



PRELUDE TO SPACE

 ARTHUR C.
CLARKE

RTM

Arthur C. Clarke

Prelude to Space

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To my friends in the
British Interplanetary Society—
who, by sharing this dream, helped
to make it come true.

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Post-Apollo Preface

On July 20, 1969, all the countless science-fiction stories of the first landing on the Moon became frozen in time, like flies in amber. We can look back on them now with a new perspective, and indeed with a new interest—for we know how it was really done, and can judge the accuracy of the predictions.

Now—contrary to a general belief—prediction is *not* the main purpose of science-fiction writers; few, if any, have ever claimed “this is how it will be.” Most of them are concerned with the play of ideas, and the exploration of novel concepts in science and discovery. “What if...?” is the thought underlying all writing in this field. What if a man could become invisible? What if we could travel into the future? What if there is intelligent life elsewhere in the Universe? These are the initial grains around which the writer secretes his model pearl. No one is more surprised than he is, if it turns out that he has indeed forecast the pattern of future events.

Yet it must be admitted that the stories of space travel form an exception to this general rule. Although the earliest works, such as Cyrano de Bergerac’s *Voyages to the Moon and the Sun*, were pure fantasy, most of the tales written in the past hundred years were based as far as possible upon accurate science and foreseeable technology. Their writers did believe that they were predicting the future, at least in general terms. More than that, the pioneers of astronautics used fiction in a deliberate attempt to spread their ideas to the general public. Tsiolkovsky, Oberth, and von Braun all wrote space fiction at one time or another. In so doing, they were not merely predicting the future, they were creating it.

I must confess that I had similar propagandist ideas in mind when planning this book. It was written in July, 1947, during my summer vacation as a student at King’s College, London. The actual composition took exactly twenty days, a record I have never since approached. This speed was largely due to the fact that I had been making notes on the book for more than a year; it was already well organized in my head before I set pen to paper (“Pen” is correct; the original manuscript was handwritten in a series of school exercise books which were a relic of my Royal Air Force days).

In the twenty-two years between the writing of this book and the actual landing on the Moon, our world has changed almost beyond recognition. The following pages may serve as a useful reminder of the way in which the public attitude toward space travel has also been transformed, particularly in the United States. In 1947, it seemed quite reasonable to base an Interplanetary Project in London; as one of my English characters remarks, “You Americans have always been a bit conservative about space flight, and didn’t take it seriously until several years after us.” That statement was still true a decade after I had finished the book—when Sputnik I was launched in October, 1957. It is now very hard to realize that right in the late 1950s many American engineers *in the rocket field itself* pooh-poohed the idea of space flight. With a few notable exceptions, the banner of astronautics was borne by Europeans—former Europeans like Willy Ley, who, alas, died only a few days before Apollo 11 vindicated his dreams of more than forty years.

The modest amounts of money with which I assumed space research could be conducted

will now cause some rueful amusement. No one could have imagined, in 1947, that within twenty years not merely millions, but *billions*, of dollars would be budgeted annually for space flight and that a lunar landing would be a primary objective of the two most powerful nations on Earth. Back in the 1940s it seemed most unlikely that governments would put any money into space before private enterprise had shown the way.

I can claim a few successes as a minor prophet. I placed the first lunar impact in 1959, and Luna II hit the Mare Imbrium at 21:01 GMT on September 13, 1959. I was watching hopefully through my Questar telescope in Columbo as the Moon sank into the Indian Ocean but saw nothing.

Prelude to Space was written just two years after my 1945 paper on synchronous communications satellites and was, therefore, the first work of fiction in which the idea of “comsats” was advocated. I have reason to believe that it had some influence on the men who turned this dream into reality.

The book appeared originally as a paperback (Galaxy Novel No. 3, February 1951) and was thus my first novel to achieve independent publication. The first hard-cover edition appeared in June 1953 (Gnome Press), together with a paperback edition by Ballantine Books. Another publisher, now deservedly extinct, later issued two editions with a change of title, despite my express orders. (For the record, these titles, were *Master of Space* and *The Space Dreamers*.) I am now happy to see the return of the Ballantine imprint; the current hard-cover edition published by Harcourt Brace Jovanovich.

One prediction which gives me much pleasure is that contained in the sentence “Oberth—now an old man of eighty-four—had started the chain reaction which was to lead in his own lifetime to the crossing of space.” A reviewer who discussed Oberth’s proposals in a leading scientific journal of the 1930s once scoffingly conceded that they might be realized “before the human race became extinct.” I am happy to report that Herman Oberth, as a not-so-old man of seventy-five, watched Apollo 11 being launched from Cape Kennedy on July 16, 1969.

While writing this novel, I had the great advantage of access to calculations which my colleagues A.V. Cleaver and L.R. Shepherd (later manager of the Rolls-Royce Rocket Division and chief executive of the “Dragon” High Temperature Reactor Project) were making on the subject of nuclear rocket propulsion. These were published in their classic paper “The Atomic Rocket,” in the *Journal of the British Interplanetary Society* for September 1948–March 1949, which pioneered this field of studies.

