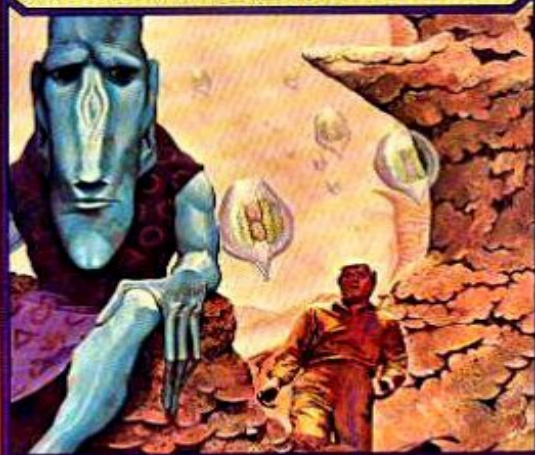


WINNER OF THE JAMES HUGO AWARD

# BLISH

## MISSION TO THE HEART STARS



THEIR JOURNEY TO THE CENTER OF THE GALAXY COULD MEAN  
INCREDIBLE ADVANCEMENT FOR EARTH—OR CATASTROPHE!  
WITH A NEW INTRODUCTION BY ELISABETH BLISH

# Mission to the Heart Stars

James Blish

## Foreword

You have probably often had the experience of encountering, apparently for the first time, a new word and then running into it three or four more times within just the next few days. Early in this book, for instance, you may make your first encounter with the word 'processing'; it means--movement of the axis of rotation. It's a very common word in astronomy and so, also, a part of the vocabulary of the space age. Hence you will run up against it again promptly. In fact, you've probably seen it often before, but your eye skipped over it because of its resemblance to 'processing'. Now you've become, so to speak, sensitized to it, and you marvel that it pops up so frequently in the first week that you've recognized its existence.

Writers will tell you that the same thing often happens in the realm of ideas. You may not have thought much about a subject before, nor have seen much written about it, either; but only sit down to plan a book about it, and references to it appear as explosively as popcorn. Three or four writers have described the process to me in the same words: 'It seems as if things just fall into my hands when I need them.'

I had a gratifying experience of this kind with this book. For several years, I have been wondering about the future of individual human freedom in a high-energy culture like ours. Regardless of the kind of

political or economic system under which you find it, the high-energy culture (a term for which I think I am solely responsible) is alike everywhere in certain important ways. The most obvious of these is that it tends to consume more and more energy as time goes on, and to expend more and more energy; aeroplanes go higher and faster and gulp more and more fuel, cities grow and demand more electricity, and, alas, the amount of destruction that can be released by one bomb increases without any visible limits.

One not quite so obvious result of this is that as the years go by, things also tend to happen faster and faster, and to require decisions more quickly. These trends in turn have two additional effects. First, they tend to concentrate the power to make a decision in the hands of fewer and fewer people, many of the people whose very names we do not know. Second, they shorten the time in which a decision can be made, so as to make it impossible for these few executives and technicians to consult the rest of us, even though we shall all be profoundly affected by whatever they do or don't do.

I didn't arrive at any solution for this very complicated problem, but it did seem to me that the chances of worrying out an answer might be improved if I could at least spread the worry around a little. A science-fiction novel looked like a good way--indeed, the traditional way--to raise the questions; and, I thought, it should be a novel for young people, who will be living with the problem even more intimately than my generation has had to do. Furthermore, in a novel nobody expects or even welcomes blanket answers. I could simply prowl around the margins of the problem, giving the reader a look at it from as many different angles as my ingenuity could manage.

I had written not quite half of the manuscript when there arrived in the post the Autumn, 1962, issue of *Technology and Culture*, the official journal of the Society for the History of Technology. This issue was devoted to a conference on 'the technological order' which had been

sponsored by the Encyclopaedia Britannica the preceding March in Santa Barbara, California. It was a 279-page gold mine of scholarly discussion of the very question I was writing about—including a paper by the eminent French philosopher, Jacques Ellul, which explored in detail a part of the problem that I had introduced into the novel just the preceding night!

And yet, in the words of my friends, it just fell into my hands. I was not a member of the Society for the History of Technology at the time, nor had I ordered the issue; it was sent to me out of the blue by Britannica Vice-President John S. Robling because, he said, 'I know you share with the editors of the 194-year-old Encyclopaedia Britannica an interest in the problems of our rapidly expanding technological age.' He was right about that, but I didn't know how he knew it, since I have never met Mr Robling. Then I found the name of L. Sprague de Camp, an old friend of mine and a science-fiction writer of stature, listed on the Society's advisory council.

As a story, this book is an independent novel, but readers who would like to know more about Jack Loftus, Sandbag Stevens, Dr Langer, Sylvia McCrary, and their odd friends, the—gels, will find them also in—book called *The Star Dwellers* (Faber & Faber, 1962). This tells the story of the Earth's first encounter with the Angels, and how a treaty was negotiated with them, in much greater detail than I could summarize it in *Mission to the Heart Stars*. It was another of science fiction's masters, Lester del Rey, who suggested to me after reading *The Star Dwellers* that the alliance between the Angels and the Earth might well be more powerful than my central galactic federation—a lovely idea, and one that could be wedded usefully to my then rather hazy plan to explore the future of freedom in a high-energy culture. I'm much indebted—as often before—to both of these romantically named colleagues.

