'

Krasnin was looking at me with a rather calculating expression, and I found it singularly difficult to return his gaze.

'I hate to sound cynical,' he said, 'but I've learned to be a little suspicious when people start doing big favours without very good reasons. And frankly, I don't think the reason you've given is good enough. You wouldn't have anything else up your sleeve, would you?'

'Oh, very well,' I sighed. 'I'd hoped to get a *little* credit but I see it's no use trying to convince anyone of the purity of my motives. I've got a reason, and you might as well know it. But please don't spread it around; I'd hate the folks back on Earth to be disillusioned. They still think of us as noble and heroic seekers after knowledge; let's keep it that way, for all our sakes.'

Then I pulled out the calendar, and explained to Vandenburg and Krasnin what Williams had already explained to me. They listened with scepticism, then with growing sympathy.

'I had no idea it was *that* bad,' said Vandenburg at last.

'Americans never have,' I said sadly. 'Anyway, that's the way it's been for half a century, and it doesn't seem to get any better. So you agree with my suggestion?'

'Of course. It suits us fine, anyhow. Until the next expedition's ready, the moon's all yours.'

I remembered that phrase, two weeks later, as I watched

the *Goddard* blast up into the sky towards the distant, beckoning Earth. It was lonely, then, when the Americans and all but two of the Russians had gone. We envied them the reception they got, and watched jealously on the TV screens their triumphant processions through Moscow and New York. Then we went back to work, and bided our time. Whenever we felt depressed, we would do little sums on bits of paper and would be instantly restored to cheerfulness.

The red crosses marched across the calendar as the short terrestrial days went by – days that seemed to have very little connexion with the slow cycle of lunar time. At last we were ready; all the instrument readings were taken, all the specimens and samples safely packed away aboard the ship. The motors roared into life, giving us for a moment the weight we would feel again when we were back in Earth's gravity. Below us the rugged lunar landscape, which we had grown to know so well, fell swiftly away; within seconds we could see no sign at all of the buildings and instruments we had so laboriously erected and which future explorers would one day use.

The homeward voyage had begun. We returned to Earth in uneventful discomfort, joined the already half-dismantled *Goddard* beside Space Station Three, and were quickly ferried down to the world we had left seven months before.

Seven months: that, as Williams had pointed out, was the all-important figure. We had been on the moon for more than half a financial year – and for all of us, it had been the most profitable year of our lives.

Sooner or later, I suppose, this interplanetary loop-hole will be plugged; the Department of Inland Revenue is still fighting a gallant rear-guard action, but we seem neatly covered under Section 57, paragraph 8 of the Capital Gains Act of 1972. We wrote our books and articles on the moon

– and until there's a lunar government to impose income tax, we're hanging on to every penny.

And if the ruling finally goes against us – well, there's always Mars ...

INTO THE COMET

'I DON'T know why I'm recording this,' said George Takeo Pickett slowly into the hovering microphone. 'There's no chance that anyone will ever hear it. They say the comet will bring us back to the neighbourhood of Earth in about two million years, when it makes its next turn around the sun. I wonder if mankind will still be in existence then, and whether the comet will put on as good a display for our descendants as it did for us? Maybe they'll launch an expedition, just as we have done, to see what they can find. And they'll find us ...

'For the ship will still be in perfect condition, even after all those ages. There'll be fuel in the tanks, maybe even plenty of air, for our food will give out first, and we'll starve before we suffocate. But I guess we won't wait for that; it will be quicker to open the air lock and get it all over.

'When I was a kid, I read a book on polar exploration called *Winter Amid the Ice*. Well, that's what we're facing now. There's ice all around us, floating in great porous bergs. *Challenger's* in the middle of a cluster, orbiting round one another so slowly that you have to wait several minutes before you're certain they've moved. But no expedition to Earth's poles ever faced *our* winter. During most of that two million years, the temperature will be four hundred and fifty below zero. We'll be so far away from the sun that it'll give about as much heat as the stars. And who ever tried to warm his hands by Sirius on a cold winter night?'

That absurd image, coming suddenly into his mind, broke him up completely. He could not speak because of memories

of moonlight upon snowfields, of Christmas chimes ringing across a land already fifty million miles away. Suddenly he was weeping like a child, his self-control dissolved by the remembrance of all the familiar, disregarded beauties of the Earth he had forever lost.

And everything had begun so well, in such a blaze of excitement and adventure. He could recall (was it only six months ago?) the very first time he had gone out to look for the comet, soon after eighteen-year-old Jimmy Randall had found it in his homemade telescope and sent his famous telegram to Mount Stromlo Observatory. In those early days, it had been only a faint polliwog of mist, moving slowly through the constellation of Eridanus, just south of the Equator. It was still far beyond Mars, sweeping sunward along its immensely elongated orbit. When it had last shone in the skies of Earth, there were no men to see it, and there might be none when it appeared again. The human race was seeing Randall's comet for the first and perhaps the only time.

As it approached the sun, it grew, blasting out plumes and jets, the smallest of which was larger than a hundred Earths. Like a great pennant streaming down some cosmic breeze, the comet's tail was already forty million miles long when it raced past the orbit of Mars. It was then that the astronomers realized that this might be the most spectacular sight ever to appear in the heavens; the display put on by Halley's comet, back in 1986, would be nothing in comparison. And it was then that the administrators of the International Astrophysical Decade decided to send the research ship *Challenger* chasing after it, if she could be fitted out in time; for here was a chance that might not come again in a thousand years.

For weeks on end, in the hours before dawn, the comet sprawled across the sky like a second but far brighter Milky Way. As it approached the sun, and felt again the fires it

had not known since the mammoths shook the Earth, it became steadily more active. Gouts of luminous gas erupted from its core, forming great fans which turned like slowly swinging searchlights across the stars. The tail, now a hundred million miles long, divided into intricate bands and streamers which changed their patterns completely in the course of a single night. Always they pointed away from the sun, as if driven starward by a great wind blowing forever outward from the heart of the solar system.

When the *Challenger* assignment had been given to him, George Pickett could hardly believe his luck. Nothing like this had happened to any reporter since William Laurence and the atom bomb. The facts that he had a science degree, was unmarried, in good health, weighed less than one hundred and twenty pounds, and had no appendix undoubtedly helped. But there must have been many others equally qualified; well, their envy would soon turn to relief.

Because the skimpy pay load of *Challenger* could not accommodate a mere reporter, Pickett had had to double up in his spare time as executive officer. This meant, in practice, that he had to write up the log, act as captain's secretary, keep track of stores, and balance the accounts. It was very fortunate, he often thought, that one needed only three hours' sleep in every twenty-four, in the weightless world of space.

Keeping his two duties separate had required a great deal of tact. When he was not writing in his closet-sized office, or checking the thousands of items stacked away in stores, he would go on the prow with his recorder. He had been careful, at one time or another, to interview every one of the twenty scientists and engineers who manned *Challenger*. Not all the recordings had been radioed back to Earth; some had been too technical, some too inarticulate, and others too much the reverse. But at least he had played no favourites and, as far as he knew, had trodden on no toes. Not

that it mattered now.

He wondered how Dr. Martens was taking it; the astronomer had been one of his most difficult subjects, yet the one who could give most information. On a sudden impulse, Pickett located the earliest of the Martens tapes, and inserted it in the recorder. He knew that he was trying to escape from the present by retreating into the past, but the only effect of that self-knowledge was to make him hope the experiment would succeed.

He still had vivid memories of that first interview, for the weightless microphone, wavering only slightly in the draft of air from the ventilators had almost hypnotized him into incoherence. Yet no one would have guessed: his voice had its normal professional smoothness.

They had been twenty million miles behind the comet, but swiftly overtaking it, when he had trapped Martens in the observatory and thrown that opening question at him.

'Dr. Martens,' he began, 'just what *is* Randall's comet made of?'

'Quite a mixture,' the astronomer had answered, 'and it's changing all the time as we move away from the sun. But the tail's mostly ammonia, methane, carbon dioxide, water vapour, cyanogen —'

'Cyanogen? Isn't that a poison gas? What would happen if the Earth ran into it?'

'Not a thing. Though it looks so spectacular, by our normal standards a comet's tail is a pretty good vacuum. A volume as big as Earth contains about as much gas as a matchbox full of air.'

'And yet this thin stuff puts on such a wonderful display!'

'So does the equally thin gas in an electric sign, and for the same reason. A comet's tail glows because the sun bombards it with electrically charged particles. It's a cosmic sky-sign; one day, I'm afraid, the advertising people will wake up to this, and find a way of writing slogans across

the solar system.'

'That's a depressing thought – though I suppose someone will claim it's a triumph of applied science. But let's leave the tail; how soon will we get into the heart of the comet – the nucleus, I believe you call it?'

'Since a stern chase always takes a long time, it will be another two weeks before we enter the nucleus. We'll be ploughing deeper and deeper into the tail, taking a cross section through the comet as we catch up with it. But though the nucleus is still twenty million miles ahead, we've already learned a good deal about it. For one thing, it's extremely small – less than fifty miles across. And even that's not solid, but probably consists of thousands of smaller bodies, all milling round in a cloud.'

'Will we be able to go into the nucleus?'

'We'll know when we get there. Maybe we'll play safe and study it through our telescopes from a few thousand miles away. But personally, I'll be disappointed unless we go right inside. Won't you?'

Pickett switched off the recorder. Yes, Martens had been right. He *would* have been disappointed, especially since there had seemed no possible source of danger. Nor was there, as far as the comet was concerned. The danger had come from within.

They had sailed through one after another of the huge but unimaginably tenuous curtains of gas that Randall's comet was still ejecting as it raced away from the sun. Yet even now, though they were approaching the densest regions of the nucleus, they were for all practical purposes in a perfect vacuum. The luminous fog that stretched around *Challenger* for so many millions of miles scarcely dimmed the stars; but directly ahead, where lay the comet's core, was a brilliant patch of hazy light, luring them onward like a will-o'-the-wisp.

The electrical disturbances now taking place around them

with ever-increasing violence had almost completely cut their link with Earth. The ship's main radio transmitter could just get a signal through, but for the last few days they had been reduced to sending 'O.K.' messages in Morse. When they broke away from the comet and headed for home, normal communication would be resumed; but now they were almost as isolated as explorers had been in the days before radio. It was inconvenient, but that was all. Indeed, Pickett rather welcomed this state of affairs; it gave him more time to get on with his clerical duties. Though *Challenger* was sailing into the heart of a comet, on a course that no captain could have dreamed of before the twentieth century, someone still had to check the provisions and count the stores.

Very slowly and cautiously, her radar probing the whole sphere of space around her, *Challenger* crept into the nucleus of the comet. And there she came to rest – amid the ice.

Back in the nineteen-forties, Fred Whipple, of Harvard, had guessed the truth, but it was hard to believe it even when the evidence was before one's eyes. The comet's relatively tiny core was a loose cluster of icebergs, drifting and turning round one another as they moved along their orbit. But unlike the bergs that floated in polar seas, they were not a dazzling white, nor were they made of water. They were a dirty grey, and very porous, like partly thawed snow. And they were riddled with pockets of methane and frozen ammonia, which erupted from time to time in gigantic gas jets as they absorbed the heat of the sun. It was a wonderful display, but Pickett had little time to admire it. Now he had far too much.

He had been doing his routine check of the ship's stores when he came face to face with disaster – though it was some time before he realized it. For the supply situation had been perfectly satisfactory; they had ample stocks for the

return to Earth. He had checked that with his own eyes, and now had merely to confirm the balances recorded in the pinhead-sized section of the ship's electronic memory which stored all the accounts.

When the first crazy figures flashed on the screen, Pickett assumed that he had pressed the wrong key. He cleared the totals, and fed the information into the computer once more.

Sixty cases of pressed meat to start with; 17 consumed so far; quantity left: 99999943.

He tried again, and again, with no better result. Then, feeling annoyed but not particularly alarmed, he went in search of Dr. Martens.

He found the astronomer in the Torture Chamber – the tiny gym, squeezed between the technical stores and the bulkhead of the main propellant tank. Each member of the crew had to exercise here for an hour a day, lest his muscles waste away in this gravityless environment. Martens was wrestling with a set of powerful springs, an expression of grim determination on his face. It became much grimmer when Pickett gave his report.

A few tests on the main input board quickly told them the worst. 'The computer's insane,' said Martens. 'It can't even add or subtract.'

'But surely we can fix it!'

Martens shook his head. He had lost all his usual cocky self-confidence; he looked, Pickett told himself, like an inflated rubber doll that had started to leak.

'Not even the builders could do that. It's a solid mass of microcircuits, packed as tightly as the human brain. The memory units are still operating, but the computing section's utterly useless. It just scrambles the figures you feed into it.'

'And where does that leave us?' Pickett asked.

'It means that we're all dead,' Martens answered flatly. 'Without the computer, we're done for. It's impossible to

calculate an orbit back to Earth. It would take an army of mathematicians weeks to work it out on paper.'

'That's ridiculous! The ship's in perfect condition, we've plenty of food and fuel – and you tell me we're all going to die just because we can't do a few sums.'

'A few sums!' retorted Martens, with a trace of his old spirit. 'A major navigational change, like the one needed to break away from the comet and put us on an orbit to Earth, involves about a hundred thousand separate calculations. Even the computer needs several minutes for the job.'

Pickett was no mathematician, but he knew enough of astronautics to understand the situation. A ship coasting through space was under the influence of many bodies. The main force controlling it was the gravity of the sun, which kept all the planets firmly chained in their orbits. But the planets themselves also tugged it this way and that, though with much feebler strength. To allow for all these conflicting tugs and pulls – above all, to take advantage of them to reach a desired goal scores of millions of miles away – was a problem of fantastic complexity. He could appreciate Marten's despair; no man could work without the tools of his trade, and no trade needed more elaborate tools than this one.

Even after the Captain's announcement, and that first emergency conference when the entire crew had gathered to discuss the situation, it had taken hours for the facts to sink home. The end was still so many months away that the mind could not grasp it; they were under sentence of death, but there was no hurry about the execution. And the view was still superb ...

Beyond the glowing mists that enveloped them – and which would be their celestial monument to the end of time – they could see the great beacon of Jupiter, brighter than all the stars. Some of them might still be alive, if the others were willing to sacrifice themselves, when the ship went

past the mightiest of the sun's children. Would the extra weeks of life be worth it, Pickett asked himself, to see with your own eyes the sight that Galileo had first glimpsed through his crude telescope four centuries ago – the satellites of Jupiter, shuttling back and forth like beads upon an invisible wire?

Beads upon a wire. With that thought, an all-but-forgotten childhood memory exploded out of his subconscious. It must have been there for days, struggling upward into the light. Now at last it had forced itself upon his waiting mind.

'No!' he cried aloud. 'It's ridiculous! They'll laugh at me!'

So what? said the other half of his mind. You've nothing to lose; if it does no more, it will keep everyone busy while the food and the oxygen dwindle away. Even the faintest hope is better than none at all . . .

He stopped fidgeting with the recorder; the mood of maudlin self-pity was over. Releasing the elastic webbing that held him to his seat, he set off for the technical stores in search of the material he needed.

'This,' said Dr. Martens three days later, 'isn't my idea of a joke.' He gave a contemptuous glance at the flimsy structure of wire and wood that Pickett was holding in his hand.

'I guessed you'd say that,' Pickett replied, keeping his temper under control. 'But please listen to me for a minute. My grandmother was Japanese, and when I was a kid she told me a story that I'd completely forgotten until this week. I think it may save our lives.'

'Sometime after the Second World War, there was a contest between an American with an electric desk calculator and a Japanese using an abacus like this. The abacus won.'

'Then it must have been a poor desk machine, or an incompetent operator.'

‘They used the best in the U.S. Army. But let’s stop arguing. Give me a test – say a couple of three-figure numbers to multiply.’

‘Oh – 856 times 437.’

Pickett’s fingers danced over the beads, sliding them up and down the wires with lightning speed. There were twelve wires in all, so that the abacus could handle numbers up to 999,999,999,999 – or could be divided into separate sections where several independent calculations could be carried out simultaneously.

‘374072,’ said Pickett, after an incredibly brief interval of time. ‘Now see how long *you* take to do it, with pencil and paper.’

There was a much longer delay before Martens, who like most mathematicians was poor at arithmetic, called out ‘375072.’ A hasty check soon confirmed that Martens had taken at least three times as long as Pickett to arrive at the wrong answer.

The astronomer’s face was a study in mingled chagrin, astonishment, and curiosity.

‘Where did you learn that trick?’ he asked. ‘I thought those things could only add and subtract.’

‘Well – multiplication’s only repeated addition, isn’t it? All I did was to add 856 seven times in the unit column, three times in the tens column, and four times in the hundreds column. You do the same thing when you use pencil and paper. Of course, there are some short cuts, but if you think *I’m* fast, you should have seen my granduncle. He used to work in a Yokohama bank, and you couldn’t see his fingers when he was going at speed. He taught me some of the tricks, but I’ve forgotten most of them in the last twenty years. I’ve only been practising for a couple of days, so I’m still pretty slow. All the same, I hope I’ve convinced you that there’s something in my argument.’

‘You certainly have: I’m quite impressed. Can you

divide just as quickly?’

‘Very nearly, when you’ve had enough experience.’

Martens picked up the abacus, and started flicking the beads back and forth. Then he sighed.

‘Ingenious – but it doesn’t really help us. Even if it’s ten times as fast as a man with pencil and paper – which it isn’t – the computer was a million times faster.’

‘I’ve thought of that,’ answered Pickett, a little impatiently.

(Martens had no guts – he gave up too easily. How did he think astronomers managed a hundred years ago, before there were any computers?)

‘This is what I propose – tell me if you can see any flaws in it . . .’

Carefully and earnestly he detailed his plan. As he did so, Martens slowly relaxed, and presently he gave the first laugh that Pickett had heard aboard *Challenger* for days.

‘I want to see the skipper’s face,’ said the astronomer, ‘when you tell him that we’re all going back to the nursery to start playing with beads.’

There was scepticism at first, but it vanished swiftly when Pickett gave a few demonstrations. To men who had grown up in a world of electronics, the fact that a simple structure of wire and beads could perform such apparent miracles was a revelation. It was also a challenge, and because their lives depended upon it, they responded eagerly.

As soon as the engineering staff had built enough smoothly operating copies of Pickett’s crude prototype, the classes began. It took only a few minutes to explain the basic principles; what required time was practice – hour after hour of it, until the fingers flew automatically across the wires and flicked the beads into the right positions without any need for conscious thought. There were some members of the crew who never acquired both accuracy and

speed, even after a week of constant practice, but there were others who quickly out-distanced Pickett himself.

They dreamed counters and columns, and flicked beads in their sleep. As soon as they had passed beyond the elementary stage they were divided into teams, which then competed fiercely against each other, until they had reached still higher standards of proficiency. In the end, there were men aboard *Challenger* who could multiply four-figure numbers on the abacus in fifteen seconds, and keep it up hour after hour.

Such work was purely mechanical; it required skill, but no intelligence. The really difficult job was Martens', and there was little that anyone could do to help him. He had to forget all the machine-based techniques he had taken for granted, and rearrange his calculations so that they could be carried out automatically by men who had no idea of the meaning of the figures they were manipulating. He would feed them the basic data, and then they would follow the programme he had laid down. After a few hours of patient routine work, the answer would emerge from the end of the mathematical production line – provided that no mistakes had been made. And the way to guard against that was to have two independent teams working, cross-checking results at regular intervals.

'What we've done,' said Pickett into his recorder, when at last he had time to think of the audience he had never expected to speak to again, 'is to build a computer out of human beings instead of electronic circuits. It's a few thousand times slower, can't handle many digits, and gets tired easily – but it's doing the job. Not the whole job of navigating to Earth – that's far too complicated – but the simpler one of giving us an orbit that will bring us back into radio range. Once we've escaped from the electrical interference around us, we can radio our position and the big computers on Earth can tell us what to do next.

‘We’ve already broken away from the comet and are no longer heading out of the solar system. Our new orbit checks with the calculations, to the accuracy that can be expected. We’re still inside the comet’s tail, but the nucleus is a million miles away and we won’t see those ammonia icebergs again. They’re racing on towards the stars into the freezing night between the suns, while we are coming home ...

‘Hello, Earth ... hello, Earth! This is *Challenger* calling, *Challenger* calling. Signal back as soon as you receive us – we’d like you to check our arithmetic – before we work our fingers to the bone!’

SUMMERTIME ON ICARUS

WHEN Colin Sherrard opened his eyes after the crash, he could not imagine where he was. He seemed to be lying, trapped in some kind of vehicle, on the summit of a rounded hill, which sloped steeply away in all directions. Its surface was seared and blackened, as if a great fire had swept over it. Above him was a jet-black sky, crowded with stars; one of them hung like a tiny, brilliant sun low down on the horizon.

Could it be the sun? Was he so far from Earth? No – that was impossible. Some nagging memory told him that the sun was very close – hideously close – not so distant that it had shrunk to a star. And with that thought, full consciousness returned. Sherrard knew exactly where he was, and the knowledge was so terrible that he almost fainted again.

He was nearer to the sun than any man had ever been. His damaged space-pod was lying on no hill, but on the steeply curving surface of a world only two miles in diameter. That brilliant star sinking swiftly in the west was the light of *Prometheus*, the ship that had brought him here across so many millions of miles of space. She was hanging up there among the stars, wondering why his pod had not returned like a homing pigeon to its roost. In a few minutes she would have passed from sight, dropping below the horizon in her perpetual game of hide-and-seek with the sun.

That was a game that he had lost. He was still on the night side of the asteroid, in the cool safety of its shadow, but the short night would be ending soon. The four-hour day of Icarus was spinning him swiftly towards that dreadful

dawn, when a sun thirty times larger than ever shone upon Earth would blast these rocks with fire. Sherrard knew all too well why everything around him was burned and blackened. Icarus was still a week from perihelion but the temperature at noon had already reached a thousand degrees Fahrenheit.

Though this was no time for humour, he suddenly remembered Captain McClellan's description of Icarus: 'The hottest piece of real estate in the solar system.' The truth of that jest had been proved, only a few days before, by one of those simple and unscientific experiments that are so much more impressive than any number of graphs and instrument readings.

Just before daybreak, someone had propped a piece of wood on the summit of one of the tiny hills. Sherrard had been watching, from the safety of the night side, when the first rays of the rising sun had touched the hilltop. When his eyes had adjusted to the sudden detonation of light, he saw that the wood was already beginning to blacken and char. Had there been an atmosphere here, the stick would have burst into flames; such was dawn, upon Icarus . . .

Yet it had not been impossibly hot at the time of their first landing, when they were passing the orbit of Venus five weeks ago. *Prometheus* had overtaken the asteroid as it was beginning its plunge towards the sun, had matched speed with the little world and had touched down upon its surface as lightly as a snowflake. (A snowflake on Icarus – *that* was quite a thought . . .) Then the scientists had fanned out across the fifteen square miles of jagged nickel-iron that covered most of the asteroid's surface, setting up their instruments and checkpoints, collecting samples and making endless observations.

Everything had been carefully planned, years in advance, as part of the International Astrophysical Decade. Here was a unique opportunity for a research ship to get within a

mere seventeen million miles of the sun, protected from its fury by a two-mile thick shield of rock and iron. In the shadow of Icarus, the ship could ride safely round the central fire which warmed all the planets, and upon which the existence of all life depended. As the Prometheus of legend had brought the gift of fire to mankind, so the ship that bore his name would return to Earth with other unimagined secrets from the heavens.

There had been plenty of time to set up the instruments and make the surveys before *Prometheus* had to take off and seek the permanent shade of night. Even then, it was still possible for men in the tiny self-propelled space-pods – miniature spaceships, only ten feet long – to work on the night side for an hour or so, as long as they were not overtaken by the advancing line of sunrise. That had seemed a simple-enough condition to meet, on a world where dawn marched forward at only a mile an hour; but Sherrard had failed to meet it, and the penalty was death.

He was still not quite sure what had happened. He had been replacing a seismograph transmitter at Station 145, unofficially known as Mount Everest because it was a full ninety feet above the surrounding territory. The job had been a perfectly straightforward one, even though he had to do it by remote control through the mechanical arms of his pod. Sherrard was an expert at manipulating these; he could tie knots with his metal fingers almost as quickly as with his flesh-and-bone ones. The task had taken little more than twenty minutes, and then the radioseismograph was on the air again, monitoring the tiny quakes and shudders that racked Icarus in ever-increasing numbers as the asteroid approached the sun. It was small satisfaction to know that he had now made a king-sized addition to the record.

After he had checked the signals, he had carefully replaced the sun screens around the instrument. It was hard

to believe that two flimsy sheets of polished metal foil, no thicker than paper, could turn aside a flood of radiation that would melt lead or tin within seconds. But the first screen reflected more than ninety per cent of the sunlight falling upon its mirror surface and the second turned back most of the rest, so that only a harmless fraction of the heat passed through.

He had reported completion of the job, received an acknowledgment from the ship, and prepared to head for home. The brilliant floodlights hanging from *Prometheus* – without which the night side of the asteroid would have been in utter darkness – had been an unmistakable target in the sky. The ship was only two miles up, and in this feeble gravity he could have jumped that distance had he been wearing a planetary-type space-suit with flexible legs. As it was, the low-powered micro-rockets of his pod would get him there in a leisurely five minutes.

He had aimed the pod with its gyros, set the rear jets at Strength Two, and pressed the firing button. There had been a violent explosion somewhere in the vicinity of his feet and he had soared away from Icarus – but not towards the ship. Something was horribly wrong; he was tossed to one side of the vehicle, unable to reach the controls. Only one of the jets was firing, and he was pinwheeling across the sky, spinning faster and faster under the off-balanced drive. He tried to find the cut-off, but the spin had completely disorientated him. When he was able to locate the controls, his first reaction made matters worse – he pushed the throttle over to full, like a nervous driver stepping on the accelerator instead of the brake. It took only a second to correct the mistake and kill the jet, but by then he was spinning so rapidly that the stars were wheeling round in circles.

Everything had happened so quickly that there was no time for fear, no time even to call the ship and report what

was happening. He took his hands away from the controls; to touch them now would only make matters worse. It would take two or three minutes of cautious jockeying to unravel his spin, and from the flickering glimpses of the approaching rocks it was obvious that he did not have as many seconds. Sherrard remembered a piece of advice at the front of the *Spaceman's Manual*: 'When you don't know what to do, *do nothing*.' He was still doing it when Icarus fell upon him, and the stars went out.

It had been a miracle that the pod was unbroken, and that he was not breathing space. (Thirty minutes from now he might be glad to do so, when the capsule's heat insulation began to fail . . .) There had been some damage, of course. The rear-view mirrors, just outside the dome of transparent plastic that enclosed his head, were both snapped off, so that he could no longer see what lay behind him without twisting his neck. This was a trivial mishap; far more serious was the fact that his radio antennas had been torn away by the impact. He could not call the ship, and the ship could not call him. All that came over the radio was a faint crackling, probably produced inside the set itself. He was absolutely alone, cut off from the rest of the human race.