Fifteen years later, atomic rockets of the type they proposed were successfully ground tested by the A.E.C., and although “Project Rover” was canceled before flights were achieved, some form of nuclear propulsion will be available when we are ready to go to Mars.

In this story I assumed the use of orbital rendezvous techniques, and particularly of reusable boosters which could be flown over and over again. My imagination failed to conceive of multi-million-dollar vehicles like the lunar module and the Saturn-V launchers which would be discarded after a single mission. But the future of space flight lies with such concepts as those described here; politics, and not economics, has shaped our present systems, and history will soon pass them by. The Space Shuttle will, hopefully, be the first *practical* space transportation vehicle of the 1980s; like my “Beta,” it will be winged and full

reusable, capable of making scores of flights.

My little jibe at the late Dr. C.S. Lewis subsequently resulted in an amicable correspondence and a meeting at Oxford's famed Eastgate pub, where Val Cleaver and I tried to demonstrate to Dr. Lewis (and his companion, Professor J.R.R. Tolkien) that all would-be astronauts were not like the malevolent Weston in *Out of the Silent Planet*. Lewis cheerfully compromised with the observation that though we were probably very wicked people, the world would be an awfully dull place if everyone was good.

Although I am well aware that propaganda is the enemy of art, I am still proud of the fact that this novel's main theme is the absurdity of exporting national rivalries beyond the atmosphere. In 1947, I summed up this concept in the phrase, "We will take no frontiers into space." Exactly twenty years later, the United Nations Space Treaty prohibited territorial claims on any celestial bodies.

That treaty was signed just in time. Only two years later, Neil Armstrong and Edwin Aldrin unveiled the plaque which reads:

Here men from the planet Earth first
set foot upon the Moon, July 1969.
We came in peace for all mankind.

Yet when, in 1947, I set this novel exactly thirty years in the future, I did not *really* believe that a lunar landing would be achieved even by that distant date; I was optimistically whistling in the dark—and perhaps trying to give myself a sixtieth birthday present. I would never have dared to imagine that by 1977 a dozen men would have walked on the Moon, and twenty-seven would have orbited it. Still less could I have imagined that the first nation to reach the Moon would so swiftly abandon it again....

In one sense, the Apollo Project was indeed a Prelude to Space. Now there will be a short interlude; and sometime in the 1980s, the real story will begin.

The hiatus does not disappoint me, for I have already seen achievements beyond my wildest dreams. I have shaken the hands of the first man to orbit the earth, the first man to step out into space, and the first to walk upon the Moon.

In the long perspectives of history, it will not matter that two of them were Russian and one was American.

Arthur C. Clark
September 1977

Part One

For five miles straight as an arrow, the gleaming metal track lay along the face of the desert. It pointed to the northwest across the dead heart of the continent and to the ocean beyond. Over the land, once the home of the aborigines, many strange shapes had risen, roaring, in the last generation. The greatest and strangest of them all lay at the head of the launching track along which it was to hurtle into the sky.

A little town had grown out of the desert in this valley between the low hills. It was a town built for one purpose—a purpose which was embodied in the fuel-storage tanks and the power station at the end of the five-mile-long track. Here had gathered scientists and engineers from all the countries of the world. And here the “Prometheus,” first of all spaceships, had been assembled in the past three years.

The Prometheus of legend had brought fire from heaven down to earth. The Prometheus of the twentieth century was to take atomic fire back into the home of the Gods, and to prove that Man, by his own exertions, had broken free at last from the chains that held him to his world for a million years.

No one seemed to know who had given the spaceship its name. It was, in actuality, not a single ship at all but really consisted of two separate machines. With notable lack of enterprise, the designers had christened the two components “Alpha” and “Beta.” Only the upper component, “Alpha,” was a pure rocket. “Beta,” to give it its full name, was a “hypersonic athodyd.” Most people usually called it an atomic ramjet, which was both simpler and more expressive.

It was a long way from the flying bombs of the Second World War to the two-hundred-ton “Beta,” skimming the top of the atmosphere at thousands of miles an hour. Yet both operated on the same principle—the use of forward speed to provide compression for the jet. The main difference lay in the fuel. V.1 had burned gasoline; “Beta” burned plutonium, and her range was virtually unlimited. As long as her air-scoops could collect and compress the tenuous gas of the upper atmosphere, the white-hot furnace of the atomic pile would blast it out of the jets. Only when at low altitudes the air was too thin for power or support need she inject into the pile the methane from her fuel tanks and thus become a pure rocket.

“Beta” could leave the atmosphere, but she could never escape completely from Earth. Her task was twofold. First, she had to carry up fuel tanks into the orbit round the Earth, and set them circling like tiny moons until they were needed. Not until this had been done would she lift “Alpha” into space. The smaller ship would then fuel up in free orbit from the waiting tanks, fire its motors, and break away from Earth, and make the journey to the Moon.