Finally, I have found two comments in the scholarly quarterly that 'fell

into my hands' that seem to belong here -at least, they don't belong in the body-- the novel.

One of these is a complaint by Aldous Huxley, who asked the conference what a man of letters might do about the problem of technology confronting us. He added: 'The rational side of man, with its scientific and technological expressions, gets little literary space. It is curious that science and technology have always occupied so small a place in literature... This is all the more extraordinary when one considers that literature is supposed to hold the mirror up to life. In life, people spend a great deal of time involved in the technology of the period in which they live. They work, and their jobs are connected with technology and the organizations technology engenders. Yet one sees little evidence of this in literature.'

I find this an exceedingly depressing remark coming from an author who made one of his earliest successes--both critical and popular--with a science-fiction novel, *Brave New World*, devoted almost entirely to the future of the technological explosion, and who has written often about it since. Science fiction has always been pre-eminently the literature of the impact of science and technology, present and possible, upon the lives of those who have to work with it or upon whom, in many instances, it is inflicted. If, for reasons of literary quality or any other reasons which may have occurred to him, Mr Huxley chose to ignore the millions of words of magazine science fiction that have been published since 1926, that's entirely his affair; but he was, after all, an--countryman of H. G. Wells, who can't be said to have ignored the problem either, and who has had many distinguished successors.

I feel a little encourag--in my present pr--ct, even though it raises many more questions than it answers, by the second of the two comments. This turned out to be the very last words spoken at the Britannica conference. They are by Ralph W. Tyler, who said: 'We

wish to leave both a fruitful world and difficult problems for posterity to deal with, and in so doing achieve more nearly for them their human potential. If we solve the problems for our children, they will not grow.'

That, though I didn't know it before, is both my excuse for this book and for the inordinate length of this Foreword.

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## **ONE - Fear and Flight**

It was Jack Loftus's watch when the Ariadne grounded on Phobos, the innermost of the two moons of Mars.

The first thing he did was to lock the slim, wasp-waisted little cruiser firmly to the jagged rocky face of the satellite, for Phobos has no gravity worth mentioning; it is only five miles in diameter.

Besides, it is hollow. It was that oddity which enabled Jack to moor the Ariadne to it, for he knew that--ly two thousand feet below--e rock's surface, there was a sheet of atomically pure steel into which the Ariadne's field could set its invisible teeth. Ordinarily that magnetic field was used only in space, to secure the footing of anyone who might want to venture out on to the hull in a space suit to make repairs. But atomically pure steel is theoretically the most sensitive of all known substances to magnetism--theoretically, because no human being had yet succeeded in making more than a few needles of it. The inner lining of Phobos had been made by... someone else.

The next thing Jack should have done was to have called Dr Howard

Langer, the Ariadne's master. Dr Langer was not even asleep. As a matter of fact, he was playing a stiff game of double Klondike with his cadet understudy, Jerry 'Sandbag' Stevens, in the airlock, the only chamber aboard ship large enough to accommodate two men sitting facing each other across a lapboard.

But Jack did not call him yet. There was no particular hurry, and besides, Jack wanted to look at Mars.

Less than a year ago, Jack had been scores of light years away from his home sun, in the heart of the Greater Coal Sack nebula; but he had never touched down upon any of Sol's own family of planets except Earth itself. The expedition to the Coal Sack had been his first trip into space, and this mission to Phobos was his second.

Mars loomed before him, filling the whole field of view. Actually, of course, the planet was above him, but the Ariadne's skin was unbroken by portholes; vision outside, in any direction, was provided by a sextet of television screens, all at eye level. The vast landscape, only 3,700 miles away, moved majestically across the screen in what seemed to be the wrong direction, for Phobos moves so rapidly through the Martian skies that it rises in the west and sets in the east. Like most of the many moons with which the planets are provided, Phobos goes around Mars in the same direction as the red world rotates, but it goes a great deal faster. The day, on Mars, is twenty-four hours and thirty-seven minutes long, but Phobos has started on its third circuit of the planet by the time that day is over.

The landscape was complex and difficult to make sense of, even over this short a distance. It was summer in the equatorial latitudes over which Phobos was speeding, and the steady, dull ochre of the Martian deserts had given way to broad areas of deep blue-green, some of them almost as big as Australia but with much more diffuse boundaries. The colour was provided by the lichens--a wedding

between a fungus and a one-celled alga, the only vegetation which had been able to survive the long dying of a once verdant world.

Stitching together the blue-green pseudo-continents was the elaborate network of the 'canals', which were, alas, not canals at all. If they had turned out to be real, water-carrying canals, Jack would not have been on Phobos now, and, in fact, the whole history of the Earth might have been entirely different.