It was a desperate situation, but there was one faint ray of hope. He was not, after all, completely helpless. Even if he could not use the pod's rockets – he guessed that the starboard motor had blown back and ruptured a fuel line, something the designers said was impossible – he was still able to move. He had his arms.

But which way should he crawl? He had lost all sense of location, for though he had taken off from Mount Everest, he might now be thousands of feet away from it. There were no recognizable landmarks in his tiny world; the rapidly sinking star of *Prometheus* was his best guide, and if he could keep the ship in view he would be safe. It would only

be a matter of minutes before his absence was noted, if indeed it had not been discovered already. Yet without radio, it might take his colleagues a long time to find him; small though Icarus was, its fifteen square miles of fantastically rugged no man's land could provide an effective hiding place for a ten-foot cylinder. It might take an hour to locate him – which meant that he would have to keep ahead of the murderous sunrise.

He slipped his fingers into the controls that worked his mechanical limbs. Outside the pod, in the hostile vacuum that surrounded him, his substitute arms came to life. They reached down, thrust against the iron surface of the asteroid, and levered the pod from the ground. Sherrard flexed them, and the capsule jerked forward, like some weird, two-legged insect . . . first the right arm, then the left, then the right . . .

It was less difficult than he had feared, and for the first time he felt his confidence return. Though his mechanical arms had been designed for light precision work, it needed very little pull to set the capsule moving in this weightless environment. The gravity of Icarus was ten thousand times weaker than Earth's: Sherrard and his space-pod weighed less than an ounce here, and once he had set himself in motion he floated forward with an effortless, dreamlike ease.

Yet that very effortlessness had its dangers. He had traveled several hundred yards, and was rapidly overhauling the sinking star of the *Prometheus*, when overconfidence betrayed him. (Strange how quickly the mind could switch from one extreme to the other; a few minutes ago he had been steeling himself to face death – now he was wondering if he would be late for dinner.) Perhaps the novelty of the movement, so unlike anything he had ever attempted before, was responsible for the catastrophe; or perhaps he was still suffering from the after-effects of the crash.

Like all astronauts, Sherrard had learned to orientate himself in space, and had grown accustomed to living and

working when the Earthly conceptions of up and down were meaningless. On a world such as Icarus, it was necessary to pretend that there was a real, honest-to-goodness planet 'beneath' your feet, and that when you moved you were travelling over a horizontal plain. If this innocent self-deception failed, you were heading for space vertigo.

The attack came without warning, as it usually did. Quite suddenly, Icarus no longer seemed to be beneath him, the stars no longer above. The universe tilted through a right angle; he was moving straight *up* a vertical cliff, like a mountaineer scaling a rock face, and though Sherrard's reasons told him that this was pure illusion, all his senses screamed that it was true. In a moment gravity must drag him off this sheer wall, and he would drop down mile upon endless mile until he smashed into oblivion.

Worse was to come; the false vertical was still swinging like a compass needle that had lost the pole. Now he was on the *underside* of an immense rocky roof, like a fly clinging to a ceiling; in another moment it would have become a wall again – but this time he would be moving straight down it, instead of up . . .

He had lost all control over the pod, and the clammy sweat that had begun to dew his brow warned him that he would soon lose control over his body. There was only one thing to do; he clenched his eyes tightly shut, squeezed as far back as possible into the tiny closed world of the capsule, and pretended with all his might that the universe outside did not exist. He did not even allow the slow, gentle crunch of his second crash to interfere with his self-hypnosis.

When he again dared to look outside, he found that the pod had come to rest against a large boulder. Its mechanical arms had broken the force of the impact, but at a cost that was more than he could afford to pay. Though the capsule was virtually weightless here, it still possessed its nor-

mal five hundred pounds of inertia, and it had been moving at perhaps four miles an hour. The momentum had been too much for the metal arms to absorb; one had snapped, and the other was hopelessly bent.

When he saw what had happened, Sherrard's first reaction was not despair, but anger. He had been so certain of success when the pod had started its glide across the barren face of Icarus. And now this, all through a moment of physical weakness! But space made no allowance for human frailties or emotions, and a man who did not accept that fact had no right to be here.

At least he had gained precious time in his pursuit of the ship; he had put an extra ten minutes, if not more, between himself and dawn. Whether that ten minutes would merely prolong the agony or whether it would give his shipmates the extra time they needed to find him, he would soon know.

Where were they? Surely they had started the search by now! He strained his eyes towards the brilliant star of the ship, hoping to pick out the fainter lights of space-pods moving towards him – but nothing else was visible against the slowly turning vault of heaven.

He had better look to his own resources, slender though they were. Only a few minutes were left before the *Prometheus* and her trailing lights would sink below the edge of the asteroid and leave him in darkness. It was true that the darkness would be all too brief, but before it fell upon him he might find some shelter against the coming day. This rock into which he had crashed, for example . . .

Yes, it would give some shade, until the sun was halfway up the sky. Nothing could protect him if it passed right overhead. but it was just possible that he might be in a latitude where the sun never rose far above the horizon at this season of Icarus' four-hundred-and-nine-day year. Then he might survive the brief period of daylight; that was his only hope, if the rescuers did not find him before dawn.

There went *Prometheus* and her lights, below the edge of the world. With her going, the now-unchallenged stars blazed forth with redoubled brilliance. More glorious than any of them – so lovely that even to look upon it almost brought tears to his eyes – was the blazing beacon of Earth, with its companion moon beside it. He had been born on one, and had walked on the other; would he see either again?

Strange that until now he had given no thought to his wife and children, and to all that he loved in the life that now seemed so far away. He felt a spasm of guilt, but it passed swiftly. The ties of affection were not weakened, even across the hundred million miles of space that now sundered him from his family. At this moment, they were simply irrelevant. He was now a primitive, self-centred animal fighting for his life, and his only weapon was his brain. In this conflict, there was no place for the heart; it would merely be a hindrance, spoiling his judgment and weakening his resolution.

And then he saw something that banished all thoughts of his distant home. Reaching up above the horizon behind him, spreading across the stars like a milky mist, was a faint and ghostly cone of phosphorescence. It was the herald of the sun – the beautiful, pearly phantom of the corona, visible on Earth only during the rare moments of a total eclipse. When the corona was rising, the sun would not be far behind, to smite this little land with fury.

Sherrard made good use of the warning. Now he could judge, with some accuracy, the exact point where the sun would rise. Crawling slowly and clumsily on the broken stumps of his metal arms, he dragged the capsule round to the side of the boulder that should give the greatest shade. He had barely reached it when the sun was upon him like a beast of prey, and his tiny world exploded into light.

He raised the dark filters inside his helmet, one thickness

after another, until he could endure the glare. Except where the broad shadow of the boulder lay across the asteroid, it was like looking into a furnace. Every detail of the desolate land around him was revealed by that merciless light; there were no greys, only blinding whites and impenetrable blacks. All the shadowed cracks and hollows were pools of ink, while the higher ground already seemed to be on fire, as it caught the sun. Yet it was only a minute after dawn.

Now Sherrard could understand how the scorching heat of a billion summers had turned Icarus into a cosmic cinder, baking the rocks until the last traces of gas had bubbled out of them. Why should men travel, he asked himself bitterly, across the gulf of stars at such expense and risk – merely to land on a spinning slag heap? For the same reason, he knew, that they once struggled to reach Everest and the Poles and the far places of the Earth – for the excitement of the body that was adventure, and the more enduring excitement of the mind that was discovery. It was an answer that gave him little consolation, now that he was about to be grilled like a joint on the turning spit of Icarus.

Already he could feel the first breath of heat upon his face. The boulder against which he was lying gave him protection from direct sunlight, but the glare reflected back at him from those blazing rocks only a few yards away was striking through the transparent plastic of the dome. It would grow swiftly more intense as the sun rose higher; he had even less time than he had thought, and with the knowledge came a kind of numb resignation that was beyond fear. He would wait – if he could – until the sunrise engulfed him and the capsule's cooling unit gave up the unequal struggle; then he would crack the pod and let the air gush out into the vacuum of space.

Nothing to do but to sit and think in the minutes that were left to him before his pool of shadow contracted. He did not try to direct his thoughts, but let them wander

where they willed. How strange that he should be dying now, because back in the nineteen-forties – years before he was born – a man at Palomar had spotted a streak of light on a photographic plate, and had named it so appropriately after the boy who flew too near the sun.

One day, he supposed, they would build a monument here for him on this blistered plain. What would they inscribe upon it? 'Here died Colin Sherrard, astronics engineer, in the cause of Science.' That would be funny, for he had never understood half the things that the scientists were trying to do.

Yet some of the excitement of their discoveries had communicated itself to him. He remembered how the geologists had scraped away the charred skin of the asteroid, and had polished the metallic surface that lay beneath. It had been covered with a curious pattern of lines and scratches, like one of the abstract paintings of the Post-Picasso Decadents. But these lines had some meaning; they wrote the history of Icarus, though only a geologist could read it. They revealed, so Sherrard had been told, that this lump of iron and rock had not always floated alone in space. At some remote time in the past, it had been under enormous pressure – and that could mean only one thing. Billions of years ago it had been part of a much larger body, perhaps, a planet like Earth. For some reason that planet had blown up, and Icarus and all the thousands of other asteroids were the fragments of that cosmic explosion.

Even at this moment, as the incandescent line of sunlight came closer, this was a thought that stirred his mind. What Sherrard was lying upon was the core of a world – perhaps a world that had once known life. In a strange, irrational way it comforted him to know that his might not be the only ghost to haunt Icarus until the end of time.

The helmet was misting up; that could only mean that the cooling unit was about to fail. It had done its work well;

even now, though the rocks only a few yards away must be glowing a sullen red, the heat inside the capsule was not unendurable. When failure came, it would be sudden and catastrophic.

He reached for the red lever that would rob the sun of its prey – but before he pulled it, he would look for the last time upon Earth. Cautiously, he lowered the dark filters, adjusting them so that they still cut out the glare from the rocks, but no longer blocked his view of space.

The stars were faint now, dimmed by the advancing glow of the corona. And just visible over the boulder whose shield would soon fail him was a stub of crimson flame, a crooked finger of fire jutting from the edge of the sun itself. He had only seconds left.

There was the Earth, there was the moon. Good-bye to them both, and to his friends and loved ones on each of them. While he was looking at the sky, the sunlight had begun to lick the base of the capsule, and he felt the first touch of fire. In a reflex as automatic as it was useless, he drew up his legs, trying to escape the advancing wave of heat.

What was that? A brilliant flash of light, infinitely brighter than any of the stars, had suddenly exploded overhead. Miles above him, a huge mirror was sailing across the sky, reflecting the sunlight as it slowly turned through space. Such a thing was utterly impossible; he was beginning to suffer from hallucinations, and it was time he took his leave. Already the sweat was pouring from his body, and in a few seconds the capsule would be a furnace.

He waited no longer, but pulled on the Emergency Release with all his waning strength, bracing himself at the same moment to face the end.

Nothing happened; the lever would not move. He tugged it again and again before he realized that it was hopelessly jammed. There was no easy way out for him, no merciful

death as the air gushed from his lungs. It was then, as the true terror of his situation struck home to him, that his nerve finally broke and he began to scream like a trapped animal.

When he heard Captain McClellan's voice speaking to him, thin but clear, he knew that it must be another hallucination. Yet some last remnant of discipline and self-control checked his screaming; he clenched his teeth and listened to that familiar, commanding voice.

'Sherrard! Hold on, man! We've got a fix on you – but keep shouting!'

'Here I am!' he cried, 'but hurry, for God's sake! I'm burning!'

Deep down in what was left of his rational mind he realized what had happened. Some feeble ghost of a signal was leaking through the broken stubs of his antennas, and the searchers had heard his screams – as he was hearing their voices. That meant they must be very close indeed, and the knowledge gave him sudden strength.

He stared through the steaming plastic of the dome, looking once more for that impossible mirror in the sky. There it was again – and now he realized that the baffling perspectives of space had tricked his senses. The mirror was not miles away, nor was it huge. It was almost on top of him, and it was moving fast.

He was still shouting when it slid across the face of the rising sun, and its blessed shadow fell upon him like a cool wind that had blown out of the heart of winter, over leagues of snow and ice. Now that it was so close, he recognized it at once; it was merely a large metal-foil radiation screen, no doubt hastily snatched from one of the instrument sites. In the safety of its shadow, his friends had been searching for him.

A heavy-duty, two-man capsule was hovering overhead, holding the glittering shield in one set of arms and reaching for him with the other. Even through the misty dome and

the haze of heat that still sapped his senses, he recognized Captain McClellan's anxious face, looking down at him from the other pod.

So this was what birth was like, for truly he had been reborn. He was too exhausted for gratitude – that would come later – but as he rose from the burning rocks his eyes sought and found the bright star of Earth. 'Here I am,' he said silently. 'I'm coming back.'

Back to enjoy and cherish all the beauties of the world he had thought were lost forever. No – not all of them.

He would never enjoy summer again.

DEATH AND THE SENATOR

WASHINGTON had never looked lovelier in the spring; and this was the last spring, thought Senator Steelman bleakly, that he would ever see. Even now, despite all that Dr. Jordan had told him, he could not fully accept the truth. In the past there had always been a way of escape; no defeat had been final. When men had betrayed him, he had discarded them – even ruined them, as a warning to others. But now the betrayal was within himself; already, it seemed, he could feel the laboured beating of the heart that would soon be stilled. No point in planning now for the Presidential election of 1976; he might not even live to see the nominations ...

It was an end of dreams and ambition, and he could not console himself with the knowledge that for all men these must end someday. For him it was too soon; he thought of Cecil Rhodes, who had always been one of his heroes, crying 'So much to do – so little time to do it in!' as he died before his fiftieth birthday. He was already older than Rhodes, and had done far less.

The car was taking him away from the Capitol; there was symbolism in that, and he tried not to dwell upon it. Now he was abreast of the New Smithsonian – that vast complex of museums he had never had time to visit, though he had watched it spread along the Mall throughout the years he had been in Washington. How much he had missed, he told himself bitterly, in his relentless pursuit of power. The whole universe of art and culture had remained almost closed to him, and that was only part of the price that he had paid. He had become a stranger to his family and to

those who were once his friends. Love had been sacrificed on the altar of ambition, and the sacrifice had been in vain. Was there anyone in all the world who would weep at his departure?

Yes, there was. The feeling of utter desolation relaxed its grip upon his soul. As he reached for the phone, he felt ashamed that he had to call the office to get this number, when his mind was cluttered with memories of so many less important things.

(There was the White House, almost dazzling in the spring sunshine. For the first time in his life he did not give it a second glance. Already it belonged to another world – a world that would never concern him again.)

The car circuit had no vision, but he did not need it to sense Irene's mild surprise – and her still milder pleasure.

'Hello, Renee – how are you all?'

'Fine, Dad. When are we going to see you?'

It was the polite formula his daughter always used on the rare occasions when he called. And invariably, except at Christmas or birthdays, his answer was a vague promise to drop around at some indefinite future date.

'I was wondering,' he said slowly, almost apologetically, 'if I could borrow the children for an afternoon. It's a long time since I've taken them out, and I felt like getting away from the office.'

'But of course,' Irene answered, her voice warming with pleasure. 'They'll love it. When would you like them?'

'Tomorrow would be fine. I could call around twelve, and take them to the Zoo or the Smithsonian, or anywhere else they felt like visiting.'

Now she was really startled, for she knew well enough that he was one of the busiest men in Washington, with a schedule planned weeks in advance. She would be wondering what had happened; he hoped she would not guess the truth. No reason why she should, for not even his secretary

knew of the stabbing pains that had driven him to seek this long-overdue medical checkup.

'That would be wonderful. They were talking about you only yesterday, asking when they'd see you again.'

His eyes misted, and he was glad that Renee could not see him.

'I'll be there at noon,' he said hastily, trying to keep the emotion out of his voice. 'My love to you all.' He switched off before she could answer, and relaxed against the upholstery with a sigh of relief. Almost upon impulse, without conscious planning, he had taken the first step in the reshaping of his life. Though his own children were lost to him, a bridge across the generations remained intact. If he did nothing else, he must guard and strengthen it in the months that were left.

Taking two lively and inquisitive children through the natural-history building was not what the doctor would have ordered, but it was what he wanted to do. Joey and Susan had grown so much since their last meeting, and it required both physical and mental alertness to keep up with them. No sooner had they entered the rotunda than they broke away from him, and scampered towards the enormous elephant dominating the marble hall.

'What's that?' cried Joey.

'It's an elephant, stupid,' answered Susan with all the crushing superiority of her seven years.

'I know it's an effelant,' retorted Joey. 'But what's its name?'

Senator Steelman scanned the label, but found no assistance there. This was one occasion when the risky adage 'Sometimes wrong, never uncertain' was a safe guide to conduct.

'He was called - er - Jumbo,' he said hastily. 'Just look at those tusks!'

'Did he ever get toothache?'

'Oh no.'

'Then how did he clean his teeth? Ma says that if I don't clean mine ...'

Steelman saw where the logic of this was leading, and thought it best to change the subject.

'There's a lot more to see inside. Where do you want to start – birds, snakes, fish, mammals?'

'Snakes!' clamoured Susan. 'I wanted to keep one in a box, but Daddy said no. Do you think he'd change his mind if you asked him?'

'What's a mammal?' asked Joey, before Steelman could work out an answer to that.

'Come along,' he said firmly. 'I'll show you.'

As they moved through the halls and galleries, the children darting from one exhibit to another, he felt at peace with the world. There was nothing like a museum for calming the mind, for putting the problems of everyday life in their true perspective. Here, surrounded by the infinite variety and wonder of Nature, he was reminded of truths he had forgotten. He was only one of a million million creatures that shared this planet Earth. The entire human race, with its hopes and fears, its triumphs and its follies, might be no more than an incident in the history of the world. As he stood before the monstrous bones of *Diplodocus* (the children for once awed and silent), he felt the winds of Eternity blowing through his soul. He could no longer take so seriously the gnawing of ambition, the belief that he was the man the nation needed. *What* nation, if it came to that? A mere two centuries ago this summer, the Declaration of Independence had been signed; but this old American had lain in the Utah rocks for a hundred million years ...

He was tired when they reached the Hall of Oceanic Life, with its dramatic reminder that Earth still possessed animals

greater than any that the past could show. The ninety-foot blue whale plunging into the ocean, and all the other swift hunters of the sea, brought back memories of hours he had once spent on a tiny, glistening deck with a white sail billowing above him. That was another time when he had known contentment, listening to the swish of water past the prow, and the sighing of the wind through the rigging. He had not sailed for thirty years; this was another of the world's pleasures he had put aside.

'I don't like fish,' complained Susan. 'When do we get to the snakes?'

'Presently,' he said. 'But what's the hurry? There's plenty of time.'

The words slipped out before he realized it. He checked his step, while the children ran on ahead. Then he smiled, without bitterness. For in a sense, it was true enough. There *was* plenty of time. Each day, each hour could be a universe of experience, if one used it properly. In the last weeks of his life, he would begin to live.

As yet, no one at the office suspected anything. Even his outing with the children had not caused much surprise; he had done such things before, suddenly cancelling his appointments and leaving his staff to pick up the pieces. The pattern of his behaviour had not yet changed, but in a few days it would be obvious to all his associates that something had happened. He owed it to them – and to the party – to break the news as soon as possible; there were, however, many personal decisions he had to make first, which he wished to settle in his own mind before he began the vast unwinding of his affairs.

There was another reason for his hesitancy. During his career, he had seldom lost a fight, and in the cut and thrust of political life he had given quarter to none. Now, facing his ultimate defeat, he dreaded the sympathy and the

condolences that his many enemies would hasten to shower upon him. The attitude, he knew, was a foolish one – a remnant of his stubborn pride which was too much a part of his personality to vanish even under the shadow of death.

He carried his secret from committee room to White House to Capitol, and through all the labyrinths of Washington society, for more than two weeks. It was the finest performance of his career, but there was no one to appreciate it. At the end of that time he had completed his plan of action; it remained only to dispatch a few letters he had written in his own hand, and to call his wife.

The office located her, not without difficulty, in Rome. She was still beautiful, he thought, as her features swam on to the screen; she would have made a fine First Lady, and that would have been some compensation for the lost years. As far as he knew, she had looked forward to the prospect; but had he ever really understood what she wanted?

‘Hello, Martin,’ she said, ‘I was expecting to hear from you, I suppose you want me to come back.’

‘Are you willing to?’ he asked quietly. The gentleness of his voice obviously surprised her.

‘I’d be a fool to say no, wouldn’t I? But if they don’t elect you, I want to go my own way again. You must agree to that.’

‘They won’t elect me. They won’t even nominate me. You’re the first to know this, Diana. In six months, I shall be dead.’

The directness was brutal, but it had a purpose. That fraction-of-a-second delay with the radio waves flashed up to the communication satellites and back again to Earth had never seemed so long. For once, he had broken through the beautiful mask. Her eyes widened with disbelief, her hand flew to her lips.

‘You’re joking!’

‘About *this*? It’s true enough. My heart’s worn out. Dr. Jordan told me, a couple of weeks ago. It’s my own fault, of course, but let’s not go into that.’

‘So that’s why you’ve been taking out the children: I wondered what had happened.’

He might have guessed that Irene would have talked with her mother. It was a sad reflection on Martin Steelman, if so commonplace a fact as showing an interest in his own grandchildren could cause curiosity.

‘Yes,’ he admitted frankly. ‘I’m afraid I left it a little late. Now I’m trying to make up for lost time. Nothing else seems very important.’

In silence, they looked into each other’s eyes across the curve of the Earth, and across the empty desert of the dividing years. Then Diana answered, a little unsteadily, ‘I’ll start packing right away.’

Now that the news was out, he felt a great sense of relief. Even the sympathy of his enemies was not as hard to accept as he had feared. For overnight, indeed, he had no enemies. Men who had not spoken to him in years, except with invective, sent messages whose sincerity could not be doubted. Ancient quarrels evaporated, or turned out to be founded on misunderstandings. It was a pity that one had to die to learn these things . . .

He also learned that, for a man of affairs, dying was a full-time job. There were successors to appoint, legal and financial mazes to untangle, committee and state business to wind up. The work of an energetic lifetime could not be terminated suddenly, as one switches off an electric light. It was astonishing how many responsibilities he had acquired, and how difficult it was to divest himself of them. He had never found it easy to delegate power (a fatal flaw, many critics had said, in a man who hoped to be Chief Executive), but now he must do so, before it slipped forever from his hands.

It was as if a great clock was running down, and there was

no one to rewind it. As he gave away his books, read and destroyed old letters, closed useless accounts and files, dictated final instructions, and wrote farewell notes, he sometimes felt a sense of complete unreality. There was no pain; he could never have guessed that he did not have years of active life ahead of him. Only a few lines on a cardiogram lay like a roadblock across his future – or like a curse, written in some strange language the doctors alone could read.

Almost every day now Diana, Irene, or her husband brought the children to see him. In the past he had never felt at ease with Bill, but that, he knew, had been his own fault. You could not expect a son-in-law to replace a son, and it was unfair to blame Bill because he had not been cast in the image of Martin Steelman, Jr. Bill was a person in his own right; he had looked after Irene, made her happy, and fathered her children. That he lacked ambition was a flaw – if flaw indeed it was – that the Senator could at last forgive.

He could even think, without pain or bitterness, of his own son, who had travelled this road before him and now lay, one cross among many, in the United Nations cemetery at Capetown. He had never visited Martin's grave; in the days when he had the time, white men were not popular in what was left of South Africa. Now he could go if he wished, but he was uncertain if it would be fair to harrow Diana with such a mission. His own memories would not trouble him much longer, but she would be left with hers.

Yet he would like to go, and felt it was his duty. Moreover, it would be a last treat for the children. To them it would be only a holiday in a strange land, without any tinge of sorrow for an uncle they had never known. He had started to make the arrangements when, for the second time within a month his whole world was turned upside down.

Even now, a dozen or more visitors would be waiting for him each morning when he arrived at his office. Not as many as in the old days, but still a sizable crowd. He had never imagined, however, that Dr. Harkness would be among them.

The sight of that thin, gangling figure made him momentarily break his stride. He felt his cheeks flush, his pulse quicken at the memory of ancient battles across committee-room tables, of angry exchanges that had reverberated along the myriad channels of the ether. Then he relaxed; as far as he was concerned, all that was over.

Harkness rose to his feet, a little awkwardly, as he approached. Senator Steelman knew that initial embarrassment – he had seen it so often in the last few weeks. Everyone he now met was automatically at a disadvantage, always on the alert to avoid the one subject that was taboo.

‘Well, Doctor,’ he said. ‘This is a surprise – I never expected to see *you* here.’

He could not resist that little jab, and derived some satisfaction at watching it go home. But it was free from bitterness, as the other’s smile acknowledged.

‘Senator,’ replied Harkness, in a voice that was pitched so low that he had to lean forward to hear it, ‘I’ve some extremely important information for you. Can we speak alone for a few minutes? It won’t take long.’

Stelman nodded; he had his own ideas of what was important now, and felt only a mild curiosity as to why the scientist had come to see him. The man seemed to have changed a good deal since their last encounter, seven years ago. He was much more assured and self-confident, and had lost the nervous mannerisms that had helped to make him such an unconvincing witness.

‘Senator,’ he began, when they were alone in the private office, ‘I’ve some news that may be quite a shock to you. I believe that you can be cured.’

Steelman slumped heavily in his chair. This was the one thing he had never expected; from the first, he had not encumbered himself with the burden of vain hopes. Only a fool fought against the inevitable, and he had accepted his fate.

For a moment he could not speak; then he looked up at his old adversary and gasped: 'Who told you that? All my doctors —'

'Never mind them; it's not their fault they're ten years behind the times. Look at this.'

'What does it mean? I can't read Russian.'

'It's the latest issue of the *USSR Journal of Space Medicine*. It arrived a few days ago, and we did the usual routine translation. This note here — the one I've marked — refers to some recent work at the Mechnikov Station.'

'What's that?'

'You don't *know*? Why, that's their Satellite Hospital, the one they've built just below the Great Radiation Belt.'

'Go on,' said Steelman, in a voice that was suddenly dry and constricted. 'I'd forgotten they'd called it that.' He had hoped to end his life in peace, but now the past had come back to haunt him.

'Well, the note itself doesn't say much, but you can read a lot between the lines. It's one of those advance hints that scientists put out before they have time to write a full-fledged paper, so they can claim priority later. The title is: "Therapeutic Effects of Zero Gravity on Circulatory Diseases." What they've done is to induce heart disease artificially in rabbits and hamsters, and then take them up to the space station. In orbit, of course, nothing has any weight; the heart and muscles have practically no work to do. And the result is exactly what I tried to tell you, years ago. Even extreme cases can be arrested, and many can be cured.'

The tiny, panelled office that had been the centre of his world, the scene of so many conferences, the birthplace of

so many plans, became suddenly unreal. Memory was much more vivid: he was back again at those hearings, in the fall of 1969, when the National Aeronautics and Space Administration's first decade of activity had been under review – and, frequently, under fire.