Circling patiently, “Beta” would wait until the spaceship returned. At the end of its half-million-mile journey “Alpha” would have barely enough fuel to maneuver into a parallel orbit. The crew and their equipment would then be transferred to the waiting “Beta,” which would still carry sufficient fuel to bring them safely back to Earth.

It was an elaborate plan, but even with atomic energy it was still the only practicable way of making the lunar round-trip with a rocket weighing not less than many thousands of tons. Moreover, it had many other advantages. “Alpha” and “Beta” could each be designed to carry out the

separate tasks with an efficiency which no single, all-purpose ship could hope to achieve. It was impossible to combine in one machine the ability to fly through Earth's atmosphere and to land on the airless Moon.

When the time came to make the next voyage, "Alpha" would still be circling the Earth, to be refuelled in space and used again. No later journey would ever be quite as difficult as the first. In time there would be more efficient motors, and later still, when the lunar colony had been founded, there would be refuelling stations on the Moon. After that it would be easy, and space flight would become a commercial proposition—though this would not happen for half a century or more.

Meanwhile the "Prometheus," alias "Alpha" and "Beta," still lay glistening beneath the Australian sun while the technicians worked over her. The last fittings were being installed and tested: the moment of her destiny was drawing nearer. In a few weeks, if all went well, she would carry the hopes and fears of humanity into the lonely deeps beyond the sky.

Dirk Alexson threw down his book and climbed up the short flight of stairs to the observation deck. It was still much too soon to see land, but the journey's approaching end had made him restless and unable to concentrate. He walked over to the narrow, curving windows set in the leading-edge of the great wing and stared down at the featureless ocean below.

There was absolutely nothing to be seen: from this height the Atlantic's mightiest storms would have been invisible. He gazed for a while at the blank grayness beneath and then moved across to the passengers' radar display.

The spinning line of light on the screen had begun to paint the first dim echoes at the limit of its range. Land lay ahead, ten miles below and two hundred miles away—the land that Dirk had never seen though it was sometimes more real to him than the country of his birth. From those hidden shores, over the last four centuries, his ancestors had set out for the New World in search of freedom or fortune. Now he was returning, crossing in less than three hours the wastes over which they had labored for as many weary weeks. And he was coming on a mission of which they, in their wildest imaginings, could never have dreamed.

The luminous image of Land's End had moved halfway across the radar screen before Dirk first glimpsed the advancing coastline, a dark stain almost lost in the horizon mists. Though he had sensed no change of direction, he knew that the liner must now be falling down the long slope that led to London Airport, four hundred miles away. In a few minutes he would hear again, faint but infinitely reassuring, the rumbling whisper of the great jets as the air thickened around him and brought their music once more to his ears.

Cromwall was a gray blur, sinking astern too swiftly for any details to be seen. For all that one could tell, King Mark might still be waiting above the cruel rocks for the ship that brought Iseult, while on the hills Merlin might yet be talking with the winds and thinking of his doom. From this height the land would have looked the same when the masons laid the last stone on Tintagel's walls.

Now the liner was dropping toward a cloudscape so white and dazzling that it hurt the eyes. At first it seemed broken only by a few slight undulations but, presently, as it rose toward him, Dirk realized that the mountains of cloud below were built on a Himalayan scale. A moment later, the peaks were above him and the machine was driving through a great pass flanked on either side by overhanging walls of snow. He flinched involuntarily as the white cliffs came racing toward him, then relaxed as the driving mist was all around and he could see no more.

The cloud layer must have been very thick, for he caught only the briefest glimpse of London and was taken almost unaware by the gentle shock of landing. Then the sounds of the outer world came rushing in upon his mind—the metallic voices of loud-speakers, the clanging of hatches, and above all these, the dying fall of the great turbines as they idled to rest.

The wet concrete, the waiting trucks, and the gray clouds lowering overhead dispelled the last impressions of romance or adventure. It was drizzling slightly, and as the ridiculous tiny tractor hauled the great ship away, her glistening sides made her seem a creature of the deep sea rather than of the open sky. Above the jet housings, little flurries of steam were

rising as the water drained down the wing.

Much to his relief, Dirk was met at the Customs barrier. As his name was checked off the passenger list, a stout, middle-aged man came forward with outstretched hand.

“Dr. Alexson? Pleased to meet you. My name’s Matthews. I’m taking you to Headquarters at Southbank and generally looking after you while you’re in London.”

“Glad to hear it,” smiled Dirk. “I suppose I can thank McAndrews for this?”

“That’s right. I’m his assistant in Public Relations. Here—let me have that bag. We’re going by the express tube; it’s the quickest way—and the best, since you get into the city without having to endure the suburbs. There’s one snag, though.”

“What’s that?”

Matthews sighed. “You’d be surprised at the number of visitors who cross the Atlantic safely, then disappear into the Underground and are never seen again.”

Matthews never even smiled as he imparted this unlikely news. As Dirk was to discover, his impish sense of humor seemed to go with a complete incapacity for laughter. It was a most disconcerting combination.

“There’s one thing I’m not at all clear about,” began Matthews as the long red train began to draw out of the airport station. “We get a lot of American scientists over to see us, but they don’t understand that science isn’t your line.”