It had been the Italian astronomer, Schiaparelli, Jack remembered somewhat dimly, who had first seen these strange markings and had dubbed them canali, by which he meant 'channels'. The words, however, passed unchanged into English as canals, and the American astronomer, Percival Lowell, later decided that the markings must be the final titanic effort of a race of intelligent beings to provide water to a planet becoming increasingly arid. It was a poetic concept, but very few of Lowell's colleagues could be found to agree to it, in part because most of them simply could not see, through the telescope, more than a few of the hundreds of lines Lowell drew upon his maps of Mars. Some of his confreres were so rude as to suggest that Lowell couldn't see them, either.

When the age of space flight arrived a century ago, Lowell was partly vindicated. His maps of the network turned out to be nearly eighty per cent accurate; his must have been one of the sharpest pairs of eyes since Tycho Brahe's. But the reality behind the lines was far stranger than anything that Lowell or his few supporters had imagined... stranger -and far more tragic.

About this, Lowell had turned out to be both right and wrong at once. The lines were not canals. But they should have been.

There had indeed been a race of sentient Martians, and more than half a million years ago, they had foreseen -exactly as Lowell had



imagined--that their world,--ich was too small to hold on to the oxygen and the water that had been given it at its creation, was doomed unless something was done. What the Martians chose to do might have been called an act of insanity but for the many precedents for it in the history of Earth. They did not build canals. Instead, they used all the accumulated scientific knowledge of their ancient race, which had reached its peak of civilization long before human beings had learned the use of fire, to lay out, over the whole face of Mars, something which their surviving records referred to as 'the Diagram of Power'.

Though the archaeologists could not be entirely sure after the passage of so many millennia, the significance of the Diagram appeared to be religious, even magical. It was perhaps a little like a horoscope, but one intended to freeze the future rather than to predict it. The construction of the total Inscription took three Martian centuries--twelve hundred years in Earth time--and drained the last energies and resources of the dying race.

Afterwards, the oxygen and the water vapour continued to leak away from Mars into space, and in a very short time, as geological periods go, the planet was a desert; but by that time there were no Martians left to mourn it.

The verdict had to be: Suicide through superstition. But Earthmen were in no position to condemn it. They had only to look back at the Pyramids of Egypt to see its like.

Other eyes, however, had been watching the whole of the tragedy as it happened. Their owners did not hesitate to condemn; nor did they bother to help. Those eyes, hidden within the heart of Phobos, had recorded the drama without a hint of emotion, and, an almost unthinkable distance away, the brains behind the eyes had icily decided that the Martians should be allowed to die by their own

hands. It was not the first time--not by many h--reds--that those brains had come to a similar decision. Now they were thinking about the Earth...

'What are you thinking about?' a voice behind Jack said suddenly.

Jack started and swung around in the pilot's seat. The voice, of course, was that of Dr Langer, who stood in the entranceway to the control cabin, smiling a little wryly.

'I'm sorry, sir. I've never been this close to Mars before. I guess I was feeling a little overwhelmed.'

'Small wonder,' Dr Langer said. 'That wasteland down there is a monument to an immense and terrible history. The Earth has nothing to match it, and let's pray that it never will. Are you sure that that's all that was on your mind? I think this is the very first time I've ever caught you asleep at the switch.'

'No, sir,' Jack confessed. 'I was thinking about the--the arrogance of this interstellar federation or whatever it is, those people in the centre of the galaxy who hollowed out Phobos to spy --the Martians, and then let them die--thout so much as a sympathy card. All at once it made me mad. I still don't agree with what we're supposed to be up to here--doggone it, I think the whole idea is crazy--but I think I'm beginning to understand it better.'

'Go back three spaces,' Langer said gently. 'We don't know that Phobos never communicated with the Martians. I think the chances are very good that it did. Bear in mind that the observer asteroid that's watching us tried to talk to us as far back as 1935. We didn't recognize the signals then, and since then we've chosen not to--we've just been eavesdropping. The Martians may have made a very similar decision. After all, they must have known what Phobos was -

they had had space travel for many thousands of years before they began to lay out the Diagram of Power. Look at what they built on the back of our own Moon.'

'The Death Machine?'

'That's what we call it. B--remember, we don't k-- what it was actually for. We only gave it that name because it was so deadly to explore, but that's almost surely a--well, call it a side-effect. No, I think it's almost certain that the Martians knew that help was available, if they were willing to ask for it. But they didn't. They were committed to suicide, and once the Heart Stars saw that, they didn't try to intervene any further. After all, they had seen it all happen before, hundreds and hundreds of times.'

'We wouldn't have let it happen,' Jack said stubbornly.

'No,' Langer said, seating himself in the navigator's chair next to Jack, 'but we aren't a million years old, either. Our standards of compassion may be wrong, or at least may be inferior to some overriding moral standard of which we can have no conception. That's not something tha-- like to think about, but then, there are lots of things in the universe that I don't like very much. Nevertheless, I have to learn to live with them. The Martians didn't. Down there, you see -the results: a universal desert, covered with meaningless scribblings.'

Jack continued to stare at the slo-- processing, colourful map for a long moment--e said at last: 'Well, all right. But all the same, Dr Langer, I'm scared. I don't want to meet anybody who could pass judgment on a whole planet like that, no matter how much smarter they are than I am. But that's what we've got to do.'