He had never been chairman of the Senate Committee on Astronautics, but he had been its most vocal and effective member. It was here that he had made his reputation as a guardian of the public purse, as a hardheaded man who could not be bamboozled by utopian scientific dreamers. He had done a good job; from that moment, he had never been far from the headlines. It was not that he had any particular feeling for space and science, but he knew a live issue when he saw one. Like a tape-recorder unrolling in his mind, it all came back ...

‘Dr. Harkness, you are Technical Director of the National Aeronautics and Space Administration?’

‘That is correct.’

‘I have here the figures for NASA’s expenditure over the period 1959–69; they are quite impressive. At the moment the total is \$82,547,450,000, and the estimate for fiscal 69–70 is well over ten billions. Perhaps you could give us some indication of the return we can expect from all this.’

‘I’ll be glad to do so, Senator.’

That was how it had started, on a firm but not unfriendly note. The hostility had crept in later. That it was unjustified, he had known at the time; any big organization had weaknesses and failures, and one which literally aimed at the stars could never hope for more than partial success. From the beginning, it had been realized that the conquest of space would be at least as costly in lives and treasure as the conquest of the air. In ten years, almost a hundred men had died – on Earth, in space, and upon the barren surface of the Moon. Now that the urgency of the early sixties was

over, the public was asking 'Why?' Steelman was shrewd enough to see himself as mouthpiece for those questioning voices. His performance had been cold and calculated; it was convenient to have a scapegoat, and Dr. Harkness was unlucky enough to be cast for the role.

'Yes, Doctor, I understand all the benefits we've received from space research in the way of improved communications and weather forecasting, and I'm sure everyone appreciates them. But almost all this work has been done with automatic, unmanned vehicles. What I'm worried about – what many people are worried about – is the mounting expense of the Man-in-Space programme, and its very marginal utility. Since the original Dyna-Soar and Apollo projects almost a decade ago, we've shot billions of dollars into space. And with what result? So that a mere handful of men can spend a few uncomfortable hours outside the atmosphere; achieving nothing that television cameras and automatic equipment couldn't do – much better and cheaper. And the lives that have been lost! None of us will forget those screams we heard coming over the radio when the X-21 burned up on re-entry. What right have we to send men to such deaths?'

He could still remember the hushed silence in the committee chamber when he had finished. His questions were very reasonable ones, and deserved to be answered. What was unfair was the rhetorical manner in which he had framed them and, above all, the fact that they were aimed at a man who could not answer them effectively. Steelman would not have tried such tactics on a von Braun or a Rickover; they would have given him at least as good as they received. But Harkness was no orator; if he had deep personal feelings, he kept them to himself. He was a good scientist, an able administrator – and a poor witness. It had been like shooting fish in a barrel. The reporters had loved it; he never knew which of them coined the nickname

‘Hapless Harkness’.

‘Now this plan of yours, Doctor, for a fifty-man space laboratory – *how* much did you say it would cost?’

‘I’ve already told you – just under one and a half billions.’

‘And the annual maintenance?’

Not more than \$250,000,000.’

‘When we consider what’s happened to previous estimates, you will forgive us if we look upon these figures with some scepticism. But even assuming that they are right, what will we get for the money?’

‘We will be able to establish our first large-scale research station in space. So far, we have had to do our experimenting in cramped quarters aboard unsuitable vehicles, usually when they were engaged on some other mission. A permanent, manned satellite laboratory is essential. Without it, further progress is out of the question. Astrobiology can hardly get started —’

‘Astro what?’

‘Astrobiology – the study of living organisms in space. The Russians really started it when they sent up the dog Laika in Sputnik II and they’re still ahead of us in this field. But no one’s done any serious work on insects or invertebrates – in fact, on any animals except dogs, mice, and monkeys.’

‘I see. Would I be correct in saying that you would like funds for building a zoo in space?’

The laughter in the committee room had helped to kill the project. And it had helped, Senator Steelman now realized, to kill him.

He had only himself to blame, for Dr. Harkness had tried, in his ineffectual way, to outline the benefits that a space laboratory might bring. He had particularly stressed the medical aspects, promising nothing but pointing out the possibilities. Surgeons, he had suggested, would be able to develop new techniques in an environment where the organs

had no weight; men might live longer, freed from the wear and tear of gravity, for the strain on heart and muscles would be enormously reduced. Yes, he had mentioned the heart; but that had been of no interest to Senator Steelman – healthy, and ambitious, and anxious to make good copy ...

‘Why have you come to tell me this?’ he said dully. ‘Couldn’t you let me die in peace?’

‘That’s the point,’ said Harkness impatiently. ‘There’s no need to give up hope.’

‘Because the Russians have cured some hamsters and rabbits?’

‘They’ve done much more than that. The paper I showed you only quoted the preliminary results; it’s already a year out of date. They don’t want to raise false hopes, so they are keeping as quiet as possible.’

‘How do you know this?’

Harkness looked surprised.

‘Why, I called Professor Stanyukovitch, my opposite number. It turned out that he was up on the Mechnikov Station, which proves how important they consider this work. He’s an old friend of mine, and I took the liberty of mentioning your case.’

The dawn of hope, after its long absence, can be as painful as its departure. Steelman found it hard to breathe and for a dreadful moment he wondered if the final attack had come. But it was only excitement; the constriction in his chest relaxed, the ringing in his ears faded away, and he heard Dr. Harkness’ voice saying: ‘He wanted to know if you could come to Astrograd right away, so I said I’d ask you. If you can make it, there’s a flight from New York at ten-thirty tomorrow morning.’

Tomorrow he had promised to take the children to the Zoo; it would be the first time he had let them down. The

thought gave him a sharp stab of guilt, and it required almost an effort of will to answer: 'I can make it.'

He saw nothing of Moscow during the few minutes that the big intercontinental ramjet fell down from the stratosphere. The view-screens were switched off during the descent, for the sight of the ground coming straight up as a ship fell vertically on its sustaining jets was highly disconcerting to passengers.

At Moscow he changed to a comfortable but old-fashioned turboprop, and as he flew eastward into the night he had his first real opportunity for reflection. It was a very strange question to ask himself, but was he altogether glad that the future was no longer wholly certain? His life, which a few hours ago had seemed so simple, had suddenly become complex again, as it opened out once more into possibilities he had learned to put aside. Dr. Johnson had been right when he said that nothing settles a man's mind more wonderfully than the knowledge that he will be hanged in the morning. For the converse was certainly true — nothing unsettled it so much as the thought of a reprieve.

He was asleep when they touched down at Astrograd, the space capital of the U.S.S.R. When the gentle impact of the landing shook him awake, for a moment he could not imagine where he was. Had he dreamed that he was flying halfway around the world in search of life? No; it was not a dream, but it might well be a wild-goose chase.

Twelve hours later, he was still waiting for the answer. The last instrument reading had been taken; the spots of light on the cardiograph display had ceased their fateful dance. The familiar routine of the medical examination and the gentle, competent voices of the doctors and nurses had done much to relax his mind. And it was very restful in the softly lit reception room, where the specialists had asked him to wait while they conferred together. Only the Russian

magazines, and a few portraits of somewhat hirsute pioneers of Soviet medicine, reminded him that he was no longer in his own country.

He was not the only patient. About a dozen men and women, of all ages, were sitting around the wall, reading magazines and trying to appear at ease. There was no conversation, no attempt to catch anyone's eye. Every soul in this room was in his private limbo, suspended between life and death. Though they were linked together by a common misfortune, the link did not extend to communication. Each seemed as cut off from the rest of the human race as if he was already speeding through the cosmic gulfs where lay his only hope.

But in the far corner of the room, there was an exception. A young couple – neither could have been more than twenty-five – were huddling together in such desperate misery that at first Steelman found the spectacle annoying. No matter how bad their own problems, he told himself severely, people should be more considerate. They should hide their emotions – especially in a place like this, where they might upset others.

His annoyance quickly turned to pity, for no heart can remain untouched for long at the sight of simple, unselfish love in deep distress. As the minutes dripped away in a silence broken only by the rustling of papers and the scraping of chairs, his pity grew almost to an obsession.

What was their story, he wondered? The boy had sensitive, intelligent features; he might have been an artist, a scientist, a musician – there was no way of telling. The girl was pregnant; she had one of those homely peasant faces so common among Russian women. She was far from beautiful, but sorrow and love had given her features a luminous sweetness. Steelman found it hard to take his eyes from her – for somehow, though there was not the slightest physical resemblance, she reminded him of Diana. Thirty

years ago, as they had walked from the church together, he had seen that same glow in the eyes of his wife. He had almost forgotten it; was the fault his, or hers, that it had faded so soon?

Without any warning, his chair vibrated beneath him. A swift, sudden tremor had swept through the building, as if a giant hammer had smashed again the ground, many miles away. An earthquake? Steelman wondered; then he remembered where he was, and started counting seconds.

He gave up when he reached sixty; presumably the sound-proofing was so good that the slower, air-borne noise had not reached him, and only the shock wave through the ground recorded the fact that a thousand tons had just leapt into the sky. Another minute passed before he heard, distant but clear, a sound as of a thunderstorm raging below the edge of the world. It was even more miles away than he had dreamed; what the noise must be like at the launching site was beyond imagination.

Yet that thunder would not trouble him, he knew, when he also rose into the sky; the speeding rocket would leave it far behind. Nor would the thrust of acceleration be able to touch his body, as it rested in its bath of warm water – more comfortable even than this deeply padded chair.

The distant rumble was still rolling back from the edge of space when the door of the waiting room opened and the nurse beckoned to him. Though he felt many eyes following him, he did not look back as he walked out to receive his sentence.

The news services tried to get in contact with him all the way back from Moscow, but he refused to accept the calls. 'Say I'm sleeping and musn't be disturbed,' he told the stewardess. He wondered who had tipped them off, and felt annoyed at this invasion of his privacy. Yet privacy was something he had avoided for years, and had learned

to appreciate only in the last few weeks. He could not blame the reporters and commentators if they assumed that he had reverted to type.

They were waiting for him when the ramjet touched down at Washington. He knew most of them by name, and some were old friends, genuinely glad to hear the news that had raced ahead of him.

'What does it feel like, Senator' said Macauley, of *The Times*, 'to know you're back to harness? I take it that it's true – the Russians can cure you?'

'They *think* they can,' he answered cautiously. 'This is a new field of medicine, and no one can promise anything.'

'When do you leave for space?'

'Within the week as soon as I've settled some affairs here.'

'And when will you be back – if it works?'

'That's hard to say. Even if everything goes smoothly, I'll be up there at least six months.'

Involuntarily, he glanced at the sky. At dawn or sunset – even during the daytime, if one knew where to look – the Mechnikov Station was a spectacular sight, more brilliant than any of the stars. But there were now so many satellites of which this was true that only an expert could tell one from another.

'Six months,' said a newsman thoughtfully. 'That means you'll be out of the picture for seventy-six.'

'But nicely in it for 1980,' said another.

'And 1984' added a third. There was a general laugh; people were already making jokes about 1984, which had once seemed so far in the future, but would soon be a date no different from any other . . . it was hoped.

The ears and the microphones were waiting for his reply. As he stood at the foot of the ramp, once more the focus of attention and curiosity, he felt the old excitement stirring in his veins. What a comeback it would be, to return from

space a new man! It would give him a glamour that no other candidate could match; there was something Olympian, almost godlike, about the prospect. Already he found himself trying to work it into his election slogans . . .

‘Give me time to make my plans,’ he said. ‘It’s going to take me a while to get used to this. But I promise you a statement before I leave Earth.’

Before I leave Earth. Now, there was a fine, dramatic phrase. He was still savouring its rhythm with his mind when he saw Diana coming towards him from the airport buildings.

Already she had changed as he himself was changing; in her eyes was a wariness and reserve that had not been there two days ago. It said, as clearly as any words: ‘Is it going to happen, all over again?’ Though the day was warm, he felt suddenly cold, as if he had caught a chill on those far Siberian plains.

But Joey and Susan were unchanged, as they ran to greet him. He caught them up in his arms, and buried his face in their hair, so that the cameras would not see the tears that had started from his eyes. As they clung to him in the innocent unselfconscious love of childhood, he knew what his choice would have to be.

They alone had known him when he was free from the itch for power; that was the way they must remember him, if they remembered him at all.

‘Your conference call, Mr. Steelman,’ said his secretary. ‘I’m routing it on to your private screen.’

He swivelled round in his chair and faced the grey panel on the wall. As he did so, it split into two vertical sections. On the right half was a view of an office much like his own, and only a few miles away. But on the left —

Professor Stanyukovitch, lightly dressed in shorts and singlet, was floating in mid-air a good foot above his seat.

He grabbed it when he saw that he had company, pulled himself down, and fastened a webbed belt around his waist. Behind him were ranged banks of communications equipment; and behind those, Steelman knew, was space.

Dr. Harkness spoke first from the right-hand screen.

'We were expecting to hear from you, Senator. Professor Stanyukovitch tells me that everything is ready.'

'The next supply ship' said the Russian, 'comes up in two days. It will be taking me back to Earth but I hope to see you before I leave the station.'

His voice was curiously high-pitched, owing to the thin oxyhelium atmosphere he was breathing. Apart from that, there was no sense of distance, no background of interference. Though Stanyukovitch was thousands of miles away, and racing through space at four miles a second, he might have been in the same office. Steelman could even hear the faint whirring of electric motors from the equipment racks behind him.

'Professor,' answered Steelman, 'there are a few things I'd like to ask before I go.'

'Certainly.'

Now he could tell that Stanyukovitch was a long way off. There was an appreciable time lag before his reply arrived; the station must be above the far side of the Earth.

'When I was at Astrograd I noticed many other patients at the clinic. I was wondering — on what basis do you select those for treatment?'

This time the pause was much greater than the delay due to the sluggish speed of radio waves. Then Stanyukovitch answered: 'Why, those with the best chance of responding.'

'But your accommodation must be very limited. You must have many other candidates besides myself.'

'I don't quite see the point —' interrupted Dr. Harkness, a little too anxiously.

Stelman swung his eyes to the right-hand screen. It was

quite difficult to recognize, in the man staring back at him, the witness who had squirmed beneath his needling only a few years ago. The experience had tempered Harkness, had given him his baptism in the art of politics. Steelman had taught him much, and he had applied his hard-won knowledge.

His motives had been obvious from the first. Harkness would have been less than human if he did not relish this sweetest of revenges, this triumphant vindication of his faith. And as Space Administration Director, he was well aware that half his budget battles would be over when all the world knew that a potential President of the United States was in a Russian space hospital ... because his own country did not possess one.

'Dr. Harkness,' said Steelman gently, 'this is *my* affair. I'm still waiting for your answer Professor.'

Despite the issues involved, he was quite enjoying this. The two scientists, of course, were playing for identical stakes. Stanyukovitch had his problems too; Steelman could guess the discussions that had taken place at Astrograd and Moscow, and the eagerness with which the Soviet astronauts had grasped this opportunity – which, it must be admitted, they had richly earned.

It was an ironic situation, unimaginable only a dozen years before. Here was NASA and the U.S.S.R. Commission of Astronautics working hand in hand, using him as a pawn for their mutual advantage. He did not resent this, for in their place he would have done the same. But he had no wish to be a pawn; he was an individual who still had some control of his own destiny.

'It's quite true,' said Stanyukovitch, very reluctantly, 'that we can only take a limited number of patients here in Mechnikov. In any case, the station's a research laboratory, not a hospital.'

'How many?' asked Steelman relentlessly.

'Well – fewer than ten,' admitted Stanyukovitch, still more unwillingly.

It was an old problem, of course, though he had never imagined that it would apply to him. From the depths of memory there flashed a newspaper item he had come across long ago. When penicillin had been first discovered, it was so rare that if both Churchill and Roosevelt had been dying for lack of it, only one could have been treated . . .

Fewer than ten. He had seen a dozen waiting at Astrograd, and how many were there in the whole world? Once again, as it had done so often in the last few days, the memory of those desolate lovers in the reception room came back to haunt him. Perhaps they were beyond his aid; he would never know.

But one thing he did know. He bore a responsibility that he could not escape. It was true that no man could foresee the future, and the endless consequences of his actions. Yet if it had not been for him, by this time his own country might have had a space hospital circling beyond the atmosphere. How many American lives were upon his conscience? Could he accept the help he had denied to others? Once he might have done so – but not now.

'Gentlemen,' he said, 'I can speak frankly with you both, for I know your interests are identical.' (His mild irony, he saw, did not escape them.) 'I appreciate your help and the trouble you have taken; I am sorry it has been wasted. No – don't protest; this isn't a sudden, quixotic decision on my part. If I was ten years younger, it might be different. Now I feel that this opportunity should be given to someone else – especially in view of my record.' He glanced at Dr. Harkness, who gave an embarrassed smile. 'I also have other personal reasons, and there's no chance that I will change my mind. Please don't think me rude or ungrateful, but I don't wish to discuss the matter any further. Thank you again, and good-bye.'

He broke the circuit; and as the image of the two astonished scientists faded, peace came flooding back into his soul.

Imperceptibly, spring merged into summer. The eagerly awaited Bicentenary celebrations came and went; for the first time in years, he was able to enjoy Independence Day as a private citizen. Now he could sit back and watch the others perform – or he could ignore them if he wished.

Because the ties of a lifetime were too strong to break, and it would be his last opportunity to see many old friends, he spent hours looking in on both conventions and listening to the commentators. Now that he saw the whole world beneath the light of Eternity, his emotions were no longer involved; he understood the issues and appreciated the arguments, but already he was as detached as an observer from another planet. The tiny, shouting figures on the screen were amusing marionettes, acting out roles in a play that was entertaining, but no longer important – at least, to him.

But it was important to his grandchildren, who would one day move out on to this same stage. He had not forgotten that; they were his share of the future, whatever strange form it might take. And to understand the future, it was necessary to know the past.

He was taking them into that past, as the car swept along Memorial Drive. Diana was at the wheel, with Irene beside her, while he sat with the children, pointing out the familiar sights along the highway. Familiar to him, but not to them; even if they were not old enough to understand all that they were seeing, he hoped they would remember.

Past the marble stillness of Arlington (he thought again of Martin, sleeping on the other side of the world) and up into the hills the car wound its effortless way. Behind them, like a city seen through a mirage, Washington danced and trembled in the summer haze, until the curve of the road

hid it from view.

It was quiet at Mount Vernon; there were few visitors so early in the week. As they left the car and walked towards the house, Steelman wondered what the first President of the United States would have thought could he have seen his home as it was today. He could never have dreamed that it would enter its second century still perfectly preserved, a changeless island in the hurrying river of time.

They walked slowly through the beautifully proportioned rooms, doing their best to answer the children's endless questions, trying to assimilate the flavour of an infinitely simpler, infinitely more leisurely mode of life. (But had it seemed simple or leisurely to those who lived it?) It was so hard to imagine a world without electricity, without radio, without any power save that of muscle, wind and water. A world where nothing moved faster than a running horse, and most men died within a few miles of the place where they were born.

The heat, the walking and the incessant questions proved more tiring than Steelman had expected. When they had reached the Music Room, he decided to rest. There were some attractive benches out on the porch, where he could sit in the fresh air and feast his eyes upon the green grass of the lawn.

'Meet me outside,' he explained to Diana, 'when you've done the kitchen and the stables. I'd like to sit down for a while.'

'You're sure you're quite all right?' she said anxiously.

'I never felt better, but I don't want to overdo it. Besides, the kids have drained me dry – I can't think of any more answers. You'll have to invent some; the kitchen's your department, anyway.'

Diana smiled.

'I was never much good in it, was I? But I'll do my best – I don't suppose we'll be more than thirty minutes.'

When they had left him, he walked slowly out on to the lawn. Here Washington must have stood two centuries ago, watching the Potomac wind its way to the sea, thinking of past wars and future problems. And here Martin Steelman, thirty-eighth President of the United States, might have stood a few months hence, had the fates not ruled otherwise.

He could not pretend that he had no regrets, but they were very few. Some men could achieve both power and happiness, but that gift was not for him. Sooner or later, his ambition would have consumed him. In the last few weeks he had known contentment, and for that no price was too great.

He was still marvelling at the narrowness of his escape when his time ran out and Death fell softly from the summer sky.

HATE

ONLY Joey was awake on deck, in the cool stillness before dawn, when the meteor came flaming out of the sky above New Guinea. He watched it climb up the heavens until it passed directly overhead, routing the stars and throwing swift-moving shadows across the crowded deck. The harsh light outlined the bare rigging, the coiled ropes and air hoses, the copper diving helmets neatly snugged down for the night – even the low, pandanus-clad island half a mile away. As it passed into the southwest, out over the emptiness of the Pacific, it began to disintegrate. Incandescent globules broke off, burning and guttering in a trail of fire that stretched a quarter of the way across the sky. It was already dying when it raced out of sight, but Joey did not see its end. Still blazing furiously, it sank below the horizon as if seeking to hurl itself into the face of the hidden sun.

If the sight was spectacular, the utter silence was unnerving. Joey waited and waited and waited, but no sound came from the riven heavens. When, minutes later, there was a sudden splash from the sea close at hand, he gave an involuntary start of surprise – then cursed himself for being frightened by a manta. (A mighty big one, though, to have made so much noise when it jumped.) There was no other sound, and presently he went back to sleep.

In his narrow bunk just aft of the air compressor, Tibor heard nothing. He slept so soundly after his day's work that he had little energy even for dreams – and when they came, they were not the dreams he wanted. In the hours of darkness, as his mind roamed back and forth across the past, it never came to rest amid memories of desire. He had

women in Sydney and Brisbane and Darwin and Thursday Island – but none in his dreams. All that he ever remembered when he woke, in the fetid stillness of the cabin, was the dust and fire and blood as the Russian tanks rolled into Budapest. His dreams were not of love, but only of hate.

When Nick shook him back to consciousness, he was dodging the guards on the Austrian border. It took him a few seconds to make the ten-thousand-mile journey to the Great Barrier Reef; then he yawned, kicked away the cockroaches that had been nibbling at his toes and heaved himself out of his bunk.

Breakfast, of course, was the same as always – rice, turtle eggs and bully beef, washed down with strong, sweet tea. The best that could be said of Joey's cooking was that there was plenty of it. Tibor was used to the monotonous diet; he made up for it, and for other deprivations, when he was back on the mainland.

The sun had barely cleared the horizon when the dishes were stacked in the tiny galley and the lugger got under way. Nick sounded cheerful as he took the wheel and headed out from the island; the old pearling-master had every right to be, for the patch of shell they were working was the richest that Tibor had ever seen. With any luck, they would fill their hold in another day or two, and sail back to T. I. with half a ton of shell on board. And then, with a little more luck, he could give up this stinking, dangerous job and get back to civilization. Not that he regretted anything; the Greek had treated him well, and he'd found some good stones when the shells were opened. But he understood now, after nine months on the Reef, why the number of white divers could be counted on the fingers of one hand. Japs and Kanakas and Islanders could take it – but damn few Europeans.

The diesel coughed into silence, and the *Arafura* coasted to rest. They were some two miles from the island, which

lay low and green on the water, yet sharply divided from it by its narrow band of dazzling beach. It was no more than a nameless sand bar that a tiny forest had managed to capture, and its only inhabitants were the myriads of stupid muttonbirds that riddled the soft ground with their burrows and made the night hideous with their banshee cries.

There was little talk as the three divers dressed; each man knew what to do, and wasted no time in doing it. As Tibor buttoned on his thick twill jacket, Blanco, his tender, rinsed out the faceplate with vinegar so that it would not become fogged. Then Tibor clambered down the rope ladder, while the heavy helmet and lead corselet were placed over his head. Apart from the jacket, whose padding spread the weight evenly over his shoulders, he was wearing his ordinary clothes. In these warm waters there was no need for rubber suits, and the helmet simply acted as a tiny diving bell held in position by its weight alone. In an emergency the wearer could – if he was lucky – duck out of it and swim back to the surface unhampered. Tibor had seen this done, but he had no wish to try the experiment for himself.

Each time he stood on the last rung of the ladder, gripping his shell bag with one hand and his safety line with the other, the same thought flashed through Tibor's mind. He was leaving the world he knew – but was it for an hour or was it forever? Down there on the sea bed was wealth and death, and one could be sure of neither. The chances were that this would be another day of uneventful drudgery, as were most of the days in the pearl diver's unglamorous life. But Tibor had seen one of his mates die, when his air hose tangled in the *Arafura's* prop – and he had watched the agony of another whose body twisted with the bends. In the sea, nothing was ever safe or certain. You took your chances with open eyes – and if you lost, there was no point in whining.

He stepped back from the ladder, and the world of sun and sky ceased to exist. Top-heavy with the weight of his helmet, he had to backpedal furiously to keep his body upright. He could see nothing but a featureless blue mist as he sank towards the bottom, and he hoped that Blanco would not play out the safety line too quickly. Swallowing and snorting, he tried to clear his ears as the pressure mounted; the right one 'popped' quickly enough, but a piercing, intolerable pain grew rapidly in the left, which had bothered him for several days. He forced his hand up under the helmet, gripped his nose, and blew with all his might. There was an abrupt, soundless explosion somewhere inside his head, and the pain vanished instantly. He'd have no more trouble on this dive.

Tibor felt the bottom before he saw it. Since he was unable to bend over lest he risk flooding the open helmet, his vision in the downward direction was very limited. He could see around, but not immediately below. What he did see was reassuring in its drab monotony – gently undulating, muddy plain that faded out of sight about ten feet ahead. A yard to his left a tiny fish was nibbling at a piece of coral the size and shape of a lady's fan. That was all; there was no beauty, no underwater fairyland here. But there was money, and that was what mattered.

The safety line gave a gentle pull as the lugger started to drift downward, moving broadside-on across the patch, and Tibor began to walk forward with the springy, slow-motion step forced on him by weightlessness and water resistance. As Number Two diver he was working from the bow; amidships was Stephen, still comparatively inexperienced, while at the stern was the head diver, Billy. The three men seldom saw each other while they were working; each had his own lane to search as the *Arafura* drifted silently before the wind. Only at the extremes of the zig-zags might they sometimes glimpse one another as dim

shapes looming through the mist.

It needed a trained eye to spot the shells beneath their camouflage of algae and weeds, but often the molluscs betrayed themselves. When they felt the vibrations of the approaching diver, they would snap shut – and there would be a momentary, nacreous flicker in the gloom. Yet even then they sometimes escaped, for the moving ship might drag the diver past before he could collect the prize just out of reach. In the early days of his apprenticeship, Tibor had missed quite a few of the big silver lips – any one of which might have contained some fabulous pearl. Or so he had imagined, before the glamour of the profession had worn off, and he realized that pearls were so rare that you might as well forget them. The most valuable stone he'd ever brought up had been sold for fifty-six dollars, and the shell he gathered on a good morning was worth more than that. If the industry had depended on gems instead of mother-of-pearl, it would have gone broke years ago.

There was no sense of time in this world of mist. You walked beneath the invisible, drifting ship, with the throb of the air compressor pounding in your ears, the green haze moving past your eyes. At long intervals you would spot a shell, wrench it from the sea bed, and drop it in your bag. If you were lucky, you might gather a couple of dozen on a single drift across the patch; on the other hand, you might not find a single one.