“No, I’m an historian.”

Matthews’s eyebrows asked an almost audible question.

“I suppose it must be rather puzzling,” continued Dirk, “but it’s quite logical. In the past, when history was made, there was seldom anyone around to record it properly. Nowadays, of course, we have newspapers and films—but it’s surprising what important features get overlooked simply because everyone takes them for granted at the time. Well, the project you people are working on is one of the biggest in history, and if it comes off it will change the future as perhaps no other single event has ever done. So my University decided that there should be a professional historian around to fill in the gaps that might be overlooked.”

Matthews nodded.

“Yes, that’s reasonable enough. It will make a pleasant change for us non-scientific people too. We’re rather tired of conversations in which three words out of four are mathematical symbols. Still, I suppose you have a fairly good technical background?”

Dirk looked slightly uncomfortable.

“To tell the truth,” he confessed, “it’s almost fifteen years since I did any science—and I never took it very seriously then. I’ll have to learn what I need as I go along.”

“Don’t worry; we have a high-pressure course for tired businessmen and perplexed politicians which will give you everything you need. And you’ll be surprised to find how much you pick up, simply by listening to the Boffins holding forth.”

“Boffins?”

“Good lord, don’t you know *that* word? It goes back to the War, and means any long-haired scientific type with a slide-rule in his vest-pocket. I’d better warn you right away that we’ve

quite a private vocabulary here which you'll have to learn. There are so many new ideas and conceptions in our work that we've had to invent new words. You should have brought along a philologist as well!"

Dirk was silent. There were moments when the sheer immensity of his task almost overwhelmed him. Some time in the next six months the work of thousands of men over half a century would reach its culmination. It would be his duty, and his privilege, to be present while history was being made out there in the Australian desert on the other side of the world. He must look upon these events through the eyes of the future, and must record them so that in centuries to come other men could recapture the spirit of this age and time.

They emerged at New Waterloo station, and walked the few hundred yards to the Thames. Matthews had been right in saying that this was the best way to meet London for the first time. The spacious sweep of the fine new Embankment, still only twenty years old, carried Dirk's gaze down the river until it was caught and held by the dome of St. Paul's, glistening wetly in an unexpected shaft of sunlight. He followed the river upstream, past the great white buildings before Charing Cross, but the Houses of Parliament were invisible around the curve of the Thames.

"Quite a view, isn't it?" said Matthews presently. "We're rather proud of it now, but thirty years ago this part was a horrid mass of wharves and mud-banks. By the way—you see the ship over there?"

"You mean the one tied up against the other bank?"

"Yes, do you know what it is?"

"I've no idea."

"She's the *Discovery*, which took Captain Scott into the Antarctic back at the beginning of this century. I often look at her as I come to work and wonder what he'd have thought of this little trip we are planning."

Dirk stared intently at the graceful wooden hull, the slim masts and the battered smokestack. His mind slipped into the past in the easy way it had, and it seemed that the Embankment was gone and that the old ship was steaming past walls of ice into an unknown land. He could understand Matthew's feelings, and the sense of historical continuity was suddenly very strong. The line that stretched through Scott back to Drake and Raleigh and yet earlier voyages was still unbroken: only the scale of things had changed.

"Here we are," said Matthews in a tone of proud apology. "It's not as impressive as it might be, but we didn't have a lot of money when we built it. Not that we have now, for that matter."

The white, three-story building that faced the river was unpretentious and had obviously been constructed only a few years before. It was surrounded by large, open lawns scantily covered by dispirited grass. Dirk guessed that they had already been earmarked for future building operations. The grass seemed to have realized this too.

Nevertheless, as administrative buildings went, Headquarters was not unattractive, and the view over the river was certainly very fine. Along the second story ran a line of letters, clean-cut and severely practical as the rest of the buildings. They formed a single word, but the sight of it Dirk felt a curious tingling in his veins. It seemed out of place, somehow, he

in the heart of a great city where millions were concerned with the affairs of everyday life. was as out of place as the *Discovery*, lying against the far bank at the end of her long journeying—and it spoke of a longer voyage than she or any ship had ever made:

INTERPLANETARY

Two

The office was small, and he would have to share it with a couple of junior draftsmen—but overlooked the Thames and when he was tired of his reports and files Dirk could always rest his eyes on that great dome floating above Ludgate Hill. From time to time Matthews or his chief would drop in for a talk, but usually they left him alone, knowing that that was his desire. He was anxious to be left in peace until he had burrowed through the hundreds of reports and books which Matthews had obtained for him.

It was a far cry from Renaissance Italy to twentieth-century London, but the techniques he had acquired when writing his thesis on Lorenzo the Magnificent served Dirk in good stead now. He could tell, almost at a glance, what was unimportant and what must be studied carefully. In a few days the outlines of the story were complete and he could begin to fill in the details.