'I'm scared, too,' Langer said surprisingly. 'I never thought that I would have to meet the problem of the Heart Stars in my lifetime. After al--

the Angels tell us that we have fifty thousand years of grace to go before these Galactics -or whatever they call themselves--pass judgment upon the Earth. But, there's no help for it. Suit up, Jack. We had better get on the job. I'm leaving Jerry in charge of the ship.'

Jack got up obediently, but Dr Langer, in an unprecedented moment of indecision, remained seated, staring at the vivid, glowing landscape of dead Mars. Then he shut the screen off and swung away from it. --'From now on we're going to have to watch our steps,' he said sombrely. 'Do you know the name of this little rockball we're on, Jack?'

'Sure.'

'No, I mean the real name. What does Phobos mean?'

'Why -I guess I don't know.'

'Deimos and Phobos were the names of the two horses that pulled the chariot of Mars, the god of War,' Dr Langer said. 'The names were the Greek words for flight and fear. This is Fear we're about to explore. I'm afraid it was well named.'

## **TWO - The Hollow Moon**

Jack could no longer say with any certainty just when this adventure might have begun. Sometimes it seemed to him that it ought to be dated back to that day in California when, while still a senior in high school, he had definitely decided to become a foreign service cadet, or at least to the day when he had been notified that he had passed the competitive examinations at Vallejo. Sometimes it seemed more sensible to date it to the day, a little over two years later, when he

had been apprenticed to Daniel Hart, the United States Secretary for Space, whom Dr Langer served as trouble-shooter.

But actually, their presence on Phobos was essentially an outcome of the discovery of the Angels--creatures of pure energy, rather like living ball-lightning--whose natural habitat was space, particularly those turbulent regions like the Orion nebula and the Coal Sacks where new stars were being formed. They were exquisitely beautiful, these shimmering, fiery creatures, highly intelligent and even playful. Yet they were awesome, too, considering th--the youngest were some four million years old, and the oldest possibly had participated in the First Cause which had given birth to the whole universe.

Dr Langer, Jack, and Sandbag had gone to the Greater Coal Sack nebula in the Ariadne, charged with the responsibility of negotiating a treaty with the Angels, a responsibility which, through a combination of danger, accident, and bad judgment, had devolved largely upon Jack. Somehow he had managed to bring it off. The treaty had been signed, and there were some hundreds of cadet Angels on the Earth at the moment, including a friend of Jack's whom he had named HESPERUS.

Most of them were helping to run hydrogen fusion reactors. They did this from inside, for the unthinkably furious nuclear processes by which the stars shine were as familiar and natural to them as breathing.

The Angels had long been aware of the federation of stable civilizations that occupied the centre of the galaxy and had been in contact with it. Essentially, however, they were indifferent to it, for to them even this million-year-old interstellar society was ephemeral compared to the Angels themselves. They also knew, of course, that the Heart Stars had given the Earth a hundred thousand years to prove itself stable enough as a society to be worthy of being invited

to join the galactic federation, and to them it probably seemed a reasonable test period. Nevertheless, they had been sufficiently impressed by the mature way in which the Earth-men had conducted themselves during the negotiations leading towards the treaty to recommend to the Heart Stars that the trial period be cut in half—a recommendation that would almost surely be accepted, since not even the accumulated might and wisdom of the Heart Stars could hope for an instant to survive the active displeasure of the Angels, who were masters of the energies of Creation itself.

It was at this point that politics entered the picture. It would never have occurred to the Angels that, to Man, fifty thousand years would still seem an intolerably long time. Yet it was, after all, more than five times as long as the whole of Man's recorded history. On the other hand, it was bound to occur to someone on Earth that the relationship between the Earth and the Heart Stars had, in fact, changed even more drastically: that, by virtue of its alliance with the Angels, the Earth might now be actually more powerful than the Heart Stars—or could be made to seem so.

Jack did not know exactly which high Earth official had come to this dangerous conclusion, though it was clear to him that it had to be someone in the United Nations Secretariat, perhaps the Secretary-General himself, unlike Secretary Nilssen though it sounded. He did know, because Secretary Hart had told him, that Hart had argued firmly against the notion. Hart had thought it not only foolhardy, but in violation of the spirit of the treaty with the Angels.

But Secretary Hart had been overruled. Once broached, the idea that it might be possible to gatecrash the smug, coldly aloof, apparently invulnerable galactic federation by a show of force proved to be irresistible to those in whose hands the decision rested, whoever they were. It seemed a grand opportunity to show the Heart Stars that, though the Earth was only an ordinary planet of a minor sun

swimming far out in a backwater of the galaxy and the people of Earth were barely out of the cradle from the point of view of galactic history, the Heart Stars could patronize the human race only at their peril.

The whole idea was a colossal piece of presumption loaded with unknowns, every one of which was a possibility for disaster. It was clear that its sponsors knew this, clear first of all from the great care that they had taken to preserve their anonymity and to conceal the whole course of action from the public, and even from the middle echelons of government. It became more abundantly clear from the set of instructions which had been given--through a reluctant, indeed a rebellious, Secretary Hart--to Dr Langer.