You were alert for danger, but not worried by it. The real risks were simple, unspectacular things like tangled air hoses or safety lines – not sharks, groupers or octopuses. Sharks ran when they saw your air bubbles, and in all his hours of diving Tibor had seen just one octopus, every bit of two feet across. As for groupers – well, *they* were to be taken seriously, for they could swallow a diver at one gulp if they felt hungry enough. But there was little chance of meeting them on this flat and desolate plain; there was

none of the coral caves in which they could make their homes.

The shock would not have been so great, therefore, if this uniform, level greyness had not lulled him into a sense of security. At one moment he was walking steadily towards an unreachable wall of mist, which retreated as fast as he approached. And then without warning, his private nightmare was looming above him.

Tibor hated spiders, and there was a certain creature in the sea that seemed deliberately contrived to take advantage of that phobia. He had never met one, and his mind had always shied away from the thought of such an encounter, but Tibor knew that the Japanese spider crab can span twelve feet across its spindly legs. That it was harmless mattered not in the least; a spider as big as a man simply had no right to exist.

As soon as he saw that cage of slender, joined limbs emerge from the all-encompassing greyness, Tibor began to scream with uncontrollable terror. He never remembered jerking his safety line, but Blanco reacted with the instantaneous perception of the ideal tender. His helmet still echoing to his screams, Tibor felt himself snatched from the sea bed, lifted towards light and air – and sanity. As he swept upwards, he saw both the strangeness and the absurdity of his mistake, and regained a measure of control. But he was still trembling so violently when Blanco lifted off his helmet that it was some time before he could speak.

‘What the hell’s going on here?’ demanded Nick. ‘Everyone knocking off work early?’

It was then that Tibor realized that he was not the first to come up. Stephen was sitting amidships, smoking a cigarette and looking completely unconcerned. The stern diver, doubtless wondering what had happened was being hauled up willy-nilly by his tender, since the *Arafura* had come to rest and all operations had been suspended until the trouble

was resolved.

'There's some kind of wreck down there,' said Tibor. 'I ran right into it. All I could see were a lot of wires and rods.'

To his annoyance and self-contempt, the memory set him trembling again.

'Don't see why *that* should give you the shakes,' grumbled Nick. Nor could Tibor; here on this sun-drenched deck, it was impossible to explain how a harmless shape glimpsed through the mist could set one's whole mind jangling with terror.

'I nearly got hung up on it,' he lied. 'Blanco pulled me clear just in time.'

'Hmm,' said Nick obviously not convinced. 'Anyway, it ain't a ship.' He gestured towards the midships diver. 'Steve ran into a mess of ropes and cloth – like thick nylon, he says. Sounds like some kind of parachute.' The old Greek stared in disgust at the soggy stump of his cigar, then flicked it overboard. 'Soon as Billy's up, we'll go back and take a look. Might be worth something – remember what happened to Jo Chambers.'

Tibor remembered; the story was famous the whole length of the Great Barrier Reef. Jo had been a lone-wolf fisherman who, in the last months of the war had spotted a DC-3 lying in shallow water a few miles off the Queensland coast. After prodigies of singlehanded salvage, he had broken into the fuselage and started unloading boxes of taps and dies, perfectly protected by their greased wrappings. For a while he had run a flourishing import business, but when the police caught up with him he reluctantly revealed his source of supply; Australian cops can be very persuasive.

And it was then, after weeks and weeks of backbreaking underwater work, that Jo discovered what his DC-3 had been carrying besides the miserable few hundred quid's

worth of tools he had been flogging to garages and workshops on the mainland. The big wooden crates he'd never got round to opening held a week's payroll for the U.S. Pacific forces – most of it in twenty-dollar gold pieces.

No such luck here, thought Tibor as he sank over the side again; but the aircraft – or whatever it was – might contain valuable instruments, and there could be a reward for its discovery. Besides, he owed it to himself; he wanted to see exactly what it was that had given him such a fright.

Ten minutes later, he knew it was no aircraft. It was the wrong shape and it was much too small – only about twenty feet long and half that in width. Here and there on the gently tapering body were access hatches and tiny ports through which unknown instruments peered at the world. It seemed unharmed, though one end had been fused as if by terrific heat. From the other sprouted a tangle of antennas, all of them broken or bent by the impact with the water. Even now they bore an incredible resemblance to the legs of a giant insect.

Tibor was no fool; he guessed at once what the thing was. Only one problem remained, and he solved that with little difficulty. Though they had been partly charred away by heat, stencilled words could still be read on some of the hatch covers. The letters were Cyrillic, and Tibor knew enough Russian to pick out references to electrical supplies and pressurizing systems.

'So they've lost a sputnik' he told himself with satisfaction. He could imagine what had happened; the thing had come down too fast, and in the wrong place. Around one end were the tattered remnants of flotation bags; they had burst under the impact, and the vehicle had sunk like a stone. The *Arafura's* crew would have to apologize to Joey; he hadn't been drinking grog. What he'd seen burning across the stars must have been the rocket carrier, separated from its pay

load and falling back unchecked into the Earth's atmosphere.

For a long time Tibor hovered on the sea bed, knees bent in the diver's crouch as he regarded this space creature now trapped in an alien element. His mind was full of half-formed plans but none had yet come clearly into focus. He no longer cared about the salvage money; much more important were the prospects of revenge. Here was one of the proudest creations of Soviet technology – and Szabo Tibor, late of Budapest, was the only man on earth who knew.

There must be some way of exploiting the situation – of doing harm to the country and the cause he now hated with such smouldering intensity. In his waking hours, he was seldom conscious of the hate, and still less did he ever stop to analyse its real cause. Here in this lonely world of sea and sky, of steaming mangrove swamps and dazzling coral strands, there was nothing to recall the past. Yet he could never escape it, and sometimes the demons in his mind would awake, lashing him into a fury of rage or vicious, wanton destructiveness. So far he had been lucky; he had not killed anyone. But some day . . .

An anxious jerk from Blanco interrupted his reveries of vengeance. He gave a reassuring signal to his tender, and started a closer examination of the capsule. What did it weigh? Could it be hoisted easily? There were many things he had to discover, before he could settle on any definite plans.

He braced himself against the corrugated metal wall, and pushed cautiously. There was a definite movement as the capsule rocked on the sea bed. Maybe it could be lifted, even with the few pieces of tackle that the *Arafura* could muster. It was probably lighter than it looked.

Tibor pressed his helmet against a flat section of the hull and listened intently. He had half expected to hear some mechanical noise, such as the whirring of electric motors.

Instead, there was utter silence. With the hilt of his knife, he rapped sharply on the metal, trying to gauge its thickness and to locate any weak spots. On the third try, he got results: but they were not what he had anticipated.

In a furious, desperate tattoo, the capsule rapped back at him.

Until this moment, Tibor had never dreamed that there might be someone inside; the capsule had seemed far too small. Then he realized that he had been thinking in terms of conventional aircraft; there was plenty of room here for a little pressure cabin in which a dedicated astronaut could spend a few cramped hours.

As a kaleidoscope can change its pattern completely in a single moment, so the half-formed plans in Tibor's mind dissolved and then crystallized into a new shape. Behind the thick glass of his helmet, he ran his tongue lightly across his lips. If Nick could have seen him now, he would have wondered – as he had sometimes done before – whether his Number Two diver was wholly sane. Gone were all thoughts of a remote and impersonal vengeance against something as abstract as a nation or a machine; now it would be man to man.

‘Took your time, didn’t you?’ said Nick. ‘What did you find?’

‘It’s Russian,’ said Tibor. ‘Some kind of sputnik. If we can get a rope around it, I think we can lift it off the bottom. But it’s too heavy to get aboard.’

Nick chewed thoughtfully on his eternal cigar. The pearl-ing master was worried about a point that had not occurred to Tibor. If there were any salvage operations around here, everyone would know where the *Arafura* had been drifting. When the news got back to Thursday Island, his private patch of shell would be cleaned out in no time.

They’d have to keep quiet about the whole affair, or else

haul the damn thing up themselves and not say where they'd found it. Whatever happened, it looked like being more of a nuisance than it was worth. Nick, who shared most Australians' profound suspicion of authority, had already decided that all he'd get for his trouble would be a nice letter of thanks.

'The boys won't go down,' he said. 'They think it's a bomb. Want to leave it alone.'

'Tell 'em not to worry,' replied Tibor. 'I'll handle it.' He tried to keep his voice normal and unemotional but this was too good to be true. If the other divers heard the tapping from the capsule, his plans would have been frustrated.

He gestured to the island, green and lovely on the skyline.

'Only one thing we can do. If we can heave it a couple of feet off the bottom, we can run for the shore. Once we're in shallow water, it won't be too hard to haul it up on the beach. We can use the boats, and maybe get a block and tackle on one of those trees.'

Nick considered the idea without much enthusiasm. He doubted if they could get the sputnik through the reef, even on the leeward side of the island, but he was all in favour of lugging it away from this patch of shell; they could always dump it somewhere else, buoy the place, and still get whatever credit was going.

'O.K.,' he said. 'Down you go. That two-inch rope's the strongest we've got - better take that. Don't be all the bloody day; we've lost enough time already.'

Tibor had no intention of being all day. Six hours would be quite long enough. That was one of the first things he had learned, from the signals through the wall.

It was a pity that he could not hear the Russian's voice; but the Russian could hear him, and that was what really mattered. When he pressed his helmet against the metal and shouted, most of his words got through. So far, it had been

a friendly conversation; Tibor had no intention of showing his hand until the right psychological moment.

The first move had been to establish a code – one knock for ‘yes’, two for ‘no’. After that, it was merely a matter of framing suitable questions; given time, there was no fact or idea that could not be communicated by means of these two signals. It would have been a much tougher job if Tibor had been forced to use his indifferent Russian; he had been pleased, but not surprised, to find that the trapped pilot understood English perfectly.

There was air in the capsule for another five hours; the occupant was uninjured; yes, the Russians knew where it had come down. That last reply gave Tibor pause. Perhaps the pilot was lying, but it might very well be true. Although something had obviously gone wrong with the planned return to Earth, the tracking ships out in the Pacific must have located the impact point – with what accuracy, he could not guess. Still, did that matter? It might take them days to get here, even if they came racing straight into Australian territorial waters without bothering to get permission from Canberra. He was master of the situation; the entire might of the U.S.S.R. could do nothing to interfere with his plans – until it was much too late.

The heavy rope fell in coils on the sea bed, stirring up a cloud of silt that drifted like smoke down the slow current. Now that the sun was higher in the sky, the underwater world was no longer wrapped in a grey, twilight gloom. The sea bed was colourless but bright, and the boundary of vision was now almost fifteen feet away. For the first time, Tibor could see the space capsule in its entirety. It was such a peculiar-looking object, being designed for conditions beyond all normal experience, that there was an eye-teasing wrongness about it. One searched in vain for a front or a rear; there was no way of telling us what direction it pointed as it sped along its orbit.

Tibor pressed his helmet against the metal and shouted. 'I'm back,' he called. 'Can you hear me?'

Tap

'I've got a rope, and I'm going to tie it on to the parachute cables. We're about three kilometres from an island, and as soon as we've made you fast we'll head towards it. We can't lift you out of the water with the gear on the lugger, so we'll try to get you up on the beach. You understand?'

Tap

It took only a few moments to secure the rope; now he had better get clear before the *Arafura* started to lift. But there was something he had to do first.

'Hello!' he shouted. 'I've fixed the rope. We'll lift in a minute. D'you hear me?'

Tap

'Then you can hear this too. You'll never get there alive. I've fixed *that* as well.'

Tap, tap

'You've got five hours to die. My brother took longer than that, when he ran into your mine field. You understand? I'm from Budapest. I hate you and your country and everything it stands for. You've taken my home, my family, made my people slaves. I wish I could see your face now – I wish I could watch you die, as I had to watch Theo. When you're halfway to the island, this rope is going to break where I cut it, I'll go down and fix another – and that'll break, too. You can sit in there and wait for the bumps.'

Tibor stopped abruptly, shaken and exhausted by the violence of his emotion. There was no room for logic or reason in this orgasm of hate; he did not pause to think, for he dared not. Yet somewhere far down inside his mind the real truth was burning its way up towards the light of consciousness.

It was not the Russians he hated, for all that they had done. It was himself, for he had done more. The blood of Theo, and of ten thousand countrymen, was upon his own hands. No one could have been a better Communist than he had been, or have more supinely believed the propaganda from Moscow. At school and college, he had been the first to hunt out and denounce 'traitors'. (How many had he sent to the labour camps or the AVO torture chambers?) When he had seen the truth, it was far, far too late; and even then, he had not fought – he had run.

He had run across the world, trying to escape his guilt; and the two drugs of danger and dissipation had helped him to forget the past. The only pleasures life gave him now were the loveless embraces he sought so feverishly when he was on the mainland, and his present mode of existence was proof that these were not enough. If he now had the power to deal out death, it was only because he had come here in search of it himself.

There was no sound from the capsule; its silence seemed contemptuous, mocking. Angrily, Tibor banged against it with the hilt of his knife.

'Did you hear me?' he shouted. 'Did you hear me?'

No answer.

'Damn you! I know you're listening! If you don't answer, I'll hole you and let the water in!'

He was sure that he could, with the sharp point of his knife. But that was the last thing he wanted to do; that would be too quick, too easy an ending.

There was still no sound; maybe the Russian had fainted. Tibor hoped not, but there was no point in waiting any longer. He gave a vicious parting bang on the capsule, and signalled to his tender.

Nick had news for him when he broke the surface.

'T. I. radio's been squawking,' he said. 'The Ruskies are asking everyone to look out for one of their rockets. They

say it should be floating somewhere off the Queensland coast. Sounds as if they want it badly.'

'Did they say anything else about it?' Tibor asked anxiously.

'Oh yes – it's been round the moon a couple of times.'

'That all?'

'Nothing else that I remember. There was a lot of science stuff I didn't get.'

That figured; it was just like the Russians to keep as quiet as they could about an experiment that had gone wrong.

'You tell T. I. that we'd found it?'

'Are you crazy? Anyway, the radio's crook; couldn't if we wanted to. Fixed that rope properly?'

'Yes – see if you can haul her off the bottom.'

The end of the rope had been wound round the mainmast, and in a few seconds it had been drawn taut. Although the sea was calm, there was a slight swell, and the lugger was rolling ten or fifteen degrees. With each roll, the gunwales would rise a couple of feet, then drop again. There was a lift here of several tons, but one had to be careful in using it.

The rope twanged, the woodwork groaned and creaked, and for a moment Tibor was afraid that the weakened line would part too soon. But it held, and the load lifted. They got a further hoist on the second roll – and on the third. Then the capsule was clear of the sea bed, and the *Arafura* was listing slightly to port.

'Let's go,' said Nick, taking the wheel. 'Should be able to get her half a mile before she bumps again.'

The lugger began to move slowly towards the island, carrying its hidden burden beneath it. As he leaned on the rails, letting the sun steam the moisture from his sodden clothing, Tibor felt at peace for the first time in – how many months? Even his hate had ceased to burn like fire in his

brain. Perhaps, like love, it was a passion that could never be satisfied; but for the moment, at least, it was satiated.

There was no weakening of his resolve; he was implacably set upon the vengeance that had been so strangely – so miraculously – placed within his power. Blood called for blood, and now the ghosts that haunted him might rest at last. Yet he felt a strange sympathy, even pity, towards the unknown man through whom he could now strike back at the enemies who had once been his friends. He was robbing them of much more than a single life – for what was one man, even a highly trained scientist – to the Russians? What he was taking from them was power and prestige and knowledge, the things they valued most.

He began to worry when they were two thirds of the way to the island, and the rope had not parted. There was still four hours to go, and that was much too long. For the first time it occurred to him that his entire plan might miscarry, and might even recoil on his head. Suppose that, despite everything, Nick managed to get the capsule up on the beach before the deadline?

With a deep ‘twang’ that set the whole ship vibrating, the rope came snaking out of the water, scattering spray in all directions.

‘Might have guessed,’ muttered Nick. ‘She was just starting to bump. You like to go down again, or shall I send one of the boys?’

‘I’ll take it,’ Tibor hastily answered. ‘I can do it quicker than they can.’

That was perfectly true, but it took him twenty minutes to locate the capsule. The *Arafura* had drifted well away from it before Nick could stop the engine, and there was a time when Tibor wondered if he would ever find it again. He quartered the sea bed in great arcs, and it was not until he had accidentally tangled in the trailing parachute that his search was ended. The shrouds lay pulsating slowly in the

current like some weird and hideous marine monster – but there was nothing that Tibor feared now except frustration, and his pulse barely quickened as he saw the whitely looming mass ahead.

The capsule was scratched and stained with mud, but appeared undamaged. It was lying on its side now, looking rather like a giant milk churn that had been tipped over. The passenger must have been bumped around, but if he'd fallen all the way back from the moon, he must have been well padded and was probably still in good shape. Tibor hoped so; it would be a pity if the remaining three hours were wasted.

Once again he rested the verdigrised copper of his helmet against the no-longer-quite-so-brightly-gleaming metal of the capsule.

'Hello!' he shouted. 'Can you hear me?'

Perhaps the Russian would try to balk him by remaining silent – but that, surely, was asking too much of any man's self-control. Tibor was right; almost at once there was the sharp knock of the reply.

'So glad you're there,' he called back. 'Things are working out just the way I said, though I guess I'll have to cut the rope a little deeper.'

The capsule did not answer. It never answered again, though Tibor banged and banged on the next dive – and on the next. But he hardly expected it to then, for they'd had to stop for a couple of hours to ride out a squall, and the time limit had expired long before he made his final descent. He was a little annoyed about that, for he had planned a farewell message. He shouted it just the same, though he knew he was wasting his breath.

By early afternoon, the *Arafura* had come in as close as she dared. There were only a few feet of water beneath her, and the tide was falling. The capsule broke surface at the bottom of each wave trough, and was now firmly stranded

on a sandbank. There was no hope of moving it any farther; it was stuck, until a high sea would dislodge it.

Nick regarded the situation with an expert eye.

'There's a six-foot tide tonight,' he said. 'The way she's lying now, she'll be in only a couple of feet of water at low. We'll be able to get at her with the boats.'

They waited off the sandbank while the sun and the tide went down, and the radio broadcast intermittent reports of a search that was coming closer but still far away. Late in the afternoon the capsule was almost clear of the water; the crew rowed the small boat towards it with a reluctance which Tibor, to his annoyance, found himself sharing.

'It's got a door in the side,' said Nick suddenly. 'Jeeze - think there's anyone in it?'

'Could be,' answered Tibor, his voice not as steady as he thought. Nick glanced at him curiously. His diver had been acting strangely all day, but he knew better than to ask him what was wrong. In this part of the world, you soon learned to mind your own business.

The boat, rocking slightly in the choppy sea, had now come alongside the capsule. Nick reached out and grabbed one of the twisted antenna stubs; then, with catlike agility, he clambered up the curved metal surface. Tibor made no attempt to follow him, but watched silently from the boat as he examined the entrance hatch.

'Unless it's jammed,' Nick muttered, 'there must be some way of opening it from outside. Just our luck if it needs special tools.'

His fears were groundless. The word 'Open' had been stencilled in ten languages around the recessed door catch, and it took only seconds to deduce its mode of operation. As the air hissed out, Nick said 'Phew!' and turned suddenly pale. He looked at Tibor as if seeking support, but Tibor avoided his eye. Then, reluctantly, Nick lowered himself into the capsule.

He was gone for a long time. At first, they could hear muffled bangings and bumpings from the inside, followed by a string of bilingual profanity. And then there was a silence that went on and on and on.

When at last Nick's head appeared above the hatchway, his leathery, wind-tanned face was grey and streaked with tears. As Tibor saw this incredible sight, he felt a sudden ghastly premonition. Something had gone horribly wrong, but his mind was too numb to anticipate the truth. It came soon enough, when Nick handed down his burden, no larger than an over-sized doll.

Blanco took it, as Tibor shrank to the stern of the boat. As he looked at the calm, waxen face, fingers of ice seemed to close not only upon his heart, but around his loins. In the same moment, both hate and desire died forever within him, as he knew the price of his revenge.

The dead astronaut was perhaps more beautiful in death than she had been in life; tiny though she was, she must have been tough as well as highly trained to qualify for this mission. As she lay at Tibor's feet, she was neither a Russian nor the first human being to have seen the far side of the moon; she was merely the girl that he had killed.

Nick was talking, from a long way off.

'She was carrying this,' he said, in an unsteady voice. 'Had it tight in her hand – took me a long time to get it out.'

Tibor scarcely heard him, and never even glanced at the tiny spool of tape lying in Nick's palm. He could not guess, in this moment beyond all feeling, that the Furies had yet to close in upon his soul – and that soon the whole world would be listening to an accusing voice from beyond the grave, branding him more irrevocably than any man since Cain.

SUNJAMMER

THE enormous disc of sail strained at its rigging, already filled with the wind that blew between the worlds. In three minutes the race would begin, yet now John Merton felt more relaxed, more at peace, than at any time for the past year. Whatever happened when the Commodore gave the starting signal, whether *Diana* carried him to victory or defeat, he had achieved his ambition. After a lifetime spent in designing ships for others, now he would sail his own.

'T minus two minutes,' said the cabin radio. 'Please confirm your readiness.'

One by one, the other skippers answered. Merton recognized all the voices – some tense, some calm – for they were the voices of his friends and rivals. On the four inhabited worlds, there were scarcely twenty men who could sail a sun-yacht; and they were all here, on the starting-line or aboard the escort vessels, orbiting twenty-two thousand miles above the equator.

'Number One, *Gossamer* – ready to go.'

'Number Two, *Santa Maria* – all O.K.'

'Number Three, *Sunbeam* – O.K.'

'Number Four, *Woomera* – all systems go.'

Merton smiled at that last echo from the early, primitive days of astronautics. But it had become part of the tradition of space; and there were times when a man needed to evoke the shades of those who had gone before him to the stars.

'Number Five, *Lebedev* – we're ready.'

'Number Six, *Arachne* – O.K.'

Now it was his turn, at the end of the line; strange to

think that the words he was speaking in this tiny cabin were being heard by at least five billion people.

‘Number Seven, *Diana* – ready to start.’

‘One through Seven acknowledged.’ The voice from the judge’s launch was impersonal. ‘Now T minus one minute.’

Merton scarcely heard it; for the last time, he was checking the tension in the rigging. The needles of all the dynamometers were steady; the immense sail was taut, its mirror surface sparkling and glittering gloriously in the sun.

To Merton, floating weightless at the periscope, it seemed to fill the sky. As well it might – for out there were fifty million square feet of sail, linked to his capsule by almost a hundred miles of rigging. All the canvas of all the tea-clippers that had once raced like clouds across the China seas, sewn into one gigantic sheet, could not match the single sail that *Diana* had spread beneath the sun. Yet it was little more substantial than a soap-bubble; that two square miles of aluminized plastic was only a few millionths of an inch thick.

‘T minus ten seconds. All recording cameras *on*.’

Something so huge, yet so frail, was hard for the mind to grasp. And it was harder still to realize that this fragile mirror could tow them free of Earth, merely by the power of the sunlight it would trap.

‘... Five, four, three, two, one, *cut!*’

Seven knife-blades sliced through the seven thin lines tethering the yachts to the mothership that had assembled and serviced them.

Until this moment, all had been circling Earth together in a rigidly held formation, but now the yachts would begin to disperse, like dandelion seeds drifting before the breeze. And the winner would be the one that first drifted past the Moon.

Aboard *Diana*, nothing seemed to be happening. But Merton knew better; though his body could feel no thrust,

the instrument board told him he was now accelerating at almost one thousandth of a gravity. For a rocket, that figure would have been ludicrous – but this was the first time any solar yacht had attained it. *Diana's* design was sound; the vast sail was living up to his calculations. At this rate, two circuits of the Earth would build up his speed to escape velocity – then he could head out for the Moon, with the full force of the Sun behind him.

The full force of the Sun. He smiled wryly, remembering all his attempts to explain solar sailing to those lecture audiences back on Earth. That had been the only way he could raise money, in those early days. He might be Chief Designer of Cosmodyne Corporation, with a whole string of successful spaceships to his credit, but his firm had not been exactly enthusiastic about his hobby.

‘Hold your hands out to the Sun,’ he’d said. ‘What do you feel? Heat, of course. But there’s pressure as well – though you’ve never noticed it, because it’s so tiny. Over the area of your hands, it only comes to about a millionth of an ounce.

‘But out in space, even a pressure as small as that can be important – for it’s acting all the time, hour after hour, day after day. Unlike rocket fuel, it’s free and unlimited. If we want to, we can use it; we can build sails to catch the radiation blowing from the Sun.’

At that point, he would pull out a few square yards of sail material and toss it towards the audience. The silvery film would coil and twist like smoke, then drift slowly to the ceiling in the hot-air currents.

‘You can see how light it is,’ he’d continue. ‘A square mile weighs only a ton, and can collect five pounds of radiation pressure. So it will start moving – and we can let it tow us along, if we attach rigging to it.

‘Of course, its acceleration will be tiny – about a thou-

sandth of a g. That doesn't seem much, but let's see what it means.

'It means that in the first second, we'll move about a fifth of an inch. I suppose a healthy snail could do better than that. But after a minute, we've covered sixty feet, and will be doing just over a mile an hour. That's not bad, for something driven by pure sunlight! After an hour, we're forty miles from our starting point, and will be moving at eighty miles an hour. Please remember that in space there's no friction, so once you start anything moving, it will keep going forever. You'll be surprised when I tell you what our thousandth-of-a-g sailing boat will be doing at the end of a day's run. *Almost two thousand miles an hour!* If it starts from orbit – as it has to, of course – it can reach escape velocity in a couple of days. And all without burning a single drop of fuel!'

Well, he'd convinced them, and in the end he'd even convinced Cosmodyne. Over the last twenty years, a new sport had come into being. It had been called the sport of billionaires, and that was true – but it was beginning to pay for itself in terms of publicity and television coverage. The prestige of four continents and two worlds was riding on this race, and it had the biggest audience in history.

Diana had made a good start; time to take a look at the opposition. Moving very gently. Though there were shock absorbers between the control capsule and the delicate rigging, he was determined to run no risk. Merton stationed himself at the periscope.

There they were, looking like strange silver flowers planted in the dark fields of space. The nearest, South America's *Santa Maria*, was only fifty miles away; it bore a resemblance to a boy's kite – but a kite more than a mile on its side. Farther away, the University of Astrograd's *Lebedev* looked like a Maltese cross; the sails that formed

the four arms could apparently be tilted for steering purposes. In contrast, the Federation of Australasia's *Woomera* was a simple parachute, four miles in circumference. General Spacecraft's *Arachne*, as its name suggested, looked like a spider-web – and had been built on the same principles, by robot shuttles spiralling out from a central point. Euro-space Corporation's *Gossamer* was an identical design, on a slightly smaller scale. And the Republic of Mars' *Sunbeam* was a flat ring, with a half-mile-wide hole in the centre, spinning slowly so that centrifugal force gave it stiffness. That was an old idea, but no one had ever made it work. Merton was fairly sure that the colonials would be in trouble when they started to turn.