The dream was older than he had imagined. Two thousand years ago the Greeks had guessed that the Moon was a world not unlike the Earth, and in the second century A.D. the satirist Lucian had written the first of all interplanetary romances. It had taken more than seventeen centuries to bridge the gulf between fiction and reality—and almost all that progress had been made in the last fifty years.

The modern era had begun in 1923, when an obscure Transylvanian professor named Hermann Oberth had published a pamphlet entitled *The Rocket Into Interplanetary Space*. In this he developed for the first time the mathematics of space flight. Leafing through the pages of one of the few copies still in existence, Dirk found it hard to believe that so enormous a superstructure had arisen from so small a beginning. Oberth—now an old man of 84—had started the chain reaction which was to lead in his own lifetime to the crossing of space.

In the decade before the Second World War, Oberth's German disciples had perfected the liquid-fuelled rocket. At first they too had dreamed of the conquest of space, but that dream had been forgotten with the coming of Hitler. The city over which Dirk so often gazed still bore the scars from the time, thirty years ago, when the great rockets had come falling down from the stratosphere in a tumult of sundered air.

Less than a year later had come that dreary dawn in the New Mexico desert, when it seemed that the River of Time had halted for a moment, then plunged in foam and spray into a new channel toward a changed and unknown future. With Hiroshima had come the end of the war and the end of an age: the power and the machine had come together at last and the road to space lay clear ahead.

It had been a steep road, and it had taken thirty years to climb—thirty years of triumph and heartbreaking disappointments. As he grew to know the men around him, as he listened to their stories and their conversations, Dirk slowly filled in the personal details which the reports and summaries could never provide.

“The television picture wasn't too clear, but every few seconds it steadied and we got a good image. That was the biggest thrill of my life—being the first man to see the other side of the Moon. Going there will be a bit of an anti-climax.”

“—most terrific explosion you ever saw. When we got up, I heard Goering say: ‘If *that's* the best you can do, I'll tell the Fuehrer the whole thing's a waste of money.’ You should have

seen von Braun's face—”

“The KX 14's still up there: she completes one orbit every three hours, which was just what we'd intended. But the blasted radio transmitter failed at take-off, so we never got those instrument readings after all.”

“I was looking through the twelve-inch reflector when that load of magnesium powder hit the Moon, about fifty kilometers from Aristarchus. You can just see the crater it made, if you have a look around sunset.”

Sometimes Dirk envied these men. They had a purpose in life, even if it was one he could not fully understand. It must give them a feeling of power to send their great machines thousands of miles out into space. But power was dangerous, and often corrupting. Could they be trusted with the forces they were bringing into the world? Could the world itself be trusted with them?

Despite his intellectual background, Dirk was not altogether free from the fear of science that had been common ever since the great discoveries of the Victorian era. He felt not only isolated but sometimes a little nervous in his new surroundings. The few people he spoke to were invariably helpful and polite, but a certain shyness and his anxiety to master the background of his subject in the shortest time kept him away from all social entanglements. He liked the atmosphere of organization, which was almost aggressively democratic, and later on it would be easy enough to meet all the people he wished.

At the moment, Dirk's chief contacts with anyone outside the Public Relations Department were at mealtimes. Interplanetary's small canteen was patronized, in relays, by all the staff from the Director General downwards. It was run by a very enterprising committee with a fondness for experimenting, and although there were occasional culinary catastrophes, the food was usually very good. For all that Dirk could tell, Interplanetary's boast of the best cooking on South-bank might indeed be justified.

As Dirk's lunch-time, like Easter, was a movable feast, he usually met a fresh set of faces every day and soon grew to know most of the important members of the organization by sight. No one took any notice of him: the building was full of birds-of-passage from universities and industrial firms all over the world, and he was obviously regarded as just another visiting scientist.

His college, through the ramifications of the United States Embassy, had managed to find Dirk a small service flat a few hundred yards from Grosvenor Square. Every morning he walked to Bond Street Station and took the Tube to Waterloo. He quickly learned to avoid the early-morning rush, but he was seldom much later than many senior members of Interplanetary's staff. Eccentric hours were popular at Southbank: though Dirk sometimes remained in the building until midnight, there were always sounds of activity around him—usually from the research sections. Often, in order to clear his head and get a little exercise, he would go for a stroll along the deserted corridors, making mental notes of interesting departments which he might one day visit officially. He learned a great deal more about the place in this way than from the elaborate and much-amended organization charts which Matthews had lent him—and was always borrowing back again.

Frequently Dirk would come across half-opened doors revealing vistas of untidy labs and

machine-shops in which gloomy technicians sat gazing at equipment which was obviously refusing to behave. If the hour was very late, the scene would be softened by a mist of tobacco-smoke and invariably an electric kettle and a battered tea pot would occupy places of honor in the near foreground. Occasionally Dirk would arrive at some moment of technical triumph, and if he was not careful he was likely to be invited to share the ambiguous liquid which the engineers were continually brewing. In this way he became on nodding terms with a great many people, but he knew scarcely a dozen well enough to address them by name.