He had been told to determine, as quietly as possible, just how strong a combination of the Earth and the Angels might be against the Heart Stars, preferably without letting the Heart Stars suspect that any such question had even been raised. How he went about it was up to him, but there was the limiting proviso that he keep the budget well under two million dollars so as not to alert the General Assembly--let alone the public--that this might in time become a major project. The orders did not say this explicitly. It was, after all, the public's two million dollars. It was anticipated, the orders said instead, that Dr Langer would hold down staff expenses during this preliminary phase of the investigation by recourse to the cadet system.

This veiled directive explained the presence of Sandbag Stevens on Phobos. It did not quite explain Jack's; he was, after all, Secretary Hart's understudy, not Dr Langer's. But the fact that they were on Phobos at all was much easier to explain. They were about to explore the strength of the Heart Stars through the major instrument that that vast federation had made accessible to the solar system in which men lived: the observer satellite that it had built to monitor the

Martians and which still whirled intact around the dying planet's equator, no higher up from the surface than the distance between New York and San Francisco.

The inside of Phobos had often been explored before. The difference, this time, was that Dr Langer was authorized to break silence, if he judged that necessary, and let the Heart Stars know that Earth was looking back at them.

By the tangerine-coloured light of Mars, Jack followed Dr Langer over the surface of Phobos. There were no landmarks in this jumbled wilderness of rock, but Dr Langer seemed to know exactly where he was going—perhaps he was following some sort of radio beacon. One thing was certain, however. It would be very difficult to become lost on Phobos, for the total surface area was about the size of a California truck farm, and besides, if one kept on walking in a straight line, one could completely circumnavigate the little body in under three hours. To find the Ariadne not even this would be necessary, for, since Phobos always kept the same face turned towards Mars, there would be no need to bother stumbling around—the dark side of the moonlet. All the same, Phobos was a gloomy and disquieting place, and Jack would have been glad to be somewhere else... even back at Vallejo.

Dr Langer stopped and raised an arm, the Mars light running in glistening lines along the metal fabric of the space suit. When Jack had closed the gap between them, he found the troubleshooter peering down into a perfectly round hole, about eighteen feet in diameter, which seemed to have smooth-polished rock walls; the bottom of the shaft was not visible.

'Is this it?' Jack said, almost whispering without being aware of it.

'Yes. Not very impressive, is it? But try throwing a stone at it.'



'Do you mean it?' Jack said.

'Sure. Try it.' Langer's voice chuckled drily. 'Things are not always what they seem. Especially not here.'

Jack bent and picked up a sizable boulder--with no effort, for although the thing was almost half as big as he was, it weighed only a few ounces despite its mass--and shoved it away from him at the mouth of the shaft. It was a fair throw and the boulder sailed gently almost into the centre of the opening.

Then, with slow, absurd solemnity, it bounced--off nothing at all--and went sailing away towards the horizon. It was quite possible that Jack's shove had pushed it past Phobos's velocity of escape, in which case it would never come down--at least, not down on Phobos, though it might well strike Mars in a year or so.

'Oh,' Jack said, a little dazed. 'Then that hole's an airlock, after all. How do we get in?'

'We walk in,' Dr Langer said. 'Nobody knows exactly how they did it, but the field there is set to admit life-forms above a certain level of neural organization, even if they're enclosed in space suits or other non-living cans. I remember the films of the attempt to drop a Peking duck down that hole. It was in a spherical capsule, mostly transparent, so you could see it quacking wildly away even though you couldn't hear a thing. But the capsule wouldn't go through the field, and when we tried to have a man carry it down, the man went down, all right, but the duck capsule bobbed right back up again like a cork. On the other hand, the field passed a cat without any difficulty--except for the trouble we had getting it back.' He laughed very briefly. 'Well, here we go.'

Taking Jack's arm, Dr Langer led the rather reluctant cadet out on to

the invisible lens that guarded the airlock. Jack did not know exactly what he had expected--perhaps a completely smooth surface, like oiled glass or a field of ice -but in fact the lens, whatever it was, seemed to afford quite a good grip for his boots. As they approached the centre of the pit, however, the going began to become steadily more tacky, as though he were king in a puddle of increasingly thickening syrup. And at the very centre, Jack found it impossible to move his feet in any direction more than a few inches before the field seized them again and returned them to immobility.

At the same time, Jack noticed uneasily that the rim of the black orifice was slowly rising around them. It was a distinctly uncomfortable sensation, all too suggestive of being swallowed. Soon Dr Langer and Jack were sinking into the shaft faster and faster, much faster than --ld be accounted for by Phobos's feeble gravity, and the opening on the surface was only a dwindling orange disc, stippled with blue mould, far above their heads.

'How fast are we going?' Jack said.

'Only about ten feet per second as best I can judge. But bear in mind that I've never been here before, either. I have to judge by Mars light, just as you do.'

Since there was no other source of light and the walls of the shaft continued to be absolutely smooth, it shortly became impossible to judge just how fast they were falling, or rather, how fast they were being drawn down.