That would not be for another six hours, when the yachts had moved along the first quarter of their slow and stately twenty-four hour orbit. Here at the beginning of the race, they were all heading directly away from the Sun – running, as it were, before the solar wind. One had to make the most of this lap, before the boats swung round to the other side of Earth and then started to head back into the Sun.

Time for the first check, Merton told himself, while he had no navigational worries. With the periscope, he made a careful examination of the sail, concentrating on the points where the rigging was attached to it. The shroud-lines – narrow bands of unsilvered plastic film – would have been completely invisible had they not been coated with fluorescent paint. Now they were taut lines of coloured light, dwindling away for hundreds of yards towards that gigantic sail. Each had its own electric windlass, not much bigger than a game-fisherman's reel. The little windlasses were continually turning, playing lines in or out, as the autopilot kept the sail trimmed at the correct angle to the Sun.

The play of sunlight on the great flexible mirror was beautiful to watch. It was undulating in slow, stately oscillations, sending multiple images of the Sun marching across

the heavens, until they faded away at the edges of the sail. Such leisurely vibrations were to be expected in this vast and flimsy structure; they were usually quite harmless, but Merton watched them carefully. Sometimes they could build up to the catastrophic undulations known as the wriggles, which could tear a sail to pieces.

When he was satisfied that everything was shipshape, he swept the periscope around the sky, rechecking the positions of his rivals. It was as he had hoped; the weeding-out process had begun, as the less efficient boats fell astern. But the real test would come when they passed into the shadow of the Earth; then manoeuvrability would count as much as speed.

It seemed a strange thing to do, now that the race had just started, but it might be a good idea to get some sleep. The two man crews on the other boats could take it in turns, but Merton had no one to relieve him. He must rely on his physical resources – like that other solitary seaman Joshua Slocum, in his tiny *Spray*. The American skipper had sailed *Spray* single-handed round the world; he could never have dreamt that, two centuries later, a man would be sailing single-handed from Earth to Moon – inspired, at least partly, by his example.

Merton snapped the elastic bands of the cabin seat around his waist and legs, then placed the electrodes of the sleep-inducer on his forehead. He set the timer for three hours, and relaxed.

Very gently, hypnotically, the electronic pulses throbbed in the frontal lobes of his brain. Coloured spirals of light expanded beneath his closed eyelids, widening outwards to infinity. Then – nothing . . .

The brazen clamour of the alarm dragged him back from his dreamless sleep. He was instantly awake, his eyes scanning the instrument panel. Only two hours had passed – but

above the accelerometer, a red light was flashing. Thrust was falling; *Diana* was losing power.

Merton's first thought was that something had happened to the sail; perhaps the antispin devices had failed, and the rigging had become twisted. Swiftly, he checked the meters that showed the tension in the shroud-lines. Strange, on one side of the sail they were reading normally – but on the other, the pull was dropping slowly even as he watched.

In sudden understanding, Merton grabbed the periscope, switched to wide-angle vision, and started to scan the edge of the sail. Yes – there was the trouble, and it could have only one cause.

A huge, sharp-edged shadow had begun to slide across the gleaming silver of the sail. Darkness was falling upon *Diana*, as if a cloud had passed between her and the Sun. And in the dark, robbed of the rays that drove her, she would lose all thrust and drift helplessly through space.

But, of course, there were no clouds here, more than twenty thousand miles above Earth. If there was a shadow, it must be made by man.

Merton grinned as he swung the periscope towards the Sun, switching on the filters that would allow him to look full into its blazing face without being blinded.

'Manoeuvre 4a,' he muttered to himself. 'We'll see who can play best at *that* game.'

It looked as if a giant planet was crossing the face of the Sun. A great black disc had bitten deep into its edge. Twenty miles astern, *Gossamer* was trying to arrange an artificial eclipse – specially for *Diana's* benefit.

The manoeuvre was a perfectly legitimate one; back in the days of ocean racing, skippers had often tried to rob each other of the wind. With any luck, you could leave your rival becalmed, with his sails collapsing around him – and be well ahead before he could undo the damage.

Merton had no intention of being caught so easily. There was plenty of time to take evasive action; things happened very slowly, when you were running a solar sailingboat. It would be at least twenty minutes before *Gossamer* could slide completely across the face of the Sun, and leave him in darkness.

Diana's tiny computer – the size of a matchbox, but the equivalent of a thousand human mathematicians – considered the problem for a full second and then flashed the answer. He'd have to open control panels three and four, until the sail had developed an extra twenty degrees of tilt; then the radiation pressure would blow him out of *Gossamer's* dangerous shadow, back into the full blast of the Sun. It was a pity to interfere with the auto-pilot, which had been carefully programmed to give the fastest possible run – but that, after all, was why he was here. This was what made solar yachting a sport, rather than a battle between computers.

Out went control lines one to six, slowly undulating like sleepy snakes as they momentarily lost their tension. Two miles away, the triangular panels began to open lazily, spilling sunlight through the sail. Yet, for a long time, nothing seemed to happen. It was hard to grow accustomed to this slow motion world, where it took minutes for the effects of any action to become visible to the eye. Then Merton saw that the sail was indeed tipping towards the Sun – and that *Gossamer's* shadow was sliding harmlessly away, its cone of darkness lost in the deeper night of space.

Long before the shadow had vanished, and the disc of the Sun had cleared again, he reversed the tilt and brought *Diana* back on course. Her new momentum would carry her clear of the danger; no need to overdo it, and upset his calculations by side-stepping too far. That was another rule that was hard to learn. The very moment you had started something happening in space, it was already time to think

about stopping it.

He reset the alarm, ready for the next natural or man-made emergency; perhaps *Gossamer*, or one of the other contestants, would try the same trick again. Meanwhile, it was time to eat, though he did not feel particularly hungry. One used little physical energy in space, and it was easy to forget about food. Easy – and dangerous; for when an emergency arose, you might not have the reserves needed to deal with it.

He broke open the first of the meal packets, and inspected it without enthusiasm. The name on the label – SPACE-TASTIES – was enough to put him off. And he had grave doubts about the promise printed underneath. Guaranteed Crumbless. It had been said that crumbs were a greater danger to space vehicles than meteorites. They could drift into the most unlikely places, causing short circuits, blocking vital jets and getting into instruments that were supposed to be hermetically sealed.

Still, the liverwurst went down pleasantly enough; so did the chocolate and the pineapple puree. The plastic coffee-bulb was warming on the electric heater when the outside world broke in on his solitude. The radio operator on the Commodore's launch routed a call to him.

'Dr. Merton? If you can spare the time, Jeremy Blair would like a few words with you.' Blair was one of the more responsible news commentators, and Merton had been on his programme many times. He could refuse to be interviewed, of course, but he liked Blair, and at the moment he could certainly not claim to be too busy. 'I'll take it,' he answered.

'Hello, Dr. Merton,' said the commentator immediately. 'Glad you can spare a few minutes. And congratulations – you seem to be ahead of the field.'

'Too early in the game to be sure of that,' Merton answered cautiously.

‘Tell me, doctor – why did you decide to sail *Diana* by yourself? Just because it’s never been done before?’

‘Well, isn’t that a very good reason? But it wasn’t the only one, of course.’ He paused, choosing his words carefully. ‘You know how critically the performance of a sun-yacht depends on its mass. A second man, with all his supplies, would mean another five hundred pounds. That could easily be the difference between winning and losing.’

‘And you’re quite certain that you can handle *Diana* alone?’

‘Reasonably sure, thanks to the automatic controls I’ve designed. My main job is to supervise and make decisions.’

‘But – two square miles of sail! It just doesn’t seem possible for one man to cope with all that!’

Merton laughed.

‘Why not? Those two square miles produce maximum pull of just ten pounds. I can exert more force with my little finger.’

‘Well, thank you, doctor. And good luck.’

As the commentator signed off, Merton felt a little ashamed of himself. For his answer had been only part of the truth; and he was sure that Blair was shrewd enough to know it.

There was just one reason why he was here, alone in space. For almost forty years he had worked with teams of hundreds or even thousands of men, helping to design the most complex vehicles that the world had ever seen. For the last twenty years he had led one of those teams, and watched his creations go soaring to the stars. (But there were failures that he could never forget, even though the faults had not been his.) He was famous, with a successful career behind him. Yet he had never done anything by himself; always he had been one of an army.

This was his very last chance of individual achievement, and he would share it with no one. There would be no more

solar yachting for at least five years, as the period of the quiet Sun ended and the cycle of bad weather began, with radiation storms bursting through the Solar System. When it was safe again for these frail, unshielded craft to venture aloft, he would be too old. If, indeed, he was not too old already . . .

He dropped the empty food containers into the waste disposal, and turned once more to the periscope. At first, he could find only five of the other yachts; there was no sign of *Woomera*. It took him several minutes to locate her – a dim, star-eclipsing phantom, neatly caught in the shadow of *Lebedev*. He could imagine the frantic efforts the Australasians were making to extricate themselves, and wondered how they had fallen into the trap. It suggested that *Lebedev* was unusually manoeuvrable; she would bear watching, though she was too far away to menace *Diana* at the moment.

Now the Earth had almost vanished. It had waned to a narrow, brilliant bow of light that was moving steadily towards the Sun. Dimly outlined within that burning bow was the night side of the planet, with the phosphorescent gleams of great cities showing here and there through gaps in the clouds. The disc of darkness had already blanked out a huge section of the Milky Way; in a few minutes, it would start to encroach upon the Sun.

The light was fading. A purple, twilight hue – the glow of many sunsets, thousands of miles below – was falling across the sail, as *Diana* slipped into the shadow of Earth. The Sun plummeted below that invisible horizon. Within minutes, it was night.

Merton looked back along the orbit he had traced now a quarter of the way around the world. One by one he saw the brilliant stars of the other yachts wink out, as they joined him in the brief night. It would be an hour before the Sun

emerged from that enormous black shield, and through all that time they would be completely helpless, coasting without power.

He switched on the external spotlight and started to search the now darkened sail with its beam. Already, the thousands of acres of film were beginning to wrinkle and become flaccid; the shroud-lines were slackening, and must be wound in lest they become entangled. But all this was expected; everything was going as planned.

Forty miles astern, *Arachne* and *Santa Maria* were not so lucky. Merton learnt of their troubles when the radio burst into life on the emergency circuit.

'Number Two, Number Six – this is Control. You are on a collision course. Your orbits will intersect in sixty-five minutes! Do you require assistance?'

There was a long pause while the two skippers digested this bad news. Merton wondered who was to blame; perhaps one yacht had been trying to shadow the other, and had not completed the manoeuvre before they were both caught in darkness. Now there was nothing that either could do; they were slowly but inexorably converging, unable to change course by a fraction of a degree.'

Yet, sixty-five minutes! That would just bring them out into the sunlight again, as they emerged from the shadow of the Earth. They still had a slim chance, if their sails could snatch enough power to avoid a crash. There must be some frantic calculations going on, aboard *Arachne* and *Santa Maria*.

Arachne answered first; her reply was just what Merton had expected.

'Number Six calling Control. We don't need assistance, thank you. We'll work this out for ourselves.'

I wonder, thought Merton. But at least it will be interesting to watch. The first real drama of the race was approach-

ing – exactly above the line of midnight on the sleeping Earth.

For the next hour, Merton's own sail kept him too busy to worry about *Arachne* and *Santa Maria*. It was hard to keep a good watch on that fifty million square feet of dim plastic out there in the darkness, illuminated only by his narrow spotlight and the rays of the still distant Moon. From now on, for almost half his orbit round the Earth, he must keep the whole of this immense area edge-on to the Sun. During the next twelve or fourteen hours, the sail would be a useless encumbrance; for he would be heading back into the Sun, and its rays could only drive him backwards along his orbit. It was a pity that he could not furl the sail completely, until he was ready to use it again. But no one had yet found a practical way of doing this.

Far below, there was the first hint of dawn along the edge of the Earth. In ten minutes, the Sun would emerge from its eclipse; the coasting yachts would come to life again as the blast of radiation struck their sails. That would be the moment of crisis for *Arachne* and *Santa Maria* – and indeed, for all of them.

Merton swung the periscope until he found the two dark shadows drifting against the stars. They were very close together – perhaps less than three miles apart. They might, he decided, just be able to make it . . .

Dawn flashed like an explosion along the rim of Earth, as the Sun rose out of the Pacific. The sail and shroud-lines glowed a brief crimson, then gold, then blazed with the pure white light of day. The needles of the dynamometers began to lift from their zeros – but only just. *Diana* was still almost completely weightless, for with the sail pointing towards the Sun, her acceleration was now only a few millionths of a gravity.

But *Arachne* and *Santa Maria* were crowding on all the sail they could manage, in their desperate attempt to keep

apart. Now, while there was less than two miles between them, their glittering plastic clouds were unfurling and expanding with agonizing slowness, as they felt the first delicate push of the Sun's rays. Almost every TV screen on Earth would be mirroring this protracted drama; and even now, at this very last minute, it was impossible to tell what the outcome would be.

The two skippers were stubborn men. Either could have cut his sail, and fallen back to give the other a chance; but neither would do so. Too much prestige, too many millions, too many reputations, were at stake. And so, silently and softly as snowflakes falling on a winter night, *Arachne* and *Santa Maria* collided.

The square kite crawled almost imperceptibly into the circular spider's-web; the long ribbons of the shroud-lines twisted and tangled together with dreamlike slowness. Even aboard *Diana*, busy with his own rigging, Merton could scarcely tear his eye away from this silent, long drawn out disaster.

For more than ten minutes the billowing, shining clouds continued to merge into one inextricable mass. Then the crew capsules tore loose and went their separate ways, missing each other by hundreds of yards. With a flare of rockets, the safety launches hurried to pick them up.

That leaves five of us, thought Merton. He felt sorry for the skippers who had so thoroughly eliminated each other, only a few hours after the start of the race; but they were young men, and would have another chance.

Within minutes, the five had dropped to four. From the very beginning, Merton had had doubts about the slowly rotating *Sunbeam*. Now he saw them justified.

The Martian ship had failed to tack properly; her spin had given her too much stability. Her great ring of a sail was turning to face the Sun, instead of being edge-on to it. She was being blown back along her course at almost her maxi-

mum acceleration.

That was about the most maddening thing that could happen to a skipper – worse even than a collision, for he could blame only himself. But no one would feel much sympathy for the frustrated colonials, as they dwindled slowly astern. They had made too many brash boasts before the race, and what had happened to them was poetic justice.

Yet it would not do to write off *Sunbeam* completely. With almost half a million miles still to go, she might still pull ahead. Indeed, if there were a few more casualties, she might be the only one to complete the race. It had happened before.

However, the next twelve hours were uneventful, as the Earth waxed in the sky from new to full. There was little to do while the fleet drifted round the unpowered half of its orbit, but Merton did not find the time hanging heavily on his hands. He caught a few hours' sleep, ate two meals, wrote up his log, and became involved in several more radio interviews. Sometimes, though rarely, he talked to the other skippers, exchanging greetings and friendly taunts. But most of the time he was content to float in weightless relaxation, beyond all the cares of Earth, happier than he had been for many years. He was – as far as any man could be in space – master of his own fate, sailing the ship upon which he had lavished so much skill, so much love, that she had become part of his very being.

The next casualty came when they were passing the line between Earth and Sun, and were just beginning the powered half of the orbit. Aboard *Diana*, Merton saw the great sail stiffen as it tilted to catch the rays that drove it. The acceleration began to climb up from the microgravities, though it would be hours yet before it would reach its maximum value.

It would never reach it for *Gossamer*. The moment when power came on again was always critical, and she failed to

survive it.

Blair's radio commentary, which Merton had left running at low volume, alerted him with the news: 'Hullo, *Gossamer* has the wriggles!' He hurried to the periscope, but at first could see nothing wrong with the great circular disc of *Gossamer's* sail. It was difficult to study it, as it was almost edge-on to him and so appeared as a thin ellipse; but presently he saw that it was twisting back and forth in slow, irresistible oscillations. Unless the crew could damp out these waves, by properly timed but gentle tugs on the shroud-lines, the sail would tear itself to pieces.

They did their best, and after twenty minutes it seemed that they had succeeded. Then, somewhere near the centre of the sail, the plastic film began to rip. It was slowly driven outwards by the radiation pressure, like smoke coiling upwards from a fire. Within a quarter of an hour, nothing was left but the delicate tracery of the radial spars that had supported the great web. Once again there was a flare of rockets, as a launch moved in to retrieve the *Gossamer's* capsule and her dejected crew.

'Getting rather lonely up here, isn't it?' said a conversational voice over the ship-to-ship radio.

'Not for you, Dimitri,' retorted Merton. 'You've still got company back there at the end of the field. I'm the one who's lonely, up here in front.' It was not an idle boast. By this time *Diana* was three hundred miles ahead of the next competitor, and his lead should increase still more rapidly in the hours to come.

Aboard *Lebedev*, Dimitri Markoff gave a good-natured chuckle. He did not sound, Merton thought, at all like a man who had resigned himself to defeat.

'Remember the legend of the tortoise and the hare,' answered the Russian. 'A lot can happen in the next quarter-million miles.'

It happened much sooner than that, when they had completed their first orbit of Earth and were passing the starting line again – though thousands of miles higher, thanks to the extra energy the Sun's rays had given them. Merton had taken careful sights on the other yachts, and had fed the figures into the computer. The answer it gave for *Woomera* was so absurd that he immediately did a recheck.

There was no doubt of it – the Australasians were catching up at a fantastic rate. No solar yacht could possibly have such an acceleration, unless —

A swift look through the periscope gave the answer. *Woomera's* rigging, pared back to the very minimum of mass, had given way. It was her sail alone, still maintaining its shape, that was racing up behind him like a handkerchief blown before the wind. Two hours later it fluttered past, less than twenty miles away. But long before that, the Australasians had joined the growing crowd aboard the Commodore's launch.

So now it was a straight fight between *Diana* and *Lebedev* – for though the Martians had not given up, they were a thousand miles astern and no longer counted as a serious threat. For that matter, it was hard to see what *Lebedev* could do to overtake *Diana's* lead. But all the way round the second lap – through eclipse again, and the long, slow drift against the Sun, Merton felt a growing unease.

He knew the Russian pilots and designers. They had been trying to win this race for twenty years and after all, it was only fair that they should, for had not Pyotr Nikolayevich Lebedev been the first man to detect the pressure of sunlight, back at the very beginning of the Twentieth Century? But they had never succeeded.

And they would never stop trying. Dimitri was up to something – and it would be spectacular.

Aboard the official launch, a thousand miles behind the racing yachts, Commodore van Stratten looked at the radio-

gram with angry dismay. It had travelled more than a hundred million miles, from the chain of solar observatories swinging high above the blazing surface of the Sun, and it brought the worst possible news.

The Commodore – his title, of course, was purely honorary – back on Earth he was Professor of Astrophysics at Harvard – had been half expecting it. Never before had the race been arranged so late in the season; there had been many delays, they had gambled and now, it seemed they might all lose.

Deep beneath the surface of the Sun, enormous forces were gathering. At any moment, the energies of a million hydrogen bombs might burst forth in the awesome explosion known as a solar flare. Climbing at millions of miles an hour, an invisible fireball many times the size of Earth would leap from the Sun, and head out across space.

The cloud of electrified gas would probably miss the Earth completely. But if it did not, it would arrive in just over a day. Spaceships could protect themselves, with their shielding and their powerful magnetic screen. But the lightly-built solar yachts, with their paper-thin walls, were defenceless against such a menace. The crews would have to be taken off, and the race abandoned.

John Merton still knew nothing of this as he brought *Diana* round the Earth for the second time. If all went well, this would be the last circuit, both for him and the Russians. They had spiralled upwards by thousands of miles, gaining energy from the Sun's rays. On this lap, they should escape from Earth completely – and head outwards on the long run to the Moon. It was a straight race now. *Sunbeam's* crew had finally withdrawn, exhausted, after battling valiantly with their spinning sail for more than a hundred thousand miles.

Merton did not feel tired; he had eaten and slept well, and *Diana* was behaving herself admirably. The autopilot,

tensioning the rigging like a busy little spider, kept the great sail trimmed to the Sun more accurately than any human skipper. Though by this time, the two square miles of plastic sheet must have been riddled by hundreds of micrometeorites, the pinhead-sized punctures had produced no falling off to thrust.

He had only two worries. The first was shroud-line Number Eight, which could no longer be adjusted properly. Without any warning, the reel had jammed; even after all these years of astronautical engineering, bearings sometimes seized up in vacuum. He could neither lengthen nor shorten the line, and would have to navigate as best he could with the others. Luckily, the most difficult manoeuvres were over. From now on, *Diana* would have the Sun behind her as she sailed straight down the solar wind. And as the old-time sailors often said, it was easy to handle a boat when the wind was blowing over your shoulder.

His other worry was *Lebedev*, still dogging his heels three hundred miles astern. The Russian yacht had shown remarkable manoeuvrability, thanks to the four great panels that could be tilted around the central sail. All her flip-overs as she rounded Earth had been carried out with superb precision; but to gain manoeuvrability she must have sacrificed speed. You could not have it both ways. In the long, straight haul ahead, Merton should be able to hold his own. Yet he could not be certain of victory until, three or four days from now, *Diana* went flashing past the far side of the Moon.

And then, in the fiftieth hour of the race, near the end of the second orbit around Earth, Markoff sprang his little surprise.

‘Hello, John,’ he said casually, over the ship-to-ship circuit. ‘I’d like you to watch this. It should be interesting.’

Merton drew himself across to the periscope and turned up the magnification to the limit. There in the field of view,

a most improbable sight against the background of the stars, was the glittering Maltese cross of *Lebedev*, very small but very clear. And then, as he watched, the four arms of the cross slowly detached themselves from the central square and went drifting away, with all their spars and rigging, into space.

Markoff had jettisoned all unnecessary mass, now that he was coming up to escape velocity and need no longer plod patiently around the Earth, gaining momentum on each circuit. From now on, *Lebedev* would be almost unsteerable – but that did not matter. All the tricky navigation lay behind her. It was as if an old-time yachtsman had deliberately thrown away his rudder and heavy keel – knowing that the rest of the race would be straight downwind over a calm sea.

‘Congratulations, Dimitri,’ Merton radioed. ‘It’s a neat trick. But it’s not good enough – you can’t catch up now.’

‘I’ve not finished yet,’ the Russian answered. ‘There’s an old winter’s tale in my country, about a sleigh being chased by wolves. To save himself, the driver has to throw off the passengers one by one. Do you see the analogy?’

Merton did, all too well. On this final straight lap, Dimitri no longer needed his co-pilot. *Lebedev* could really be stripped down for action.

‘Alexis won’t be very happy about this,’ Merton replied. ‘Besides, it’s against the rules.’

‘Alexis isn’t happy, but I’m the captain. He’ll just have to wait around for ten minutes until the Commodore picks him up. And the regulations say nothing about the size of the crew – you should know that.’

Merton did not answer. He was too busy doing some hurried calculations, based on what he knew of *Lebedev’s* design. By the time he had finished, he knew that the race was still in doubt. *Lebedev* would be catching up with him at just about the time he hoped to pass the Moon.

But the outcome of the race was already being decided, ninety-two million miles away.

On Solar Observatory Three, far inside the orbit of Mercury, the automatic instruments recorded the whole history of the flare. A hundred million square miles of the Sun's surface suddenly exploded in such blue-white fury that, by comparison, the rest of the disc paled to a dull glow. Out of that seething inferno, twisting and turning like a living creature in the magnetic fields of its own creation, soared the electrified plasma of the great flare. Ahead of it, moving at the speed of light, went the warning flash of ultra-violet and X-rays. That would reach Earth in eight minutes, and was relatively harmless. Not so the charged atoms that were following behind at their leisurely four million miles an hour – and which, in just over a day, would engulf *Diana*, *Lebedev*, and their accompanying little fleet in a cloud of lethal radiation.

The Commodore left his decision to the last possible minute. Even when the jet of plasma had been tracked past the orbit of Venus, there was a chance that it might miss the Earth. But when it was less than four hours away, and had already been picked up by the Moon-based radar network, he knew that there was no hope. All solar sailing was over for the next five or six years until the Sun was quiet again.

A great sigh of disappointment swept across the Solar System. *Diana* and *Lebedev* were halfway between Earth and Moon, running neck and neck – and now no one would ever know which was the better boat. The enthusiasts would argue the result for years; history would merely record: Race cancelled owing to solar storm.

When John Merton received the order, he felt a bitterness he had not known since childhood. Across the years, sharp and clear, came the memory of his tenth birthday. He had been promised an exact scale model of the famous spaceship *Morning Star*, and for weeks had been planning how he

would assemble it, where he would hang it up in his bedroom. And then, at the last moment, his father had broken the news. 'I'm sorry, John – it costs too much money. Maybe next year ...'

Half a century and a successful lifetime later, he was a heartbroken boy again.

For a moment, he thought of disobeying the Commodore. Suppose he sailed on, ignoring the warning? Even if the race were abandoned, he could make a crossing to the Moon that would stand in the record books for generations.

But that would be worse than stupidity. It would be suicide – and a very unpleasant form of suicide. He had seen men die of radiation poisoning, when the magnetic shielding of their ships had failed in deep space. No – nothing was worth that ...

He felt as sorry for Dimitri Markoff as for himself; they both deserved to win, and now victory would go to neither. No man could argue with the Sun in one of its rages, even though he might ride upon its beams to the edge of space.

Only fifty miles astern now, the Commodore's launch was drawing alongside *Lebedev*, preparing to take off her skipper. There went the silver sail, as Dimitri – with feelings that he would share – cut the rigging. The tiny capsule would be taken back to earth, perhaps to be used again – but a sail was spread for one voyage only.

He could press the jettison button now, and save his rescuers a few minutes of time. But he would not do so. He wanted to stay aboard to the very end, on the little boat that had been for so long a part of his dreams and his life. The great sail was spread now at right angles to the Sun, exerting its utmost thrust. Long ago it had torn him clear of Earth – and *Diana* was still gaining speed.

Then, out of nowhere, beyond all doubt or hesitation, he knew what must be done. For the last time, he sat down

before the computer that had navigated him halfway to the Moon.

When he had finished, he packed the log and his few personal belongings. Clumsily – for he was out of practice, and it was not an easy job to do by oneself – he climbed into the emergency survival suit.

He was just sealing the helmet when the Commodore's voice called over the radio. 'We'll be alongside in five minutes, Captain. Please cut your sail so we won't foul it.'

John Merton, first and last skipper of the sun-yacht *Diana*, hesitated for a moment. He looked for the last time round the tiny cabin, with its shining instruments and its neatly arranged controls, now all locked in their final positions. Then he said to the microphone: 'I'm abandoning ship. Take your time to pick me up. *Diana* can look after herself.'

There was no reply from the Commodore, and for that he was grateful. Professor van Stratten would have guessed what was happening – and would know that, in these final moments, he wished to be left alone.