At the age of thirty-three, Dirk Alexson was still somewhat nervous of the everyday world around him. He was happier in the past and among his books, and though he had traveled fairly extensively in the United States, he had spent almost all his life in academic circles. His colleagues recognized him as a steady, sound worker with an almost intuitive flair for unraveling complicated situations. No one knew if he would make a great historian, but his study of the Medicis had been acknowledged as outstanding. His friends had never been able to understand how anyone of Dirk's somewhat placid disposition could so accurately have analyzed the motives and behavior of that flamboyant family.

Pure chance, it seemed, had brought him from Chicago to London, and he was still very much conscious of the fact. A few months ago the influence of Walter Pater had begun to wane: the little, crowded stage of Renaissance Italy was losing its charm—if so mild a word could be applied to that microcosm of intrigues and assassinations. It had not been his first change of interest, and he feared it would not be his last, for Dirk Alexson was still seeking work to which he could devote his life. In a moment of depression he had remarked to his Dean that probably only the future held a subject which would really appeal to him. This casual and half-serious complaint had coincided with a letter from the Rockefeller Foundation, and before he knew it Dirk had been on the way to London.

For the first few days he was haunted by the specter of his own incapacity, but he had learned now that this always happened when he started a new job and it had ceased to be more than a nuisance. After about a week he felt that he now had a fairly clear picture of the organization in which he had so unexpectedly found himself. His confidence began to return and he could relax a little.

Since undergraduate days he had kept a desultory journal—usually neglected save on occasional crises—and he now began once more to record his impressions and the everyday events of his life. These notes, written for his own satisfaction, would enable him to marshal his thoughts and might later serve as a basis for the official history he must one day produce.

“Today, May 3, 1978, I've been in London for exactly a week—and I've seen nothing of interest except the areas around Bond Street and Waterloo. When it's fine Matthews and I usually go for a stroll along the river after lunch. We go across the “New” bridge (which has only been built for about forty years!) and walk up or down river as the fancy takes us, crossing again at Charing Cross or Blackfriars. There are quite a number of variations, clockwise and counter-clockwise.

“Alfred Matthews is about forty, and I've found him very helpful. He has an extraordinary sense of humor, but I've never seen him smile—he's absolutely deadpan. He seems to know his job pretty well—a good deal better, I should say, than McAndrews, who is supposed to be his boss. Mac is about ten years older: like Alfred, he graduated through journalism in

public relations. He's a lean, hungry-looking person and usually speaks with a slight Scottish accent—which vanishes completely when he's excited. This should prove something, but I can't imagine what. He's not a bad fellow, but I don't think he's very bright. Alfred does all the work and there's not much love lost between them. It's sometimes a bit difficult keeping on good terms with them both.

“Next week I hope to start meeting people and going further afield. I particularly want to meet the crew—but I'm keeping out of the scientists' way until I know a bit more about atomic drives and interplanetary orbits. Alfred is going to teach me all about this next week—so he says. What I also hope to discover is how such an extraordinary hybrid as Interplanetary was ever formed in the first place. It seems a typically British compromise and there's very little on paper about its formation and origins. The whole institution is a mass of paradoxes. It exists in a state of chronic bankruptcy, yet it's responsible for spending something like ten millions a year (£, not \$). The Government has very little in its administration, and in some ways it seems as autocratic as the B.B.C. But when it's attacked in Parliament (which happens every other month) some Minister always gets up to defend it. Perhaps, after all, Mac's a better organizer than I imagine!

“I called it 'British,' but of course it isn't. About a fifth of the staff are American, and I've heard every conceivable accent in the canteen. It's as international as the United Nations secretariat, though the British certainly provide most of the driving force and the administrative staff. Why this should be, I don't know: perhaps Matthews can explain.

“Another query: apart from their accents, it's very difficult to see any real distinction between the different nationalities here. Is this due to the—to put it mildly—supranational nature of their work? And if I stay here long enough, I suppose I shall get deracinated too.”

Three

“I was wondering,” said McAndrews, “when you were going to ask that question. The answer’s rather complicated.”

“I’ll be very much surprised,” Dirk answered dryly, “if it’s quite as involved as the machinations of the Medici family.”

“Perhaps not; we’ve never used assassination yet, though we’ve often felt like it. Mr. Reynolds, will you take any calls while I talk with Dr. Alexson? Thank you.

“Well, as you know, the foundations of astronautics—the science of space travel—had been pretty well laid at the end of the Second World War. V. 2 and atomic energy had convinced most people that space could be crossed, if anyone wanted to do it. There were several societies, in England and the States, actively promulgating the idea that we should go to the Moon and the planets. They made steady but slow progress until the 1950s, when things really started to get moving.

“In 1959, as you may—er—just remember, the American Army’s guided missile ‘Orphan Annie’ hit the Moon with twenty-five pounds of flash-powder aboard. From that moment, the public began to realize that space travel wasn’t a thing of the distant future, but might come inside a generation. Astronomy began to replace atomic physics as the Number One science and the rocket societies’ membership lists started to lengthen steadily. But it was one thing to crash an unmanned projectile into the Moon—and quite another to land a full-sized spaceship there and bring it home again. Some pessimists thought the job might still take another hundred years.