'It makes me feel like Alice, falling down the White Rabbit's hole,' Langer's voice said inside the darkness of Jack's helmet. 'I keep wanting to look at my watch.'

This incongruous comparison, obviously intended to keep Jack's

spirits up, actually did amuse him fo-- moment. But only a second later, he remembered that at the bottom of that hole in Alice in Wonderland, she had shed an ocean of tears.

Then a growing sensation of weight, again far beyond anything that could be accounted for by the gravity of Phobos, told him that they were decelerating. Almost at the same time, a dim glow began to suffuse upwards through the shaft. It was white light with a distinct greenish tinge to it, quite unlike the reflected desert sunlight of Mars, and yet quite unlike the artificial light that Jack was familiar with, to. The brighter it grew, the more unpleasant he found it.

He noticed also, with considerable surprise, that there was now a whisper of friction outside his suit. He glanced at the exterior pressure gauge inside his helmet. Sure enough--the pressure outside was already more than nine pounds per square inch and was still rising.

'Can we breathe down here, sir?'

'No, sir,' Langer said promptly. 'The atmosphere down here is more than ninety-nine per cent pure xenon. The rest of it is nitrogen, most of it in the free-radical state. It's an open question whether you would die faster of suffocation or of poisoning if you were to take a breath of it. We don't even dare work in here with respirators; the free radicals would attack the skin and even the fabric. Hello! Here we are.'

The soles of Jack's boots struck the bottom of the shaft with a barely perceptible jar. Dr Langer did not hesitate; he stepped out immediately into the subdued greenish-white light, beckoning Jack to follow.

The world into which the shaft opened was so strange as to be

almost completely unintelligible. For one thing, it had no floor. From the exit platform of the shaft, which was merely a brief spur of rock, the walls curved gently again on all sides to invisibility. It was a gigantic cavern, apparently encompassing the whole interior of the moon.

Though it was illuminated, there was no way to tell where the light came from, and the light itself behaved in curious ways. Here and there, it gathered in glowing patches, like clouds of fog, and glowing streamers of it crossed the bands of darkness which lay between one patch and another. At the centre of each patch, hanging immobile in mid-space, was a shining geometrical solid; there a cube, there a trapezoid, there a polyhedral shape whose name Jack couldn't remember, there another whose name he had never known; their sizes were impossible to judge, because in this confusing chiaroscuro he could not tell how far away they were from him or from each other. All of them, however, were stitched together by a complex web work of rigid, brilliant lines of light--some ruby-red, some --phire, some topaz--which were even more difficult to understand, because, although they could be plainly seen to be brighter than the drifting noctilucous clouds, they did not seem to contribute anything to the more general illumination. Some of them could also be seen to be pulsating rapidly, almost at the eye's limit of detection, but most of them looked quite steady.

'Don't let it buffalo you, Jack,' Dr Langer's radio voice said softly in his ears. 'Granted that it looks like nothing so much as an abstract painting, but actually it's not difficult to understand. Our technology ought to be up to duplicating it in about a century or perhaps even sooner. Though I can't say that the thought cheers me much.' 'I'm not exactly buffaloed,' Jack said, not entirely truthfully, 'but I am puzzled. What does it all mean?'

'Well, let's start with the light. The visible part of it is the least

important, but the reason why even that is so unpleasant to the eyes is because it's heavily ionizing, the idea being to keep the nitrogen fraction of the gas here in a constant state of electrical conductivity.'

It was strange to hear Dr Langer talking so calmly, indeed so academically, on the flickering verge of mystery. But there was no doubt that it helped. The troubleshooter spoke again.

'There are no wires or cables anywhere inside Phobos. All the power is passed along by laser beams, those very tight lines of light you see crisscrossing the clouds of ionized gas. On a smaller scale, there's no wiring in the various individual components, either. Each component is a single crystal, chemically almost completely pure, with a circuit laid out inside it partly by a pattern of trace impurities, and partly by screw dislocations and other mechanical flaws in its molecular structure. Sounds familiar, doesn't it?'

'Sure--transistor circuitry. Dr Langer, I never did --erstand solid-state physics, but haven't-- been doing that kind of thing since about 1975? You don't make the Heart Stars sound anything like a century ahead of us. They only sound like they're two or three years ahead of me, and that doesn't take much doing--not on this subject.'

'I guess them a century ahead of us because of the scale on which they've done it, Jack. Each one of those large blobs of metal that you see floating out there is a single crystal; the shapes tell you what kind of metal it is. Each one is atomically pure, except for the tiny impurities and dislocations which make it work. Compared to them, our transistor crystals are just seeds, while those there are the full-grown adults, and we can't grow them yet. As far as I know, we wouldn't even know how to begin.'

The huge, cubist spectacle began to make a little more sense. Nevertheless, it seemed to Jack that there was nothing that a human

being could do with it but look at it, exactly as though it really were a painting. After all, they were still stuck on this spur of rock.

'All the same, I don't see how anybody ever figured out what any part of this actually does. Where do we go from here, Dr Langer?'