He did not bother to exhaust the airlock, and the rush of escaping gas blew him gently out into space; the thrust he gave her then was his last gift to *Diana*. She dwindled away from him, sail glittering splendidly in the sunlight that would be hers for centuries to come. Two days from now she would flash past the Moon; but the Moon, like the Earth, could never catch her. Without his mass to slow her down, she would gain two thousand miles an hour in every day of sailing. In a month, she would be travelling faster than any ship that man had ever built.

As the Sun's rays weakened with distance, so her acceleration would fall. But even at the orbit of Mars, she would be gaining a thousand miles an hour in every day. Long before then, she would be moving too swiftly for the Sun itself to hold her. Faster than any comet that had ever

streaked in from the stars, she would be heading out into the abyss.

The glare of rockets, only a few miles away, caught Merton's eye. The launch was approaching to pick him up at thousands of times the acceleration that *Diana* could ever attain. But engines could burn for a few minutes only, before they exhausted their fuel – while *Diana* would still be gaining speed, driven outwards by the Sun's eternal fires, for ages yet to come.

‘Good-bye, little ship,’ said John Merton. ‘I wonder what eyes will see you next, how many thousand years from now?’

At last he felt at peace, as the blunt torpedo of the launch nosed up beside him. He would never win the race to the Moon; but his would be the first of all man's ships to set sail on the long journey to the stars.

A MEETING WITH MEDUSA

1. A DAY TO REMEMBER

THE *Queen Elizabeth* was over three miles above the Grand Canyon, dawdling along at a comfortable hundred and eighty, when Howard Falcon spotted the camera platform closing in from the right. He had been expecting it – nothing else was cleared to fly at this altitude – but he was not too happy to have company. Although he welcomed any signs of public interest, he also wanted as much empty sky as he could get. After all, he was the first man in history to navigate a ship three-tenths of a mile long . . .

So far, this first test flight had gone perfectly; ironically enough, the only problem had been the century-old aircraft carrier *Chairman Mao*, borrowed from the San Diego Naval Museum for support operations. Only one of *Mao*'s four nuclear reactors was still operating, and the old battle-wagon's top speed was barely thirty knots. Luckily, the wind speed at sea level had been less than half this, so it had not been too difficult to maintain still air on the flight deck. Though there had been a few anxious moments during gusts, when the mooring lines had been dropped, the great dirigible had risen smoothly, straight up into the sky, as if on an invisible elevator. If all went well, *Queen Elizabeth IV* would not meet *Chairman Mao* again for another week.

Everything was under control; all test instruments gave normal readings. Commander Falcon decided to go upstairs and watch the rendezvous. He handed over to his second officer, and walked out into the transparent tubeway that led through the heart of the ship. There, as always, he was

overwhelmed by the spectacle of the largest single space ever enclosed by man.

The ten spherical gas cells, each more than a hundred feet across, were ranged one behind the other like a line of gigantic soap bubbles. The tough plastic was so clear that he could see through the whole length of the array, and make out details of the elevator mechanism, more than a third of a mile from his vantage point. All around him, like a three-dimensional maze, was the structural framework of the ship – the great longitudinal girders running from nose to tail, the fifteen hoops that were the circular ribs of this sky-borne colossus, and whose varying sizes defined its graceful, streamlined profile.

At this low speed, there was little sound – merely the soft rush of wind over the envelope and an occasional creak of metal as the pattern of stresses changed. The shadowless light from the rows of lamps far overhead gave the whole scene a curiously submarine quality, and to Falcon this was enhanced by the spectacle of the translucent gasbags. He had once encountered a squadron of large but harmless jellyfish, pulsing their mindless way above a shallow tropical reef, and the plastic bubbles that gave *Queen Elizabeth* her lift often reminded him of these – especially when changing pressures made them crinkle and scatter new patterns of reflected light.

He walked down the axis of the ship until he came to the forward elevator, between gas cells one and two. Riding up to the Observation Deck, he noticed that it was uncomfortably hot, and dictated a brief memo to himself on his pocket recorder. The *Queen* obtained almost a quarter of her buoyancy from the unlimited amounts of waste heat produced by her fusion power plant. On this lightly loaded flight, indeed, only six of the ten gas cells contained helium; the remaining four were full of air. Yet she still carried two hundred tons of water as ballast. However, running the cells at high

temperatures did produce problems in refrigerating the access ways; it was obvious that a little more work would have to be done there.

A refreshing blast of cooler air hit him in the face when he stepped out on to the Observation Deck and into the dazzling sunlight streaming through the plexiglass roof. Half a dozen workmen, with an equal number of super-chimp assistants, were busily laying the partly completed dance floor, while others were installing electric wiring and fixing furniture. It was a scene of controlled chaos, and Falcon found it hard to believe that everything would be ready for the maiden voyage, only four weeks ahead. Well, that was not *his* problem, thank goodness. He was merely the Captain, not the Cruise Director.

The human workers waved to him, and the 'sims' flashed toothy smiles, as he walked through the confusion, into the already completed Skylounge. This was his favourite place in the whole ship, and he knew that once she was operating he would never again have it all to himself. He would allow himself just five minutes of private enjoyment.

He called the bridge, checked that everything was still in order, and relaxed into one of the comfortable swivel chairs. Below, in a curve that delighted the eye, was the unbroken silver sweep of the ship's envelope. He was perched at the highest point, surveying the whole immensity of the largest vehicle ever built. And when he had tired of that – all the way out to the horizon was the fantastic wilderness carved by the Colorado River in half a billion years of time.

Apart from the camera platform (it had now fallen back and was filming from amidships), he had the sky to himself. It was blue and empty, clear down to the horizon. In his grandfather's day, Falcon knew, it would have been streaked with vapour trails and stained with smoke. Both had gone: the aerial garbage had vanished with the primitive technologies that spawned it, and the long-distance

transportation of this age arced too far beyond the stratosphere for any sight or sound of it to reach Earth. Once again, the lower atmosphere belonged to the birds and the clouds – and now to *Queen Elizabeth IV*.

It was true, as the old pioneers had said at the beginning of the twentieth century: this was the only way to travel – in silence and luxury, breathing the air around you and not cut off from it, near enough to the surface to watch the ever-changing beauty of land and sea. The subsonic jets of the 1980s, packed with hundreds of passengers seated ten abreast, could not even begin to match such comfort and spaciousness.

Of course, the Queen would never be an economic proposition, and even if her projected sister ships were built, only a few of the world's quarter of a billion inhabitants would ever enjoy this silent gliding through the sky. But a secure and prosperous global society could afford such follies and indeed needed them for their novelty and entertainment. There were at least a million men on Earth whose discretionary income exceeded a thousand new dollars a year, so the *Queen* would not lack for passengers.

Falcon's pocket communicator beeped. The co-pilot was calling from the bridge.

'O.K. for rendezvous, Captain? We've got all the data we need from this run, and the TV people are getting impatient.'

Falcon glanced at the camera platform, now matching his speed a tenth of a mile away.

'O.K.,' he replied. 'Proceed as arranged. I'll watch from here.'

He walked back through the busy chaos of the Observation Deck so that he could have a better view amidships. As he did so, he could feel the change of vibration underfoot; by the time he had reached the rear of the lounge, the ship had come to rest. Using his master key, he let himself out

on to the small external platform flaring from the end of the deck; half a dozen people could stand here, with only low guardrails separating them from the vast sweep of the envelope – and from the ground, thousands of feet below. It was an exciting place to be, and perfectly safe even when the ship was travelling at speed, for it was in the dead air behind the huge dorsal blister of the Observation Deck. Nevertheless, it was not intended that the passengers would have access to it; the view was a little too vertiginous.

The covers of the forward cargo hatch had already opened like giant trap doors, and the camera platform was hovering above them, preparing to descend. Along this route, in the years to come, would travel thousands of passengers and tons of supplies. Only on rare occasions would the *Queen* drop down to sea level and dock with her floating base.

A sudden gust of cross-wind slapped Falcon's cheek, and he tightened his grip on the guardrail. The Grand Canyon was a bad place for turbulence, though he did not expect much at this altitude. Without any real anxiety, he focused his attention on the descending platform, now about a hundred and fifty feet above the ship. He knew that the highly skilled operator who was flying the remotely controlled vehicle had performed this simple manoeuvre a dozen times already; it was inconceivable that he would have any difficulties.

Yet he seemed to be reacting rather sluggishly. That last gust had drifted the platform almost to the edge of the open hatchway. Surely the pilot could have corrected before this. . . . Did he have a control problem? It was very unlikely; these remotes had multiple-redundancy, fail-safe takeovers and any number of backup systems. Accidents were almost unheard of.

But there he went again, off to the left. Could the pilot be *drunk*? Improbable though that seemed, Falcon considered it seriously for a moment. Then he reached for his micro-

phone switch.

Once again, without warning, he was slapped violently in the face. He hardly felt it, for he was staring in horror at the camera platform. The distant operator was fighting for control, trying to balance the craft on its jets – but he was only making matters worse. The oscillations increased – twenty degrees, forty, sixty, ninety . . .

‘Switch to automatic, you fool!’ Falcon shouted uselessly into his microphone. ‘Your manual control’s not working!’

The platform flipped over on its back. The jets no longer supported it, but drove it swiftly downward. They had suddenly become allies of the gravity they had fought until this moment.

Falcon never heard the crash, though he felt it; he was already inside the Observation Deck, racing for the elevator that would take him down to the bridge. Workman shouted at him anxiously, asking what had happened. It would be many months before he knew the answer to that question.

Just as he was stepping into the elevator cage, he changed his mind. What if there was a power failure? Better be on the safe side, even if it took longer and time was the essence. He began to run down the spiral stairway enclosing the shaft.

Halfway down he paused for a second to inspect the damage. That damned platform had gone clear through the ship, rupturing two of the gas cells as it did so. They were still collapsing slowly, in great falling veils of plastic. He was not worried about the loss of lift – the ballast could easily take care of that, as long as eight cells remained intact. Far more serious was the possibility of structural damage. Already he could hear the great latticework around him groaning and protesting under its abnormal loads. It was not enough to have sufficient lift; unless it was properly distributed, the ship would break her back.

He was just resuming his descent when a superchimp,

shrieking with fright, came racing down the elevator shaft, moving with incredible speed, hand over hand, along the *outside* of the latticework. In its terror, the poor beast had torn off its company uniform, perhaps in an unconscious attempt to regain the freedom of its ancestors.

Falcon, still descending as swiftly as he could, watched its approach with some alarm. A distraught simp was a powerful and potentially dangerous animal, especially if fear overcame its conditioning. As it overtook him, it started to call out a string of words, but they were all jumbled together, and the only one he could recognize was a plaintive, frequently repeated 'boss'. Even now, Falcon realized, it looked towards humans for guidance. He felt sorry for the creature, involved in a man-made disaster beyond its comprehension, and for which it bore no responsibility.

It stopped opposite him, on the other side of the lattice; there was nothing to prevent it from coming through the open framework if it wished. Now its face was only inches from his, and he was looking straight into the terrified eyes. Never before had he been so close to a simp, and able to study its features in such detail. He felt that strange mingling of kinship and discomfort that all men experience when they gave thus into the mirror of time.

His presence seemed to have calmed the creature. Falcon pointed up the shaft, back towards the Observation Deck, and said very clearly and precisely: 'Boss – boss – go.' To his relief, the simp understood; it gave him a grimace that might have been a smile, and at once started to race back the way it had come. Falcon had given it the best advice he could. If any safety remained aboard the *Queen*, it was in that direction. But his duty lay in the other.

He had almost completed his descent when, with a sound of rending metal, the vessel pitched nose down, and the lights went out. But he could still see quite well, for a shaft of sunlight streamed through the open hatch and the huge

tear in the envelope. Many years ago he had stood in a great cathedral nave watching the light pouring through the stained-glass windows and forming pools of multicoloured radiance on the ancient flagstones. The dazzling shaft of sunlight through the ruined fabric high above reminded him of that moment. He was in a cathedral of metal, falling down the sky.

When he reached the bridge, and was able for the first time to look outside, he was horrified to see how close the ship was to the ground. Only three thousand feet below were the beautiful and deadly pinnacles of rock and the red rivers of mud that were still carving their way down into the past. There was no level area anywhere in sight where a ship as large as the *Queen* could come to rest on an even keel.

A glance at the display board told him that all the ballast had gone. However, rate of descent had been reduced to a few yards a second; they still had a fighting chance.

Without a word, Falcon eased himself into the pilot's seat and took over such control as still remained. The instrument board showed him everything he wished to know; speech was superfluous. In the background, he could hear the Communications Officer giving a running report over the radio. By this time, all the news channels of Earth would have been pre-empted, and he could imagine the utter frustration of the programme controllers. One of the most spectacular wrecks in history was occurring – without a single camera to record it. The last moments of the *Queen* would never fill millions with awe and terror, as had those of the *Hindenburg*, a century and a half before.

Now the ground was only about seventeen hundred feet away, still coming up slowly. Though he had full thrust, he had not dared to use it, lest the weakened structure collapse; but now he realized that he had no choice. The wind was taking them towards a fork in the canyon, where the river was split by a wedge of rock like the prow of some gigantic,

fossilized ship of stone. If she continued on her present course, the *Queen* would straddle that triangular plateau and come to rest with at least a third of her length jutting out over nothingness; she would snap like a rotten stick.

Far away, above the sound of straining metal and escaping gas, came the familiar whistle of the jets as Falcon opened up the lateral thrusters. The ship staggered, and began to slew to port. The shriek of tearing metal was now almost continuous – and the rate of descent had started to increase ominously. A glance at the damage-control board showed that cell number five had just gone.

The ground was only yards away. Even now, he could not tell whether his manoeuvre would succeed or fail. He switched the thrust vectors over to vertical, giving maximum life to reduce the force of impact.

The crash seemed to last forever. It was not violent – merely prolonged, and irresistible. It seemed that the whole universe was falling about them.

The sound of crunching metal came nearer, as if some great beast were eating its way through the dying ship.

Then floor and ceiling closed upon him like a vice.

2. 'BECAUSE IT'S THERE'

'Why do you want to go to Jupiter?'

'As Springer said when he lifted for Pluto – "because it's there".'

'Thanks. Now we've got *that* out of the way – the real reason.'

Howard Falcon smiled, though only those who knew him well could have interpreted the slight, leathery grimace. Webster was one of them; for more than twenty years they had been involved in each other's projects. They had shared

triumphs and disasters – including the greatest disaster of all.

‘Well, Springer’s cliché is still valid. We’ve landed on all the terrestrial planets, but none of the gas giants. They are the only real challenge left in the solar system.’

‘An expensive one. Have you worked out the cost?’

‘As well as I can; here are the estimates. Remember, though – this isn’t a one-shot mission, but a transportation system. Once it’s proved out, it can be used over and over again. And it will open up not merely Jupiter, but *all* the giants.’

Webster looked at the figures, and whistled.

‘Why not start with an easier planet – Uranus, for example? Half the gravity, and less than half the escape velocity. Quieter weather, too – if that’s the right word for it.’

Webster had certainly done his homework. But that, of course, was why he was head of Long-Range Planning.

‘There’s very little saving – when you allow for the extra distance and the logistics problems. For Jupiter, we can use the facilities of Ganymede. Beyond Saturn, we’d have to establish a new supply base.’

Logical, thought Webster; but he was sure that it was not the important reason. Jupiter was lord of the solar system; Falcon would be interested in no lesser challenge.

‘Besides,’ Falcon continued, ‘Jupiter is a major scientific scandal. It’s more than a hundred years since its radio storms were discovered, but we still don’t know what causes them – and the Great Red Spot is as big a mystery as ever. That’s why I can get matching funds from the Bureau of Astronautics. Do you know how many probes they have dropped into that atmosphere?’

‘A couple of hundred, I believe.’

‘*Three* hundred and twenty-six, over the last fifty years – about a quarter of them total failures. Of course, they’ve

learned a hell of a lot, but they've barely scratched the planet. Do you realize how *big* it is?'

'More than ten times the size of Earth.'

'Yes, yes – but do you know what that really means?'

Falcon pointed to the large globe in the corner of Webster's office.

'Look at India – how small it seems. Well, if you skinned Earth and spread it out on the surface of Jupiter, it would look about as big as India does here.'

There was a long silence while Webster contemplated the equation: Jupiter is to Earth as Earth is to India. Falcon had – deliberately, of course – chosen the best possible example . . .

Was it already ten years ago? Yes, it must have been. The crash lay seven years in the past (that date was engraved on his heart), and those initial tests had taken place three years before the first and last flight of the *Queen Elizabeth*.

Ten years ago, then, Commander (no, Lieutenant) Falcon had invited him to a preview – a three-day drift across the northern plains of India, within sight of the Himalayas. 'Perfectly safe,' he had promised. 'It will get you away from the office – and will teach you what this whole thing is about.'

Webster had not been disappointed. Next to his first journey to the Moon, it had been the most memorable experience of his life. And yet, as Falcon had assured him, it had been perfectly safe, and quite uneventful.

They had taken off from Srinagar just before dawn, with the huge silver bubble of the balloon already catching the first light of the Sun. The ascent had been made in total silence; there was none of the roaring propane burners that had lifted the hot-air balloons of an earlier age. All the heat they needed came from the little pulsed-fusion reactor, weighing only about two hundred and twenty pounds, hanging in the open mouth of the envelope. While they were

climbing, its laser was zapping ten times a second, igniting the merest whiff of deuterium fuel. Once they reached altitude, it would fire only a few times a minute, making up for the heat lost through the great gasbag overhead.

And so, even while they were almost a mile above the ground, they could hear dogs barking, people shouting, bells ringing. Slowly the vast, Sun-smitten landscape expanded around them. Two hours later, they had levelled out at three miles and were taking frequent draughts of oxygen. They could relax and admire the scenery; the on-board instrumentation was doing all the work – gathering the information that would be required by the designers of the still-unnamed liner of the skies.

It was a perfect day. The southwest monsoon would not break for another month, and there was hardly a cloud in the sky. Time seemed to have come to a stop; they resented the hourly radio reports which interrupted their reverie. And all around, to the horizon and far beyond, was that infinite, ancient landscape, drenched with history – a patchwork of villages, fields, temples, lakes, irrigation canals . . .

With a real effort, Webster broke the hypnotic spell of that ten-year-old memory. It had converted him to lighter-than-air flight – and it had made him realize the enormous size of India, even in a world that could be circled within ninety minutes. And yet, he repeated to himself, Jupiter is to Earth as Earth is to India . . .

‘Granted your argument,’ he said, ‘and supposing the funds are available, there’s another question you have to answer. Why should you do better than the – what is it – three hundred and twenty-six robot probes that have already made the trip?’

‘I am better qualified than they were – as an observer, and as a pilot. *Especially* as a pilot. Don’t forget – I’ve more experience of lighter-than-air flight than anyone in the world.’

'You could still serve as controller, and sit safely on Ganymede.'

'But that's just the point! They've already done that. Don't you remember what killed the Queen?'

Webster knew perfectly well; but he merely answered: 'Go on.'

'Time lag – time lag! That idiot of a platform controller thought he was using a local radio circuit. But he'd been accidentally switched through a satellite – oh, maybe it wasn't his fault, but he should have noticed. That's a half-second time lag for the round trip. Even then it wouldn't have mattered flying in calm air. It was the turbulence over the Grand Canyon that did it. When the platform tipped, and he corrected for that – it had already tipped the other way. Ever tried to drive a car over a bumpy road with a half-second delay in the steering?'

'No, and I don't intend to try. But I can imagine it.'

'Well, Ganymede is a million kilometres from Jupiter. That means a round-trip delay of six seconds. No, you need a controller on the spot – to handle emergencies in real time. Let me show you something. Mind if I use this?'

'Go ahead.'

Falcon picked up a postcard that was lying on Webster's desk; they were almost obsolete on Earth, but this one showed a 3-D view of a Martian landscape, and was decorated with exotic and expensive stamps. He held it so that it dangled vertically.

'This is an old trick, but helps to make my point. Place your thumb and finger on either side, not quite touching. That's right.'

Webster put out his hand, almost but not quite gripping the card.

'Now catch it.'

Falcon waited for a few seconds; then, without warning, he let go of the card. Webster's thumb and finger closed on

empty air.

'I'll do it again, just to show there's no deception. You see?'

Once again, the falling card had slipped through Webster's fingers.

'Now you try it on me.'

This time, Webster grasped the card and dropped it without warning. It had scarcely moved before Falcon had caught it. Webster almost imagined he could hear a click, so swift was the other's reaction.

'When they put me together again,' Falcon remarked in an expressionless voice, 'the surgeons made some improvements. This is one of them – and there are others. I want to make the most of them. Jupiter is the place where I can do it.'

Webster stared for long seconds at the fallen card, absorbing the improbable colours of the Trivium Charontis Escarpment. Then he said quietly: 'I understand. How long do you think it will take?'

'With your help, plus the Bureau, plus all the science foundations we can drag in – oh, three years. Then a year for trials – we'll have to send in at least two test models. So, with luck – five years.'

'That's about what I thought. I hope you get your luck; you've earned it. But there's one thing I won't do.'

'What's that?'

'Next time you go ballooning, don't expect *me* as passenger.'

3. THE WORLD OF THE GODS

The fall from Jupiter V to Jupiter itself takes only three and a half hours. Few men could have slept on so awesome a journey. Sleep was a weakness that Howard Falcon hated,

and the little he still required brought dreams that time had not yet been able to exorcize. But he could expect no rest in the three days that lay ahead, and must seize what he could during the long fall down into that ocean of clouds, some sixty thousand miles below.

As soon as *Kon-Tiki* had entered her transfer orbit and all the computer checks were satisfactory, he prepared for the last sleep he might ever know. It seemed appropriate that at almost the same moment Jupiter eclipsed the bright and tiny Sun as he swept into the monstrous shadow of the planet. For a few minutes a strange golden twilight enveloped the ship; then a quarter of the sky became an utterly black hole in space, while the rest was a blaze of stars. No matter how far one travelled across the solar system, *they* never changed; these same constellations now shone on Earth, millions of miles away. The only novelties here were the small, pale crescents of Callisto and Ganymede; doubtless there were a dozen other moons up there in the sky, but they were all much too tiny, and too distant, for the unaided eye to pick them out.

‘Closing down for two hours,’ he reported to the mother ship, hanging almost a thousand miles above the desolate rocks of Jupiter V, in the radiation shadow of the tiny satellite. If it never served any other useful purpose, Jupiter V was a cosmic bulldozer perpetually sweeping up the charged particles that made it unhealthy to linger close to Jupiter. Its wake was almost free of radiation, and there a ship could park in perfect safety, while death sleeted invisibly all around.

Falcon switched on the sleep inducer, and consciousness faded swiftly out as the electric pulses surged gently through his brain. While *Kon-Tiki* fell towards Jupiter, gaining speed second by second in that enormous gravitational field, he slept without dreams. They always came when he

awoke; and he had brought his nightmares with him from Earth.

Yet he never dreamed of the crash itself, though he often found himself again face to face with that terrified super-chimp, as he descended the spiral stairway between the collapsing gasbags. None of the simps had survived; those that were not killed outright were so badly injured that they had been painlessly 'euthed'. He sometimes wondered why he dreamed only of this doomed creature – which he had never met before the last minutes of its life – and not of the friends and colleagues he had lost aboard the dying *Queen*.

The dreams he feared most always began with his first return to consciousness. There had been little physical pain; in fact, there had been no sensation of any kind. He was in darkness and silence, and did not even seem to be breathing. And – strangest of all – he could not locate his limbs. He could move neither his hands nor his feet, because he did not know where they were.

The silence had been the first to yield. After hours, or days, he had become aware of a faint throbbing, and eventually, after long thought, he deduced that this was the beating of his own heart. That was the first of his many mistakes.

Then there had been faint pinpricks, sparkles of light, ghosts of pressures upon still-unresponsive limbs. One by one his senses had returned, and pain had come with them. He had had to learn everything anew, recapitulating infancy and babyhood. Though his memory was unaffected, and he could understand words that were spoken to him, it was months before he was able to answer except by the flicker of an eyelid. He could remember the moments of triumph when he had spoken the first word, turned the page of a book – and, finally, learned to move under his own power. *That* was a victory indeed, and it had taken him almost two years to prepare for it. A hundred times he had envied

that dead superchimp, but *he* had been given no choice. The doctors had made their decision – and now, twelve years later, he was where no human being had ever travelled before, and moving faster than any man in history.

Kon-Tiki was just emerging from shadow, and the Jovian dawn bridged the sky ahead in a titanic bow of light, when the persistent buzz of the alarm dragged Falcon up from sleep. The inevitable nightmares (he had been trying to summon a nurse, but did not even have the strength to push the button) swiftly faded from consciousness. The greatest – and perhaps last – adventure of his life was before him.

He called Mission Control, now almost sixty thousand miles away and falling swiftly below the curve of Jupiter, to report that everything was in order. His velocity had just passed thirty-one miles a second (*that* was one for the books) and in half an hour *Kon-Tiki* would hit the outer fringes of the atmosphere, as he started on the most difficult re-entry in the entire solar system. Although scores of probes had survived this flaming ordeal, they had been tough, solidly packed masses of instrumentation, able to withstand several hundred gravities of drag. *Kon-Tiki* would hit peaks of thirty g's, and would average more than ten, before she came to rest in the upper reaches of the Jovian atmosphere. Very carefully and thoroughly, Falcon began to attach the elaborate system of restraints that would anchor him to the walls of the cabin. When he had finished, he was virtually a part of the ship's structure.

The clock was counting backward; one hundred seconds to re-entry. For better or worse, he was committed. In a minute and a half, he would graze the Jovian atmosphere, and would be caught irrevocably in the grip of the giant.

The countdown was three seconds late – not at all bad, considering the unknowns involved. From beyond the walls of the capsule came a ghostly sighing, which rose steadily to

a high-pitched, screaming roar. The noise was quite different from that of a re-entry on Earth or Mars; in this thin atmosphere of hydrogen and helium, all sounds were transformed a couple of octaves upward. On Jupiter, even thunder would have falsetto overtones.

With the rising scream came mounting weight; within seconds, he was completely immobilized. His field of vision contracted until it embraced only the clock and the accelerometer; fifteen g, and four hundred and eighty seconds to go . . .

He never lost consciousness; but then, he had not expected to. *Kon-Tiki's* trail through the Jovian atmosphere must be really spectacular – by this time, thousands of miles long. Five hundred seconds after entry, the drag began to taper off: ten g, five g, two . . . Then weight vanished almost completely. He was falling free, all his enormous orbital velocity destroyed.

There was a sudden jolt as the incandescent remnants of the heat shield were jettisoned. It had done its work and would not be needed again; Jupiter could have it now. He released all but two of the restraining buckles, and waited for the automatic sequencer to start the next, and most critical, series of events.

He did not see the first drogue parachute pop out, but he could feel the slight jerk, and the rate of fall diminished immediately. *Kon-Tiki* had lost all her horizontal speed and was going straight down at almost a thousand miles an hour. Everything depended on what happened in the next sixty seconds.

There went the second drogue. He looked up through the overhead window and saw, to his immense relief, that clouds of glittering foil were billowing out behind the falling ship. Like a great flower unfurling, the thousands of cubic yards of the balloon spread out across the sky, scooping up the thin gas until it was fully inflated. *Kon-Tiki's* rate of fall

dropped to a few miles an hour and remained constant. Now there was plenty of time; it would take him days to fall all the way down to the surface of Jupiter.