“There were a lot of people in this country who didn’t intend to wait that long. They believed that the crossing of space was as essential for progress as the discovery of the New World had been four hundred years before. It would open up new frontiers and give the human race a goal so challenging that it would overshadow national differences and put the tribal conflicts of the early twentieth century in their true perspective. Energies that might have gone into wars would be fully employed in the colonization of the planets—which could certainly keep us busy for a good many centuries. That was the theory, at any rate.

McAndrews smiled a little.

“There were, of course, a good many other motives. You know what an unsettled period the early 50s was. The cynic’s argument for space flight was summed up in the famous remark: ‘Atomic power makes interplanetary travel not only possible but imperative.’ As long as it was confined to Earth, humanity had too many eggs in one rather fragile basket.

“All this was realized by an oddly assorted group of scientists, writers, astronomers, editors, and businessmen in the old Interplanetary Society. With very small capital, they started the publication *Spacewards*, which was inspired by the success of the American National Geographic Society’s magazine. What the N.G.S. had done for the Earth could, it was argued, now be done for the solar system. *Spacewards* was an attempt to make the public shareholders, as it were, in the conquest of space. It catered to the new interest in astronomy and those who subscribed to it felt that they were helping to finance the first space flight.

“The project wouldn’t have succeeded a few years earlier, but the time was now ripe for it.

In a few years there were about a quarter of a million subscribers all over the world, and in 1962 'Interplanetary' was founded to carry out full-time research into the problems of space flight. At first it couldn't offer the salaries of the great government-sponsored rocket establishments, but slowly it attracted the best scientists in the field. They preferred working on a constructive project, even at lower pay, to building missiles for transporting atomic bombs. In the early days, the organization was also helped by one or two financial windfalls. When the last British millionaire died in 1965, he bequeathed the Treasury of almost all his fortune by making it into a Trust Fund for our use.

"From the first, Interplanetary was a world-wide organization and it's largely an historic accident that its H.Q. is actually in London. It might very well have been in America, and a lot of our compatriots are still annoyed that it isn't. But for some reason, you Americans have always been a bit conservative about space flight, and didn't take it seriously until several years after us. Never mind: the Germans beat us both.

"Also, you must remember that the United States is much too small a country for astronomical research. Yes, I know that sounds odd—but if you look at a population map you'll see what I mean. There are only two places in the world that are really suitable for long-range rocket research. One's the Sahara desert, and even that is a little too near the great cities of Europe. The other is the West Australian desert, where the British Government started building its great rocket range in 1947. It's more than a thousand miles long, and there's another two thousand miles of ocean beyond it—giving a grand total of over three thousand miles. You won't find any place in the United States where you can safely fire a rocket even five hundred miles. So it's partly a geographical accident that things have turned out this way.

"Where was I? Oh yes, up to 1960 or so. It was about then that we began to get really important, for two reasons which aren't widely known. By that time a whole section of nuclear physics had come to a full stop. The scientists of the Atomic Development Authority thought they could start the hydrogen-helium reaction—and I don't mean the tritium reaction of the old H-bomb—but the crucial experiments had been very wisely banned. There's rather a lot of hydrogen in the sea! So the nuclear physicists were all sitting around chewing the fingernails until we could build them laboratories out in space. It wouldn't matter, then, if something went wrong. The solar system would merely acquire a second and rather temporary sun. ADA also wanted us to dump the dangerous fission products from the piles which were too radioactive to keep on Earth but which might be useful some day.

"The second reason wasn't so spectacular, but was perhaps even more immediately important. The great radio and telegraph companies *had* to get out into space—it was the only way they could broadcast television over the whole world and provide a universal communication service. As you know, the very short waves of radar and television won't bend around the Earth—they travel in practically straight lines, so that one station can send signals only as far as the horizon. Airborne relays had been built to get over this difficulty, but it was realized that the final solution would be reached only when repeater stations could be built thousands of miles above the Earth—artificial moons, probably traveling in twenty-four-hour orbits so that they'd appear stationary in the sky. No doubt you've read all about these ideas, so I won't go into them now.

“So by about 1970 we had the support of some of the world’s biggest technical organizations, with virtually unlimited funds. They *had* to come to us, since we had all the experts. In the early days, I’m afraid there was a certain amount of bickering and the Service Departments have never quite forgiven us for stealing back all their best scientists. But on the whole we get along well enough with ADA, Westinghouse, General Electric, Rolls-Royce, Lockheeds, de Havillands, and the rest of them. They’ve all got offices here, as you’ve probably noticed. Although they make us very substantial grants, the technical services they provide are really beyond price. Without their help, I don’t suppose we’d have reached this stage for another twenty years.”

There was a brief pause, and Dirk emerged from the torrent of words like a spaniel clambering out of a mountain stream. McAndrews talked much too quickly, obviously repeating phrases and whole paragraphs which he had been using for years. Dirk got the impression that almost everything he had said had probably come from other sources, and wasn’t original at all.