'We have to get to the centre. There's a control room there. Luckily, it's simple to do, though quite a few lives were lost figuring it out. Follow me, Jack, follow me very exactly.'

Dr Langer's space-suited figure walked slowly out to the pointed tip of the rock spur. As he moved, a nimbus of the greenish-white fog gathered around him, until at the very tip of the spur he was enveloped in a fuzzy-edged ball of it. Without hesitation, he stepped off into the glowing ambiguity of the interior of Phobos.

The ball of light swept him away. It ducked and dodged so that Jack could not tell anything about its real path, but it was certainly moving rapidly.--thin less than a minute, it and its passenger were out of sight.

Trying without success to swallow his heart, Jack marched to the tip of the spur and stepped off after him.

There was no sensation of movement. Instead, the lines of colour, the puffballs of fog, and the geometrical solids whirled, --pped and revolved around him as though he were seated calmly at a three-dimensional movie, although one which made no sense. Nevertheless, he began to suspect that the course along which he was being taken followed strict laws. Though it never once touched any of the hair-thin laser lines or even fringed upon the blurs of light which glowed around the geometrical solids, its orbit was growing smaller and smaller. Clearly it was indeed approaching the centre of Phobos, rather like an orbiting magnetic field which tacks back into

the solar wind, no matter how often or how gravely deflected by the magnetic fields of the planets.

The field veered sharply, and the central 'sun' of Phobos came hurtling into view. It was a burnished golden ball, just as featureless as all the rest of the floating metal objects. As it swung towards him, however, he had the momentary impression that its surface was engraved with a myriad of very fine, complexly interwoven lines, almost like a map of the Diagram of Power below on unseen nearby Mars. Then there was an explosion of green-white light, and after Jack was no longer dazzled, he found himself standing next to Dr Langer in a humming, shifting room so meaningless that, at his very first glimpse of it, he began to feel dizzy and hypnotized.

'Close your eyes,' Dr Langer's voice said. 'And don't move. It will settle down in a minute.'

Jack closed his eyes again just in time, but the after-image remained on his retinas longer than he liked. If it could be trusted, that whole room was made of illuminated Jacob's Ladders, all in constant motion.

'Okay,' Dr Langer said. Jack opened his eyes reluctantly. The control room was indeed a mosaic of small squares of coloured light, but at least they weren't moving any more.

'Induction switches, colour coded,' Dr Langer explained. 'Touch one and nothing happens, but if you know the combinations, you can run the whole place.'

'Do you know them?'

'I know about ten. The experts on the station know maybe two hundred, out of several hundred thousand possibilities,' Dr Langer

said. 'Five of the ten I know are for shutting Phobos down entirely. At least we think they are, but I have no intention of trying them out. One, we believe, is an emergency escape route, though we don't know where it leads. Of the remaining four, one starts a galactic model or map--I'd call it a planetarium if the term weren't so ridiculously inadequate for a construction made to this scale -and that's what I want you to see now.'

The fingers of his right gauntlet moved in a zigzag pattern over the coloured squares of the wall nearest him. Instantly, the control room went black.

## **THREE - The Commitment**

At first Jack could see nothing, but gradually he became aware of a ghostly white glow floating before him, a ball of dim light about as big as he was, though size was again very difficult to estimate in the surrounding darkness.

Dr Langer's voice said calmly: 'I'm going to have to explain this, because it's not going to look like any picture of a galaxy that you ever saw. All those were long-exposure photographs, at the mercy of the brightest objects in their fields of view, whereas this is not a photograph but a map. And the mapping conventions involved are for convenience, not necessarily for realism. It won't look any more like a real galaxy than a terrestrial globe looks like the real Earth.'

'That ball is supposed to be our galaxy?' Jack said wonderingly. 'I thought it was supposed to be a flat spiral, like most of the rest.'

'Well, that's exactly what I meant. No possible photograph can show you that all the so-called spiral galaxies are actually spherical, but



they are. Another thing: this is an evolving demonstration, and it goes at its own pace, which I can't control. So you'd better just let me talk and save questions for afterward.'

'Okay.'

'The ball of light that you see shows only one class of elements of the galaxy. Each point of light in it represents a star cluster, a tight globular cluster of about a hundred thousand Population One stars, each cluster about three hundred light years in diameter. As you can see, these clusters are scattered very evenly throughout the galactic sphere, not concentrated in a central disc-- most Population Two stars are. You've probably seen photographs of the great cluster in Hercules. That's like the others, not in the so-called galactic plane but outside it, but it happens to be the nearest one to us. The whole ball is about a hundred thousand light years in diameter, which is about standard for a major galaxy; there are many smaller ones, but hardly any larger.'

As he finished, the misty sphere was slowly bisected by a thin black line. Jack could not resist exclaiming, 'And there's the galactic plane!'

'Yes, but actually it's the galactic equator; the plane doesn't show yet. In this case, it's not just a mapping convention but a real thing, as you'll see in a minute. Notice that there's beginning to be a glow in the centre of the sphere, and that it, too, is shaping up into a sphere, about a fifth as big as the one around it. What's happened is that the map has now added all the individual Population One stars in the galaxy, in addition to those that are gathered into clusters. There are so many of them and they're so close together--about a light year apart, on the average--that they comprise a supercluster of their own, about twenty thousand light years in diameter.'