But he would get there eventually, even if he did nothing about it. The balloon overhead was merely acting as an efficient parachute. It was providing no lift; nor could it do so, while the gas inside and out was the same.

With its characteristic and rather disconcerting crack the fusion reactor started up, pouring torrents of heat into the envelope overhead. Within five minutes, the rate of fall had become zero; within six, the ship had started to rise. According to the radar altimeter, it had levelled out at about two hundred and sixty-seven miles above the surface – or whatever passed for a surface on Jupiter.

Only one kind of balloon will work in an atmosphere of hydrogen, which is the lightest of all gases – and that is a hot-hydrogen balloon. As long as the fuser kept ticking over, Falcon could remain aloft, drifting across a world that could hold a hundred Pacifics. After travelling over three hundred million miles, *Kon-Tiki* had at last begun to justify her name. She was an aerial raft, adrift upon the currents of the Jovian atmosphere.

Though a whole new world was lying around him, it was more than an hour before Falcon could examine the view. First he had to check all the capsule's systems and test its response to the controls. He had to learn how much extra heat was necessary to produce a desired rate of ascent, and how much gas he must vent in order to descend. Above all, there was the question of stability. He must adjust the length of the cables attaching his capsule to the huge, pear-shaped balloon, to damp out vibrations and get the smoothest possible ride. Thus far, he was lucky; at this level, the wind was steady, and the Doppler reading on the invisible surface gave him a ground speed of two hundred and seventeen and

a half miles an hour. For Jupiter, that was modest; winds of up to a thousand had been observed. But mere speed was, of course, unimportant; the real danger was turbulence. If he ran into that, only skill and experience and swift reaction could save him – and these were not matters that could yet be programmed into a computer.

Not until he was satisfied that he had got the feel of his strange craft did Falcon pay any attention to Mission Control's pleadings. Then he deployed the booms carrying the instrumentation and the atmospheric samplers. The capsule now resembled a rather untidy Christmas tree, but still rode smoothly down the Jovian winds while it radioed its torrents of information to the recorders on the ship miles above. And now, at last, he could look around . . .

His first impression was unexpected, and even a little disappointing. As far as the scale of things was concerned, he might have been ballooning over an ordinary cloudscape on Earth. The horizon seemed at a normal distance; there was no feeling at all that he was on a world eleven times the diameter of his own. Then he looked at the infra-red radar, sounding the layers of atmosphere beneath him – and knew how badly his eyes had been deceived.

That layer of clouds apparently about three miles away was really more than thirty-seven miles below. And the horizon, whose distance he would have guessed at about one hundred and twenty-five, was actually eighteen hundred miles from the ship.

The crystalline clarity of the hydrohelium atmosphere and the enormous curvature of the planet had fooled him completely. It was even harder to judge distances here than on the Moon; everything he saw must be multiplied by at least ten.

It was a simple matter, and he should have been prepared for it. Yet somehow, it disturbed him profoundly. He did not feel that Jupiter was huge, but that *he* had shrunk – to

a tenth of his normal size. Perhaps, with time, he would grow accustomed to the inhuman scale of this world; yet as he stared towards that unbelievably distant horizon, he felt as if a wind colder than the atmosphere around him was blowing through his soul. Despite all his arguments, this might never be a place for man. He could well be both the first and the last to descend through the clouds of Jupiter.

The sky above was almost black, except for a few wisps of ammonia cirrus perhaps twelve miles overhead. It was cold up there, on the fringes of space, but both pressure and temperature increased rapidly with depth. At the level where *Kon-Tiki* was drifting now, it was fifty below zero, and the pressure was five atmospheres. Sixty-five miles farther down, it would be as warm as equatorial Earth, and the pressure about the same as at the bottom of one of the shallower seas. Ideal conditions for life . . .

A quarter of the brief Jovian day had already gone; the sun was halfway up the sky, but the light on the unbroken cloudscape below had a curious mellow quality. That extra three hundred million miles had robbed the Sun of all its power. Though the sky was clear, Falcon found himself continually thinking that it was a heavily overcast day. When night fell, the onset of darkness would be swift indeed; though it was still morning, there was a sense of autumnal twilight in the air. But autumn, of course, was something that never came to Jupiter. There were no seasons here.

Kon-Tiki had come down in the exact centre of the equatorial zone – the least colourful part of the planet. The sea of clouds that stretched out to the horizon was tinted a pale salmon; there was none of the yellows and pinks and even reds that banded Jupiter at higher altitudes. The Great Red Spot itself – most spectacular of all of the planet's features – lay thousands of miles to the south. It had been a tempta-

tion to descend there, but the south tropical disturbance was unusually active, with currents reaching over nine hundred miles an hour. It would have been asking for trouble to head into that maelstrom of unknown forces. The Great Red Spot and its mysteries would have to wait for future expeditions.

The Sun, moving across the sky twice as swiftly as it did on Earth, was now nearing the zenith and had become eclipsed by the great silver canopy of the balloon. *Kon-Tiki* was still drifting swiftly and smoothly westward at a steady two hundred and seventeen and a half, but only the radar gave any indication of this. Was it always as calm here? Falcon asked himself. The scientists who had talked learnedly of the Jovian doldrums, and had predicted that the equator would be the quietest place, seemed to know what they were talking about, after all. He had been profoundly sceptical of all such forecasts, and had agreed with one unusually modest researcher who had told him bluntly: 'There are *no* experts on Jupiter.' Well, there would be at least one by the end of this day.

If he managed to survive until then.

4. THE VOICES OF THE DEEP

That first day, the Father of the Gods smiled upon him. It was as calm and peaceful here on Jupiter as it had been, years ago, when he was drifting with Webster across the plains of northern India. Falcon had time to master his new skills, until *Kon-Tiki* seemed an extension of his own body. Such luck was more than he had dared to hope for, and he began to wonder what price he might have to pay for it.

The five hours of daylight were almost over; the clouds below were full of shadows, which gave them a massive solidity they had not possessed when the Sun was higher.

Colour was swiftly draining from the sky, except in the west itself, where a band of deepening purple lay along the horizon. Above this band was the thin crescent of a closer moon, pale and bleached against the utter blackness beyond.

With a speed perceptible to the eye, the Sun went straight down over the edge of Jupiter, over eighteen hundred miles away. The stars came out in their legions – and there was the beautiful evening star of Earth, on the very frontier of twilight, reminding him how far he was from home. It followed the Sun down into the west. Man's first night on Jupiter had begun.

With the onset of darkness, *Kon-Tiki* started to sink. The balloon was no longer heated by the feeble sunlight and was losing a small part of its buoyancy. Falcon did nothing to increase lift; he had expected this and was planning to descend.

The invisible cloud deck was still over thirty miles below, and he would reach it about midnight. It showed up clearly on the infra-red radar, which also reported that it contained a vast array of complex carbon compounds, as well as the usual hydrogen, helium, and ammonia. The chemists were dying for samples of that fluffy, pinkish stuff; though some atmospheric probes had already gathered a few grams, that had only whetted their appetites. Half the basic molecules of life were here, floating high above the surface of Jupiter. And where there was food, could life be far away? That was the question that, after more than a hundred years, no one had been able to answer.

The infra-red was blocked by the clouds, but the microwave radar sliced right through and showed layer after layer, all the way down to the hidden surface almost two hundred and fifty miles below. That was barred to him by enormous pressures and temperatures; not even robot probes had ever reached it intact. It lay in tantalizing inaccessibility at the bottom of the radar screen, slightly fuzzy, and show-

ing a curious granular structure that his equipment could not resolve.

An hour after sunset, he dropped his first probe. It fell swiftly for about sixty miles, then began to float in the denser atmosphere, sending back torrents of radio signals, which he relayed to Mission Control. Then there was nothing else to do until sunrise, except to keep an eye on the rate of descent, monitor the instruments, and answer occasional queries. While she was drifting in this steady current, *Kon-Tiki* could look after herself.

Just before midnight, a woman controller came on watch and introduced herself with the usual pleasantries. Ten minutes later she called again, her voice at once serious and excited.

‘Howard! Listen in on channel forty-six – high gain.’

Channel forty-six? There were so many telemetering circuits that he knew the numbers of only those that were critical; but as soon as he threw the switch, he recognized this one. He was plugged in to the microphone on the probe, floating more than eighty miles below him in an atmosphere now almost as dense as water.

At first, there was only a soft hiss of whatever strange winds stirred down in the darkness of that unimaginable world. And then, out of the background noise, there slowly emerged a booming vibration that grew louder and louder, like the beating of a gigantic drum. It was so low that it was felt as much as heard, and the beats steadily increased their tempo, though the pitch never changed. Now it was a swift, almost infrasonic throbbing. Then, suddenly, in mid-vibration, it stopped – so abruptly that the mind could not accept the silence, but memory continued to manufacture a ghostly echo in the deepest caverns of the brain.

It was the most extraordinary sound that Falcon had ever heard, even among the multitudinous noises of Earth. He could think of no natural phenomenon that could have

caused it; nor was it like the cry of any animal, not even one of the great whales . . .

It came again, following exactly the same pattern. Now that he was prepared for it, he estimated the length of the sequence; from first faint throb to final crescendo, it lasted just over ten seconds.

And this time there was a real echo, very faint and far away. Perhaps it came from one of the many reflecting layers, deeper in this stratified atmosphere; perhaps it was another, more distant source. Falcon waited for a second echo, but it never came.

Mission Control reacted quickly and asked him to drop another probe at once. With two microphones operating, it would be possible to find the approximate location of the sources. Oddly enough, none of *Kon-Tiki's* own external mikes could detect anything except wind noises. The boomings, whatever they were, must have been trapped and channelled beneath an atmospheric reflecting layer far below.

They were coming, it was soon discovered, from a cluster of sources about twelve hundred miles away. The distance gave no indication of their power; in Earth's oceans, quite feeble sounds could travel equally far. And as for the obvious assumption that living creatures were responsible, the Chief Exobiologist quickly ruled that out.

'I'll be very disappointed,' said Dr. Brenner, 'if there are no micro-organisms or plants there. But nothing like animals, because there's no free oxygen. All biochemical reactions on Jupiter must be low-energy ones – there's just no way an active creature could generate enough power to function.'

Falcon wondered if this was true; he had heard the argument before, and reserved judgment.

'In any case,' continued Brenner, 'some of those sound waves are a hundred yards long! Even an animal as big as a whale couldn't produce them. They *must* have a natural origin.'

Yes, that seemed plausible, and probably the physicists would be able to come up with an explanation. What would a blind alien make, Falcon wondered, of the sounds he might hear when standing beside a stormy sea, or a geyser, or a volcano, or a waterfall? He might well attribute them to some huge beast.

About an hour before sunrise the voices of the deep died away, and Falcon began to busy himself with preparation for the dawn of his second day. *Kon-Tiki* was now only three miles above the nearest cloud layer; the external pressure had risen to ten atmospheres, and the temperature was a tropical thirty degrees. A man could be comfortable here with no more equipment than a breathing mask and the right grade of heliox mixture.

‘We’ve some good news for you,’ Mission Control reported, soon after dawn. ‘The cloud layer’s breaking up. You’ll have partial clearing in an hour – but watch out for turbulence.’

‘I’ve already noticed some,’ Falcon answered. ‘How far down will I be able to see?’

‘At least twelve miles, down to the second thermocline. *That* cloud deck is solid – it never breaks.’

And it’s out of my reach, Falcon told himself; the temperature down there must be over a hundred degrees. This was the first time that any balloonist had ever had to worry, not about his ceiling, but about his basement!

Ten minutes later he could see what Mission Control had already observed from its superior vantage point. There was a change in colour near the horizon, and the cloud layer had become ragged and humpy, as if something had torn it open. He turned up his little nuclear furnace and gave *Kon-Tiki* another three miles of altitude, so that he could get a better view.

The sky below was clearing rapidly, completely, as if something was dissolving the solid overcast. An abyss was

opening before his eyes. A moment later he sailed out over the edge of a cloud canyon about twelve miles deep and six hundred miles wide.

A new world lay spread beneath him; Jupiter had stripped away one of its many veils. The second layer of clouds, unattainably far below, was much darker in colour than the first. It was almost salmon pink, and curiously mottled with little islands of brick red. They were all oval-shaped, with their long axes pointing east-west, in the direction of the prevailing wind. There were hundreds of them, all about the same size, and they reminded Falcon of puffy little cumulus clouds in the terrestrial sky.

He reduced buoyancy, and *Kon-Tiki* began to drop down the face of the dissolving cliff. It was then that he noticed the snow.

White flakes were forming in the air and drifting slowly downward. Yet it was much too warm for snow – and, in any event, there was scarcely a trace of water at this altitude. Moreover, there was no glitter or sparkle about these flakes as they went cascading down into the depths. When, presently, a few landed on an instrument boom outside the main viewing port, he saw that they were a dull, opaque white – not crystalline at all – and quite large – several inches across. They looked like wax, and Falcon guessed that this was precisely what they were. Some chemical reaction was taking place in the atmosphere around him, condensing out the hydrocarbons floating in the Jovian air.

About sixty miles ahead, a disturbance was taking place in the cloud layer. The little red ovals were being jostled around, and were beginning to form a spiral – the familiar cyclonic pattern so common in the meteorology of Earth. The vortex was emerging with astonishing speed; if that was a storm ahead, Falcon told himself, he was in big trouble.

And then his concern changed to wonder – and to fear. What was developing in his line of flight was not a storm at

all. Something enormous – something scores of miles across – was rising through the clouds.

The reassuring thought that it, too, might be a cloud – a thunderhead boiling up from the lower levels of the atmosphere – lasted only a few seconds. No; this was *solid*. It shouldered its way through the pink-and-salmon overcast like an iceberg rising from the deeps.

An *iceberg* floating on hydrogen? That was impossible, of course; but perhaps it was not too remote an analogy. As soon as he focused the telescope upon the enigma, Falcon saw that it was a whitish, crystalline mass, threaded with streaks of red and brown. It must be, he decided, the same stuff as the ‘snowflakes’ falling around him – a mountain range of wax. And it was not, he soon realized, as solid as he had thought; around the edges it was continually crumbling and re-forming ...

‘I know what it is,’ he radioed Mission Control, which for the last few minutes had been asking anxious questions. ‘It’s a mass of bubbles – some kind of foam. Hydrocarbon froth. Get the chemists working on ... *Just a minute!*’

‘What is it?’ called Mission Control. ‘What is it?’

He ignored the frantic pleas from space and concentrated all his mind upon the image in the telescope field. He had to be sure; if he made a mistake, he would be the laughing-stock of the solar system.

Then he relaxed, glanced at the clock, and switched off the nagging voice from Jupiter V.

‘Hello Mission Control,’ he said, very formally. ‘This is Howard Falcon aboard *Kon-Tiki*. Ephemeris Time nineteen hours twenty-one minutes fifteen seconds. Latitude zero degrees five minutes North. Longitude one hundred and five degrees forty-two minutes, System One.’

‘Tell Dr. Brenner that there is life on Jupiter. And it’s *big* ...’

5. THE WHEELS OF POSEIDON

'I'm very happy to be proved wrong,' Dr. Brenner radioed back cheerfully. 'Nature always has something up her sleeve. Keep the long-focus camera on target and give us the steadiest pictures you can.'

The things moving up and down those waxen slopes were still too far away for Falcon to make out many details, and they must have been very large to be visible at all at such a distance. Almost black, and shaped like arrowheads, they manoeuvred by slow undulations of their entire bodies, so that they looked rather like giant manta rays, swimming above some tropical reef.

Perhaps they were sky-borne cattle, browsing on the cloud pastures of Jupiter, for they seemed to be feeding along the dark, red-brown streaks that ran like dried-up river beds down the flanks of the floating cliffs. Occasionally, one of them would dive headlong into the mountain of foam and disappear completely from sight.

Kon-Tiki was moving only slowly with respect to the cloud layer below; it would be at least three hours before she was above those ephemeral hills. She was in a race with the Sun. Falcon hoped that darkness would not fall before he could get a good view of the mantas, as he had christened them, as well as the fragile landscape over which they flapped their way.

It was a long three hours. During the whole time, he kept the external microphones on full gain, wondering if here was the source of that booming in the night. The mantas were certainly large enough to have produced it; when he could get an accurate measurement, he discovered that they were almost a hundred yards across the wings. That was three times the length of the largest whale – though he doubted if they could weigh more than a few tons.

Half an hour before sunset, *Kon-Tiki* was almost above the 'mountains'.

'No,' said Falcon, answering Mission Control's repeated questions about the mantas, 'they're still showing no reaction to me. I don't think they're intelligent – they look like harmless vegetarians. And even if they try to chase me, I'm sure they can't reach my altitude.'

Yet he was a little disappointed when the mantas showed not the slightest interest in him as he sailed high above their feeding ground. Perhaps they had no way of detecting his presence. When he examined and photographed them through the telescope, he could see no signs of any sense organs. The creatures were simply huge black deltas, rippling over hills and valleys that, in reality, were little more substantial than the clouds of Earth. Though they looked solid, Falcon knew that anyone who stepped on those white mountains would go crashing through them as if they were made of tissue paper.

At close quarters he could see the myriads of cellules or bubbles from which they were formed. Some of these were quite large – a yard or so in diameter – and Falcon wondered in what witches' cauldron of hydrocarbons they had been brewed. There must be enough petrochemicals deep down in the atmosphere of Jupiter to supply all Earth's needs for a million years.

The short day had almost gone when he passed over the crest of the waxen hills, and the light was fading rapidly along their lower slopes. There were no mantas on this western side, and for some reason the topography was very different. The foam was sculptured into long, level terraces, like the interior of a lunar crater. He could almost imagine that they were gigantic steps leading down to the hidden surface of the planet.

And on the lowest of those steps, just clear of the swirling clouds that the mountain had displaced when it came surg-

ing skyward, was a roughly oval mass, one or two miles across. It was difficult to see, since it was only a little darker than the grey-white foam on which it rested. Falcon's first thought was that he was looking at a forest of pallid trees, like giant mushrooms that had never seen the Sun.

Yes, it must be a forest – he could see hundreds of thin trunks, springing from the white waxy froth in which they were rooted. But the trees were packed astonishingly close together; there was scarcely any space between them. Perhaps it was not a forest, after all, but a single enormous tree – like one of the giant multi-trunked banyans of the East. Once he had seen a banyan tree in Java that was over six hundred and fifty yards across; this monster was at least ten times that size.

The light had almost gone. The cloudscape had turned purple with refracted sunlight, and in a few seconds that, too, would have vanished. In the last light of his second day on Jupiter, Howard Falcon saw – or thought he saw – something that cast the gravest doubts on his interpretation of the white oval.

Unless the dim light had totally deceived him, those hundreds of thin trunks were beating back and forth, in perfect synchronism, like fronds of kelp rocking in the surge.

And the tree was no longer in the place where he had first seen it.

'Sorry about this,' said Mission Control, soon after sunset, 'but we think Source Beta is going to blow within the next hour. Probability seventy per cent.'

Falcon glanced quickly at the chart. Beta – Jupiter latitude one hundred and forty degrees – was over eighteen thousand six hundred miles away and well below his horizon. Even though major eruptions ran as high as ten megatons, he was much too far away for the shock wave to be a serious danger. The radio storm that it would trigger was,

however, quite a different matter.

The decameter outbursts that sometimes made Jupiter the most powerful radio source in the whole sky had been discovered back in the 1950s, to the utter astonishment of the astronomers. Now, more than a century later, their real cause was still a mystery. Only the symptoms were understood; the explanation was completely unknown.

The 'volcano' theory had best stood the test of time, although no one imagined that this word had the same meaning on Jupiter as on Earth. At frequent intervals – often several times a day – titanic eruptions occurred in the lower depths of the atmosphere, probably on the hidden surface of the planet itself. A great column of gas, more than six hundred miles high, would start boiling upward as if determined to escape into space.

Against the most powerful gravitational field of all the planets, it had no chance. Yet some traces – a mere few million tons – usually managed to reach the Jovian atmosphere; and when they did, all hell broke loose.

The radiation belts surrounding Jupiter completely dwarf the feeble Van Allen belts of Earth. When they are short-circuited by an ascending column of gas, the result is an electrical discharge millions of times more powerful than any terrestrial flash of lightning; it sends a colossal thunderclap of radio noise flooding across the entire solar system and on out to the stars.

It had been discovered that these radio outbursts came from four main areas of the planet. Perhaps there were weaknesses there that allowed the fires of the interior to break out from time to time. The scientists on Ganymede, largest of Jupiter's many moons, now thought that they could predict the onset of a decameter storm; their accuracy was about as good as a weather forecaster's of the early 1900s.

Falcon did not know whether to welcome or to fear a

radio storm; it would certainly add to the value of the mission – if he survived it. His course had been planned to keep as far as possible from the main centres of disturbance, especially the most active one, Source Alpha. As luck would have it, the threatening Beta was the closest to him. He hoped that the distance, almost three-fourths the circumference of Earth, was safe enough.

‘Probability ninety per cent,’ said Mission Control with a distinct note of urgency. ‘And forget that hour. Ganymede says it may be any moment.’

The radio had scarcely fallen silent when the reading on the magnetic field-strength meter started to shoot upward. Before it could go off scale, it reversed and began to drop as rapidly as it had risen. Far away and thousands of miles below, something had given the planet’s molten core a titanic jolt.

‘There she blows!’ called Mission Control.

‘Thanks, I already know. When will the storm hit me?’

‘You can expect onset in five minutes. Peak in ten.’

Far around the curve of Jupiter, a funnel of gas as wide as the Pacific Ocean was climbing spaceward at thousands of miles an hour. Already, the thunderstorms of the lower atmosphere would be raging around it – but they were nothing compared with the fury that would explode when the radiation belt was reached and began dumping its surplus electrons on to the planet. Falcon began to retract all the instrument booms that were extended out from the capsule. There were no other precautions he could take. It would be four hours before the atmospheric shock wave reached him – but the radio blast, travelling at the speed of light, would be here in a tenth of a second, once the discharge had been triggered.

The radio monitor, scanning back and forth across the spectrum, still showed nothing unusual, just the normal mush of background static. Then Falcon noticed that the

noise level was slowly creeping upward. The explosion was gathering its strength.

At such a distance he had never expected to see anything. But suddenly a flicker as of far-off heat lightning danced along the eastern horizon. Simultaneously, half the circuit breakers jumped out of the main switchboard, the lights failed and all communications channels went dead.

He tried to move, but was completely unable to do so. The paralysis that gripped him was not merely psychological; he seemed to have lost all control of his limbs and could feel a painful tingling sensation over his entire body. It was impossible that the electric field could have penetrated this shielded cabin. Yet there was a flickering glow over the instrument board, and he could hear the unmistakable crackle of a brush discharge.

With a series of sharp bangs, the emergency systems went into operation, and the overloads reset themselves. The lights flickered on again. And Falcon's paralysis disappeared as swiftly as it had come.

After glancing at the board to make sure that all circuits were back to normal, he moved quickly to the viewing ports.

There was no need to switch on the inspection lamps – the cables supporting the capsule seemed to be on fire. Lines of light glowing an electric blue against the darkness stretched upward from the main lift ring to the equator of the giant balloon; and rolling slowly along several of them were dazzling balls of fire.

The sight was so strange and so beautiful that it was hard to read any menace in it. Few people, Falcon knew, had ever seen ball lightning from such close quarters – and certainly none had survived if they were riding a hydrogen-filled balloon back in the atmosphere of Earth. He remembered the flaming death of the *Hindenburg*, destroyed by a stray spark when she docked at Lakehurst in 1937; as she

had done so often in the past. The horrifying old newsreel film flashed through his mind. But at least that could not happen here, though there was more hydrogen above his head than had ever filled the last of the Zeppelins. It would be a few billion years yet, before anyone could light a fire in the atmosphere of Jupiter.

With a sound like briskly frying bacon, the speech circuit came back to life.

‘Hello, *Kon-Tiki* – are you receiving? Are you receiving?’

The words were chopped and badly distorted, but intelligible. Falcon’s spirits lifted; he had resumed contact with the world of men.

‘I receive you,’ he said. ‘Quite an electrical display, but no damage – so far.’

‘Thanks – thought we’d lost you. Please check telemetry channels three, seven, twenty-six. Also gain on camera two. And we don’t quite believe the readings on the external ionization probes ...’

Reluctantly Falcon tore his gaze away from the fascinating pyrotechnic display around *Kon-Tiki*, though from time to time he kept glancing out of the windows. The ball lightning disappeared first, the fiery globes slowly expanding until they reached a critical size, at which they vanished in a gentle explosion. But even an hour later, there were still faint glows around all the exposed metal on the outside of the capsule; and the radio circuits remained noisy until well after midnight.

The remaining hours of darkness were completely uneventful – until just before dawn. Because it came from the east, Falcon assumed that he was seeing the first faint hint of sunrise. Then he realized that it was twenty minutes too early for this – and the glow that had appeared along the horizon was moving towards him even as he watched. It swiftly detached itself from the arch of stars that marked the invisible edge of the planet, and he saw that it was a rela-

tively narrow band, quite sharply defined. The beam of an enormous searchlight appeared to be swinging beneath the clouds.

Perhaps sixty miles behind the first racing bar of light came another, parallel to it and moving at the same speed. And beyond that another, and another – until all the sky flickered with alternating sheets of light and darkness.

By this time, Falcon thought, he had been inured to wonders, and it seemed impossible that this display of pure, soundless luminosity could present the slightest danger. But it was so astonishing, and so inexplicable, that he felt cold, naked fear gnawing at his self-control. No man could look upon such a sight without feeling like a helpless pygmy in the presence of forces beyond his comprehension. Was it possible that, after all, Jupiter carried not only life but also intelligence? And, perhaps, an intelligence that only now was beginning to react to his alien presence?

‘Yes, we see it,’ said Mission Control, in a voice that echoed his own awe. ‘We’ve no idea what it is. Stand by, we’re calling Ganymede.’

The display was slowly fading; the bands racing in from the far horizon were much fainter, as if the energies that powered them were becoming exhausted. In five minutes it was all over; the last faint pulse of light flickered along the western sky and then was gone. Its passing left Falcon with an overwhelming sense of relief. The sight was so hypnotic, and so disturbing, that it was not good for any man’s peace of mind to contemplate it too long.

He was more shaken than he cared to admit. The electrical storm was something that he could understand; but *this* was totally incomprehensible.

Mission Control was still silent. He knew that the information banks up on Ganymede were now being searched as men and computers turned their minds to the problem. If no answer could be found there, it would be necessary to

call Earth; that would mean a delay of almost an hour. The possibility that even Earth might be unable to help was one that Falcon did not care to contemplate.

He had never before been so glad to hear the voice of Mission Control as when Dr. Brenner finally came on the circuit. The biologist sounded relieved, yet subdued – like a man who has just come through some great intellectual crisis.

‘Hello, *Kon-Tiki*. We’ve solved your problem, but we can still hardly believe it.