“I’d no idea,” he replied, “just how extensive your ramifications were.”

“Believe me, that’s nothing!” McAndrews exclaimed. “I don’t think there are many big industrial firms who haven’t been convinced that we can help them in some way. The cable companies will save hundreds of millions when they can replace their ground stations and land-lines by a few repeaters in space; the chemical industry will—”

“Oh, I’ll take your word for it! I was wondering where all the money came from, and now I see just how big a thing this is.”

“Don’t forget,” interjected Matthews, who had hitherto been sitting in resigned silence, “our most important contribution to industry.”

“What’s that?”

“The import of high-grade vacuums for filling electric-light bulbs and electronics tubes.”

“Ignoring Alfred’s usual facetiousness,” said Mc-Andrews severely, “it’s perfectly true that physics in general will make tremendous strides when we can build laboratories in space. And you can guess how the astronomers are looking forward to observatories which will never be bothered by clouds.”

“I know now,” said Dirk, ticking off the points on his fingers, “just *how* Interplanetary happened, and also what it hopes to do. But I still find it very hard to define exactly what it is.”

“Legally, it’s a non-profit-making (‘And how!’ interjected Matthews, *sotto voce*) organization devoted, as its charter says, ‘to research into the problems of space flight.’ It originally obtained its funds from *Spacewards*, but that hasn’t any official connection with us now that it’s linked up with *National Geographic*—though it has plenty of unofficial ones. Today most of our money comes from government grants and from industrial concerns. When interplanetary travel is fully established on a commercial basis, as aviation is today, we probably evolve into something different. There are a lot of political angles to the whole thing and no one can say just what will happen when the planets start to be colonized.”

McAndrews gave a little laugh, half apologetic and half defensive.

“There are a lot of pipe-dreams floating around this place, as you’ll probably discover. Some people have ideas of starting scientific Utopias on suitable worlds, and all that sort of thing. But the immediate aim is purely technical: we must find out what the planets are like before we decide how to use them.”

The office became quiet; for a moment no one seemed inclined to speak. For the first time Dirk realized the true importance of the goal toward which these men were working. He felt overwhelmed and more than a little frightened. Was humanity ready to be pitchforked off into space, ready to face the challenge of barren and inhospitable worlds never meant for Man? He could not be sure, and in the depths of his mind he felt profoundly disturbed.

Four

From the street, 53 Rochdale Avenue, S.W.5, appeared to be one of those neo-Georgian residences which the more successful stockbrokers of the early twentieth century had erected as shelters for their declining years. It was set well back from the road, with tastefully laid out but somewhat neglected lawns and flower beds. When the weather was fine, as occasionally was in the spring of 1978, five young men might sometimes be seen performing desultory gardening operations with inadequate tools. It was clear that they were doing this merely as a relaxation, and that their minds were very far away. Just how far, a casual passer-by could hardly have guessed.

It had been a very well kept secret, largely because the security organizers themselves were ex-newspapermen. As far as the world knew, the crew of the "Prometheus" had not yet been chosen, whereas in actuality its training had begun more than a year ago. It had continued with quiet efficiency, not five miles from Fleet Street, yet altogether free from the fierce limelight of public interest.

At any time, there were not likely to be more than a handful of men in the world who would be capable of piloting a spaceship. No other work had ever demanded such a unique combination of physical and mental characteristics. The perfect pilot had not only to be a first-class astronomer, an expert engineer and a specialist in electronics, but must be capable of operating efficiently both when he was "weightless" and when the rocket's acceleration made him weigh a quarter of a ton.

No single individual could meet these requirements, and many years ago it had been decided that the crew of a spaceship must consist of at least three men, any two of whom could take over the duties of a third in an emergency. Interplanetary was training five; two were reserves in case of last-minute illness. As yet, no one knew who the two reserves would be.

Few doubted that Victor Hassell would be the ship's captain. At twenty-eight, he was the only man in the world who had logged over a hundred hours in free fall. The record had been entirely accidental. Two years before, Hassell had taken an experimental rocket up into a low orbit and circled the world thirty times before he could repair a fault which had developed in the firing circuits, and so reduce his velocity enough to fall back to Earth. His nearest rival, Pierre Leduc, had a mere twenty hours of orbital flight to his credit.

The three remaining men were not professional pilots at all. Arnold Clinton, the Australian, was an electronic engineer and a specialist in computers and automatic controls. Astronomy was represented by the brilliant young American Lewis Taine, whose prolonged absence from Mount Palomar Observatory was now requiring elaborate explanations. The Atomic Energy Development Authority had contributed James Richards, expert on nuclear propulsion systems. Being a ripe old thirty-five, he was usually called "Grandpop" by his colleagues.

Life at the "Nursery," as it was always referred to by those sharing the secret, combined the characteristics of college, monastery and operational bomber station. It was colored by the personalities of the five "pupils," and by the visiting scientists who came in an endless stream to impart their knowledge or, sometimes, to get it back with interest. It was an intensely busy but a happy life, for it had a purpose and a goal.

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