‘What you’ve been seeing is bioluminescence, very similar to that produced by micro-organisms in the tropical seas of Earth. Here they’re in the atmosphere, not the ocean, but the principle is the same.’

‘But the pattern,’ protested Falcon, ‘was so regular – so *artificial*. And it was hundreds of miles across!’

‘It was even larger than you imagine; you observed only a small part of it. The whole pattern was over three thousand miles wide and looked like a revolving wheel. You merely saw the spokes, sweeping past you at about six-tenths of a mile a second ...’

‘A *second*!’ Falcon could not help interjecting. ‘No animals could move that fast!’

‘Of course not. Let me explain. What you saw was triggered by the shock wave from Source Beta, moving at the speed of sound.’

‘But what about the pattern?’ Falcon insisted.

‘That’s the surprising part. It’s a very rare phenomenon, but identical wheels of light – except that they’re a thousand times smaller – have been observed in the Persian Gulf and the Indian Ocean. Listen to this: British India Company’s *Patna*, Persian Gulf, May 1880, 11.30 p.m. – “an enormous luminous wheel, whirling round, the spokes of which appeared to brush the ship along. The spokes were 200 or 300 yards long ... each wheel contained about sixteen

spokes ...” And here’s one from the Gulf of Omar, dated May 23rd, 1906: “The intensely bright luminescence approached us rapidly, shooting sharply defined light rays to the west in rapid succession, like the beam from the searchlight of a warship ... To the left of us, a gigantic fiery wheel formed itself, with spokes that reached as far as one could see. The whole wheel whirled around for two or three minutes ...” The archive computer on Ganymede dug up about five hundred cases. It would have printed out the lot if we hadn’t stopped it in time.’

‘I’m convinced – but still baffled.’

‘I don’t blame you. The full explanation wasn’t worked out until late in the twentieth century. It seems that these luminous wheels are the results of submarine earthquakes, and always occur in shallow waters where the shock waves can be reflected and cause standing wave patterns. Sometimes bars, sometimes rotating wheels – the “Wheels of Poseidon”, they’ve been called. The theory was finally proved by making underwater explosions and photographing the results from a satellite. No wonder sailors used to be superstitious. Who would have believed a thing like *this*?’

So that was it, Falcon told himself. When Source Beta blew its top, it must have sent shock waves in all directions – through the compressed gas of the lower atmosphere, through the solid body of Jupiter itself. Meeting and criss-crossing, those waves must have cancelled here, reinforced there; the whole planet must have rung like a bell.

Yet the explanation did not destroy the sense of wonder and awe; he would never be able to forget those flickering bands of light, racing through the unattainable depths of the Jovian atmosphere. He felt that he was not merely on a strange planet, but in some magical realm between myth and reality.

This was a world where absolutely *anything* could hap-

pen, and no man could possibly guess what the future would bring.

And he still had a whole day to go.

6. MEDUSA

When the true dawn finally arrived, it brought a sudden change of weather. *Kon-Tiki* was moving through a blizzard; waxen snowflakes were falling so thickly that visibility was reduced to zero. Falcon began to worry about the weight that might be accumulating on the envelope. Then he noticed that any flakes settling outside the windows quickly disappeared; *Kon-Tiki's* continual outpouring of heat was evaporating them as swiftly as they arrived.

If he had been ballooning on Earth, he would also have worried about the possibility of collision. At least that was no danger here; any Jovian mountains were several hundred miles below him. And as for the floating islands of foam, hitting them would probably be like ploughing into slightly hardened soap bubbles.

Nevertheless, he switched on the horizontal radar, which until now had been completely useless; only the vertical beam, giving his distance from the invisible surface, had thus far been of any value. Then he had another surprise.

Scattered across a huge sector of the sky ahead were dozens of large and brilliant echoes. They were completely isolated from one another and apparently hung unsupported in space. Falcon remembered a phrase the earliest aviators had used to describe one of the hazards of their profession: 'clouds stuffed with rocks'. That was a perfect description of what seemed to lie in the track of *Kon-Tiki*.

It was a disconcerting sight; then Falcon again reminded himself that nothing *really* solid could possibly hover in this atmosphere. Perhaps it was some strange meteorological

phenomenon. In any case, the nearest echo was about a hundred and twenty-five miles.

He reported to Mission Control, which could provide no explanation. But it gave the welcome news that he would be clear of the blizzard in another thirty minutes.

It did not warn him, however, of the violent cross-wind that abruptly grabbed *Kon-Tiki* and swept it almost at right angles to its previous track. Falcon needed all his skill and the maximum use of what little control he had over his ungainly vehicle to prevent it from being capsized. Within minutes he was racing northward at over three hundred miles an hour. Then, as suddenly as it had started, the turbulence ceased; he was still moving at high speed, but in smooth air. He wondered if he had been caught in the Jovian equivalent of a jet stream.

The snow-storm dissolved; and he saw what Jupiter had been preparing for him.

Kon-Tiki had entered the funnel of a gigantic whirlpool, some six hundred miles across. The balloon was being swept along a curving wall of cloud. Overhead, the sun was shining in a clear sky; but far beneath, this great hole in the atmosphere drilled down to unknown depths until it reached a misty floor where lightning flickered almost continuously.

Though the vessel was being dragged downward so slowly that it was in no immediate danger, Falcon increased the flow of heat into the envelope until *Kon-Tiki* hovered at a constant altitude. Not until then did he abandon the fantastic spectacle outside and consider again the problem of the radar.

The nearest echo was now only about twenty-five miles away. All of them, he quickly realized, were distributed along the wall of the vortex, and were moving with it, apparently caught in the whirlpool like *Kon-Tiki* itself. He aimed the telescope along the radar bearing and found himself looking at a curious mottled cloud that almost filled the

field of view.

It was not easy to see, being only a little darker than the whirling wall of mist that formed its background. Not until he had been staring for several minutes did Falcon realize that he had met it once before.

The first time it had been crawling across the drifting mountains of foam, and he had mistaken it for a giant, many-trunked tree. Now at last he could appreciate its real size and complexity and could give it a better name to fix its image in his mind. It did not resemble a tree at all, but a jellyfish – a medusa, such as might be met trailing its tentacles as it drifted along the warm eddies of the Gulf Stream.

This medusa was more than a mile across and its scores of dangling tentacles were hundreds of feet long. They swayed slowly back and forth in perfect unison, taking more than a minute for each complete undulation – almost as if the creature was clumsily rowing itself through the sky.

The other echoes were more distant medusae. Falcon focused the telescope on half a dozen and could see no variations in shape or size. They all seemed to be of the same species, and he wondered just why they were drifting lazily around in this six-hundred-mile orbit. Perhaps they were feeding upon the aerial plankton sucked in by the whirlpool, as *Kon-Tiki* itself had been.

‘Do you realize, Howard,’ said Dr. Brenner, when he had recovered from his initial astonishment, ‘that this thing is about a hundred thousand times as large as the biggest whale? And even if it’s only a gasbag, it must still weigh a million tons! I can’t even guess at its metabolism. It must generate megawatts of heat to maintain its buoyancy.’

‘But if it’s just a gasbag, why is it such a damn good radar reflector?’

‘I haven’t the faintest idea. Can you get any closer?’

Brenner’s question was not an idle one. If he changed altitude to take advantage of the differing wind velocities,

Falcon could approach the medusa as closely as he wished. At the moment, however, he preferred his present twenty-five miles and said so, firmly.

'I see what you mean,' Brenner answered, a little reluctantly. 'Let's stay where we are for the present.' That 'we' gave Falcon a certain wry amusement; an extra sixty thousand miles made a considerable difference in one's point of view.

For the next two hours *Kon-Tiki* drifted uneventfully in the gyre of the great whirlpool, while Falcon experimented with filters and camera contrast, trying to get a clear view of the medusa. He began to wonder if its elusive colouration was some kind of camouflage; perhaps, like many animals of Earth, it was trying to lose itself against its background. That was a trick used by both hunters and hunted.

In which category was the medusa? That was a question he could hardly expect to have answered in the short time that was left to him. Yet just before noon, without the slightest warning, the answer came . . .

Like a squadron of antique jet fighters, five mantas came sweeping through the wall of mist that formed the funnel of the vortex. They were flying in a V formation directly towards the pallid grey cloud of the medusa; and there was no doubt, in Falcon's mind, that they were on the attack. He had been quite wrong to assume that they were harmless vegetarians.

Yet everything happened at such a leisurely pace that it was like watching a slow-motion film. The mantas undulated along at perhaps thirty miles an hour; it seemed ages before they reached the medusa, which continued to paddle imperturbably along at an even slower speed. Huge though they were, the mantas looked tiny beside the monster they were approaching. When they flapped down on its back, they appeared about as large as birds landing on a whale.

Could the medusa defend itself, Falcon wondered. He did not see how the attacking mantas could be in danger as long as they avoided those huge clumsy tentacles. And perhaps their host was not even aware of them; they could be insignificant parasites, tolerated as are fleas upon a dog.

But now it was obvious that the medusa was in distress. With agonizing slowness, it began to tip over like a capsizing ship. After ten minutes it had tilted forty-five degrees; it was also rapidly losing altitude. It was impossible not to feel a sense of pity for the beleaguered monster, and to Falcon the sight brought bitter memories. In a grotesque way, the fall of the medusa was almost a parody of the dying *Queen's* last moments.

Yet he knew that his sympathies were on the wrong side. High intelligence could develop only among predators – not among the drifting browsers of either sea or air. The mantas were far closer to him than was this monstrous bag of gas. And anyway, who could *really* sympathize with a creature a hundred thousand times larger than a whale?

Then he noticed that the medusa's tactics seemed to be having some effect. The mantas had been disturbed by its slow roll and were flapping heavily away from its back – like gorged vultures interrupted at mealtime. But they did not move very far, continuing to hover a few yards from the still-capsizing monster.

There was a sudden, blinding flash of light synchronized with a crash of static over the radio. One of the mantas, slowly twisting end over end, was plummeting straight downward. As it fell, a plume of black smoke trailed behind it. The resemblance to an aircraft going down in flames was quite uncanny.

In unison, the remaining mantas dived steeply away from the medusa, gaining speed by losing altitude. They had, within minutes, vanished back into the wall of cloud from which they had emerged. And the medusa, no longer falling,

began to roll back towards the horizontal. Soon it was sailing along once more on an even keel, as if nothing had happened.

'Beautiful!' said Dr. Brenner, after a moment of stunned silence. 'It's developed electric defences, like some of our eels and rays. But that must have been about a million volts! Can you see any organs that might produce the discharge? Anything looking like electrodes?'

'No,' Falcon answered, after switching to the highest power of the telescope. 'But here's something odd. Do you see this pattern? Check back on the earlier images. I'm sure it wasn't there before.'

A broad, mottled band had appeared along the side of the medusa. It formed a startlingly regular checkerboard, each square of which was itself speckled in a complex sub-pattern of short horizontal lines. They were spaced at equal distances in a geometrically perfect array of rows and columns.

'You're right,' said Dr. Brenner, with something very much like awe in his voice. 'That's just appeared. And I'm afraid to tell you what I think it is.'

'Well, I have no reputation to lose – at least as a biologist. Shall I give my guess?'

'Go ahead.'

'That's a large meter-band radio array. The sort of thing they used back at the beginning of the twentieth century.'

'I was afraid you'd say that. Now we know why it gave such a massive echo.'

'But why has it just appeared?'

'Probably an after effect of the discharge.'

'I've just had another thought,' said Falcon, rather slowly. 'Do you suppose it's *listening* to us?'

'On this frequency? I doubt it. Those are meter – no, *decameter* antennas – judging by their size. Hmm . . . that's an idea!'

Dr. Brenner fell silent, obviously contemplating some new line of thought. Presently he continued: 'I bet they're tuned to the radio outbursts! That's something nature never got around to doing on Earth. . . . We have animals with sonar and even electric sense, but nothing ever developed a radio sense. Why bother where there was so much light?

'But it's different here. Jupiter is *drenched* with radio energy. It's worth while using it – maybe even tapping it. That thing could be a floating power plant!'

A new voice cut into the conversation.

'Mission Commander here. This is all very interesting, but there's a much more important matter to settle. *Is it intelligent?* If so, we've got to consider the First Contact directives.'

'Until I came here,' said Dr. Brenner, somewhat ruefully, 'I would have sworn that anything that could make a short-wave antenna system *must* be intelligent. Now, I'm not sure. This could have evolved naturally. I suppose it's no more fantastic than the human eye.'

'Then we have to play safe and assume intelligence. For the present, therefore, this expedition comes under all the clauses of the Prime directive.'

There was a long silence while everyone on the radio circuit absorbed the implications of this. For the first time in the history of space flight, the rules that had been established through more than a century of argument might have to be applied. Man had – it was hoped – profited from his mistakes on Earth. Not only moral considerations, but also his own self-interest demanded that he should not repeat them among the planets. It could be disastrous to treat a superior intelligence as the American settlers had treated the Indians, or as almost everyone had treated the Africans . . .

The first rule was: keep your distance. Make no attempt to approach, or even to communicate, until 'they' have had

plenty of time to study you. Exactly what was meant by 'plenty of time', no one had ever been able to decide. It was left to the discretion of the man on the spot.

A responsibility of which he had never dreamed had descended upon Howard Falcon. In the few hours that remained to him on Jupiter, he might become the first ambassador of the human race.

And *that* was an irony so delicious that he almost wished the surgeons had restored to him the power of laughter.

7. PRIME DIRECTIVE

It was growing darker, but Falcon scarcely noticed as he strained his eyes towards that living cloud in the field of the telescope. The wind that was steadily sweeping *Kon-Tiki* around the funnel of the great whirlpool had now brought him within twelve miles of the creature. If he got much closer than six, he would take evasive action. Though he felt certain that the medusa's electric weapons were short ranged, he did not wish to put the matter to the test. That would be a problem for future explorers, and he wished them luck.

Now it was quite dark in the capsule. That was strange, because sunset was still hours away. Automatically, he glanced at the horizontally scanning radar, as he had done every few minutes. Apart from the medusa he was studying, there was no other object within sixty miles of him.

Suddenly, with startling power, he heard the sound that had come booming out of the Jovian night – the throbbing beat that grew more and more rapid, then stopped in mid-crescendo. The whole capsule vibrated with it like a pea in a kettledrum.

Falcon realized two things almost simultaneously during the sudden, aching silence. *This* time the sound was not

coming from thousands of miles away, over a radio circuit. It was in the very atmosphere around him.

The second thought was even more disturbing. He had quite forgotten – it was inexcusable, but there had been other apparently more important things on his mind – that most of the sky above him was completely blanked out by *Kon Tiki's* gasbag. Being lightly silvered to conserve its heat, the great balloon was an effective shield both to radar and to vision.

He had known this, of course; it had been a minor defect of the design, tolerated because it did not appear important. It seemed very important to Howard Falcon now – as he saw that fence of gigantic tentacles, thicker than the trunks of any tree, descending all around the capsule.

He heard Brenner yelling: 'Remember the Prime directive! Don't alarm it!' Before he could make an appropriate answer that overwhelming drumbeat started again and drowned all other sounds.

The sign of a really skilled test pilot is how he reacts not to foreseeable emergencies, but to ones that nobody could have anticipated. Falcon did not hesitate for more than a second to analyse the situation. In a lightning-swift movement, he pulled the rip cord.

That word was an archaic survival from the days of the first hydrogen balloons; on *Kon-Tiki*, the rip cord did not tear open the gasbag, but merely operated a set of louvers around the upper curve of the envelope. At once the hot gas started to rush out; *Kon-Tiki*, deprived of her lift, began to fall swiftly in this gravity field two and a half miles as strong as Earth's.

Falcon had a momentary glimpse of great tentacles whipping upward and away. He had just time to note that they were studded with large bladders or sacs, presumably to give them buoyancy, and that they ended in multitudes of thin feelers like the roots of a plant. He half expected a bolt of

lightning –but nothing happened.

His precipitous rate of descent was slackening as the atmosphere thickened and the deflated envelope acted as a parachute. When *Kon-Tiki* had dropped about two miles, he felt that it was safe to close the louvers again. By the time he had restored buoyancy and was in equilibrium once more, he had lost another mile of altitude and was getting dangerously near his safety limit.

He peered anxiously through the overhead windows, though he did not expect to see anything except the obscuring bulk of the balloon. But he had sideslipped during his descent, and part of the medusa was just visible a couple of miles above him. It was much closer than he expected – and it was still coming down, faster than he would have believed possible.

Mission Control was calling anxiously. He shouted: 'I'm O.K. – but it's still coming after me. I can't go any deeper.'

That was not quite true. He could go a lot deeper – about one hundred and eighty miles. But it would be a one-way trip, and most of the journey would be of little interest to him.

Then, to his great relief, he saw that the medusa was levelling off, not quite a mile above him. Perhaps it had decided to approach this strange intruder with caution; or perhaps it, too, found this deeper layer uncomfortably hot. The temperature was over fifty degrees centigrade, and Falcon wondered how much longer his life-support system could handle matters.

Dr. Brenner was back on the circuit, still worrying about the Prime directive.

'Remember – it may only be inquisitive!' he cried, without much conviction. 'Try not to frighten it!'

Falcon was getting rather tired of this advice and recalled a TV discussion he had once seen between a space lawyer

and an astronaut. After the full implications of the Prime directive had been carefully spelled out, the incredulous spacer had exclaimed: 'Then if there was no alternative, I must sit still and let myself be eaten?' The lawyer had not even cracked a smile when he answered: 'That's an *excellent* summing up.'

It had seemed funny at the time; it was not at all amusing now.

And then Falcon saw something that made him even more unhappy. The medusa was still hovering about a mile above him – but one of its tentacles was becoming incredibly elongated, and was stretching down towards *Kon-Tiki*, thinning out at the same time. As a boy he had once seen the funnel of a tornado descending from a storm cloud over the Kansas plains. The thing coming towards him now evoked vivid memories of that black, twisting snake in the sky.

'I'm rapidly running out of options,' he reported to Mission Control. 'I now have a choice between frightening it – and giving it a bad stomach-ache. I don't think it will find *Kon-Tiki* very digestible, if that's what it has in mind.'

He waited for comments from Brenner, but the biologist remained silent.

'Very well. It's twenty-seven minutes ahead of time, but I'm starting the ignition sequencer. I hope I'll have enough reserve to correct my orbit later.'

He could no longer see the medusa; once more it was directly overhead. But he knew the descending tentacle must now be very close to the balloon. It would take almost five minutes to bring the reactor up to full thrust . . .

The fusor was primed. The orbit computer had not rejected the situation as wholly impossible. The air scoops were open, ready to gulp in tons of the surrounding hydro-helium on demand. Even under optimum conditions, this

would have been the moment of truth – for there had been no way of testing how a nuclear ramjet would *really* work in the strange atmosphere of Jupiter.

Very gently something rocked *Kon-Tiki*. Falcon tried to ignore it.

Ignition had been planned at six miles higher, in an atmosphere of less than a quarter of the density and thirty degrees cooler. Too bad.

What was the shallowest dive he could get away with, for the air scoops to work? When the ram ignited, he'd be heading towards Jupiter with two and a half g's to help him get there. Could he possibly pull out in time?

A large, heavy hand patted the balloon. The whole vessel bobbed up and down, like one of the yo-yo's that had just become the craze on Earth.

Of course, Brenner *might* be perfectly right. Perhaps it was just trying to be friendly. Maybe he should try to talk to it over the radio. Which should it be: 'Pretty pussy'? 'Down, Fido'? Or 'Take me to your leader'?

The tritium-deuterium ratio was correct. He was ready to light the candle, with a hundred-million-degree match.

The thin tip of the tentacle came slithering around the edge of the balloon some sixty yards away. It was about the size of an elephant's trunk, and by the delicate way it was moving appeared to be almost as sensitive. There were little palps at its end, like questing mouths. He was sure that Dr. Brenner would be fascinated.

This seemed about as good a time as any. He gave a swift scan of the entire control board, started the final four-second ignition count, broke the safety seal, and pressed the JETTISON switch.

There was a sharp explosion and an instant loss of weight. *Kon-Tiki* was falling freely, nose down. Overhead, the discarded balloon was racing upward, dragging the inquisitive tentacle with it. Falcon had no time to see if the gasbag

actually hit the medusa, because at that moment the ramjet fired and he had other matters to think about.

A roaring column of hot hydrohelium was pouring out of the reactor nozzles, swiftly building up thrust – but *towards* Jupiter, not away from it. He could not pull out yet, for vector control was too sluggish. Unless he could gain complete control and achieve horizontal flight within the next five seconds, the vehicle would dive too deeply into the atmosphere and would be destroyed.

With agonizing slowness – those five seconds seemed like fifty – he managed to flatten out, then pull the nose upward. He glanced back only once and caught a final glimpse of the medusa, many miles away. *Kon-Tiki's* discarded gasbag had apparently escaped from its grasp, for he could see no sign of it.

Now he was master once more – no longer drifting helplessly on the winds of Jupiter, but riding his own column of atomic fire back to the stars. He was confident that the ramjet would steadily give him velocity and altitude until he had reached near-orbital speed at the fringes of the atmosphere. Then, with a brief burst of pure rocket power, he would regain the freedom of space.

Halfway to orbit, he looked south and saw the tremendous enigma of the Great Red Spot – that floating island twice the size of Earth – coming up over the horizon. He stared into its mysterious beauty until the computer warned him that conversion to rocket thrust was only sixty seconds ahead. He tore his gaze reluctantly away.

‘Some other time,’ he murmured.

‘What’s that?’ said Mission Control. ‘What did you say?’

‘It doesn’t matter,’ he replied.

8. BETWEEN TWO WORLDS

'You're a hero now, Howard,' said Webster, 'not just a celebrity. You've given them something to think about – injected some excitement into their lives. Not one in a million will actually travel to the Outer Giants, but the whole human race will go in imagination. And that's what counts.'

'I'm glad to have made your job a little easier.'

Webster was too old a friend to take offence at the note of irony. Yet it surprised him. And this was not the first change in Howard that he had noticed since the return from Jupiter.

The Administrator pointed to the famous sign on his desk, borrowed from an impresario of an earlier age: **ASTONISH ME!**

'I'm not ashamed of my job. New knowledge, new resources – they're all very well. But men also need novelty and excitement. Space travel has become routine; you've made it a great adventure once more. It will be a long, long time before we get Jupiter pigeonholed. And maybe longer still before we understand those medusae. I still think that one *knew* where your blind spot was. Anyway, have you decided on your next move? Saturn, Uranus, Neptune – you name it.'

'I don't know. I've thought about Saturn, but I'm not really needed there. It's only one gravity, not two and a half like Jupiter. So men can handle it.'

Men, thought Webster. He said 'men'. He's never done that before. And when did I last hear him use the word 'we'? He's changing, slipping away from us . . .

'Well,' he said aloud, rising from his chair to conceal his slight uneasiness, 'let's get the conference started. The cameras are all set up and everyone's waiting. You'll meet

a lot of old friends.'

He stressed the last word, but Howard showed no response. The leathery mask of his face was becoming more and more difficult to read. Instead, he rolled back from the Administrator's desk, unlocked his undercarriage so that it no longer formed a chair, and rose on his hydraulics to his full seven feet of height. It had been good psychology on the part of the surgeons to give him that extra twelve inches, to compensate somewhat for all that he had lost when the *Queen* had crashed.

Falcon waited until Webster had opened the door, then pivoted neatly on his balloon tyres and headed for it at a smooth and silent twenty miles an hour. The display of speed and precision was not flaunted arrogantly; rather, it had become quite unconscious.

Howard Falcon, who had once been a man and could still pass for one over a voice circuit, felt a calm sense of achievement – and, for the first time in years, something like peace of mind. Since his return from Jupiter, the nightmares had ceased. He had found his role at last.

He now knew why he had dreamed about that super-chimp aboard the doomed *Queen Elizabeth*. Neither man nor beast, it was between two worlds; and so was he.

He alone could travel unprotected on the lunar surface. The life-support system inside the metal cylinder that had replaced his fragile body functioned equally well in space or under water. Gravity fields ten times that of Earth were an inconvenience, but nothing more. And no gravity was best of all . . .

The human race was becoming more remote, the ties of kinship more tenuous. Perhaps these air-breathing, radiation-sensitive bundles of unstable carbon compounds had no right beyond the atmosphere; they should stick to their natural homes – Earth, Moon, Mars.

Some day the real masters of space would be machines,

not men – and he was neither. Already conscious of his destiny, he took a sombre pride in his unique loneliness – the first immortal midway between two orders of creation.

He would, after all, be an ambassador; between the old and the new – between the creatures of carbon and the creatures of metal who must one day supersede them.

Both would have need of him in the troubled centuries that lay ahead.

THE SCIENCE FICTION BOOKS OF ARTHUR C. CLARKE

THE books are listed in chronological order of publication. The publisher of the first World edition is given, and where this was an American edition this is indicated by (US). Following this, all British editions are listed.

Short stories are indicated by 'collection', Omnibus Editions have a list of contents and these are cross-indexed by the use of In: references. All re-issues of a book under a different title are listed with the original title.

Books published in hardcover are indicated by (hd) while all others are paperbacks. The date for each edition is also given. An asterisk (*) indicates that the edition was in print when this list was compiled in 1973.

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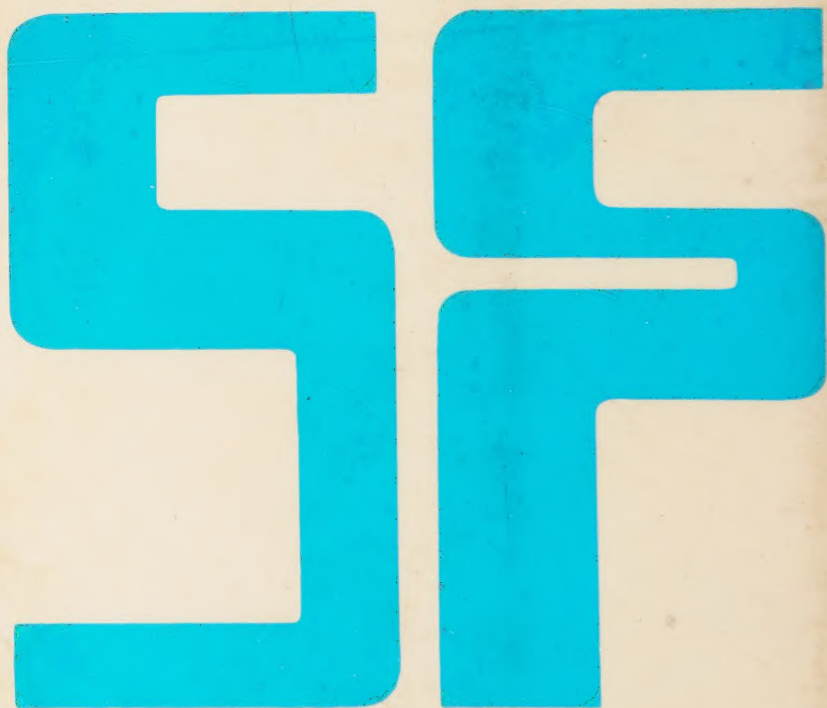
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