Despite the fact that Dr Langer was obviously pacing himself to the development of the model, he fell silent for a moment and let the image continue to change for many precious seconds. At last he spoke sombrely.

Those are the Heart Stars.'

The sphere of the Heart Stars continued to brighten and seemed to become still larger. At the same time, it changed shape, from a sphere into a spindle whose blunt points crept outward along the galactic equator on both sides. Dr Langer added quickly, 'Now the map adds all the Population Two stars in the galaxy--the stars that were formed later, after most of the material of which the galaxy was made had already contracted into the central disc.' With the words, the spindle brightened into a tremendous lens, reaching from one side of the great sphere to the other along the equator. The equator itself, however, was no longer simply a line but a thick band of fuzzy darkness, like a streak of greasy smoke.

'As you can see, we still have plenty of dust left over to make more Population Two stars, and plenty of hydrogen, too, although the map doesn't bother to show it. Nor is it all concentrated around the rim of the disc; but I don't have to tell you that, because you were in the Greater Coal Sack nebula with me, and that's well inside the rim, near our own sun. Great rivers of it run inward towards the Heart Stars between the spiral arms. And now, here we go to visualize them.'

The globe of star clusters faded out, leaving nothing behind but the elongated lens with its ominous bar of blackness running around its rim. Slowly, the near edge of the lens began to move downwards, tilting the whole central disc steadily towards them. Now Jack could see that the rim of dust and debris did indeed run forward towards the Heart Stars at regular intervals, carving out dark spiral markings

upon the surface of the disc. It was a revelation to him.

In the photographs he had seen of spiral galaxies, he had always assumed that it was the stars that were distributed in spiral arms, separated by relatively empty space. But now it was perfectly clear that the distribution of the stars in the disc was more or less regular, and that it was rivers of dust and gas that created the dark areas which divided them. Those spiral stripings were the Creator's sign that He had not finished with this galaxy yet, and when all the remaining raw material was used up, the Milky Way would be only a featureless disc -- from above, an equally featureless ellipsoid seen edge on. There were already many such galaxies scattered through the visible universe.

When that unthinkably remote day came, Jack thought dazedly, the Milky Way would not be half so beautiful as it was now, in the full flower of its prime.

On the map, the globe of star clusters had completely vanished, and there remained facing him only the incredible whirlpool of stars which was his most familiar picture of a galaxy of this type. No man had ever seen one whole with the naked eye, and no man ever would. Conversely, no photograph--and Jack had seen scores of spectacular ones, most of them made with the 64-inch telescope of Richardson Observatory on the Moon--could ever convey the glories shown by this map which eliminated all irrelevancies, such as intervening stars, and showed you what was, not just what it was possible to see.

Some distance beyond the run, seemingly continuing the outermost of the spiral arms but not connected to it, were two hazy objects. One, the closest to the run, was only a shapeless blob of haze, less than half as big as the galactic core. The farther one, however, was quite as big as the core and, furthermore, it showed traces of

structure. It looked like a miniature of that class of galaxy known as the 'barred' spiral.

'Do galaxies have satellites, too?' Jack said.

'Most spirals do,' Dr Langer said. 'But they're cast off after eight or ten revolutions and become independent, which is why the so-called elliptical galaxies don't have them. Ours are unusually large, but otherwise quite typical. They're the Greater and Lesser Magellanic Clouds, which you can see with the naked eye from the southern hemisphere of Earth. The fact that you can see them from Earth tells you that our Sun is located almost immediately "under" them, in the adjacent spiral arm, well out from the centre of the galaxy. In just a moment the map will show you exactly where.'

There was a sharp piping sound inside Jack's helmet, and a point of red light appeared in the spiral arm immediately beside the Greater Cloud.

'The machinery here has picked up the frequency of our suit radios,' Dr Langer said, 'hence the sound. Something even more startling comes next.'

But the warning hardly prepared Jack for the reality. The map faded out and the room seemed to lighten; and then, came the voice.

'Good evening, Rangers,' it said pleasantly. 'This is Rogers, speaking for Captain Video.'

Jack's -- fell open. He listened incredulously for more, but apparently there was to be no more.

'For Pete's sake!' he burst out. 'Is that some kind of a joke?'

Dr Langer chuckled. 'No; that's the way it always opens. It shows you,

incidentally, how the machine learned an Earth language, and why the language is English. It analysed the speech of a television broadcast that was obviously about space travel. Evidently it assumed that the people speaking that language actually had space travel and so were the most advanced.'

'But... it was the Russians who were first. I'm sure of that.'

'Yes, but when that programme was popular--back when I was about six years old--nobody had space travel. It was fiction, a children's show. But it showed routine interstellar flight, and the machine here obviously took it to be fact at first. It knows better now, of course, but since no Earthman has ever answered it so far, it still preserves the opening as a form of address.'

'Can't it hear us now?' Jack objected.

'Surely, but we haven't notified it that we're addressing it. If you'll look to your left, you'll see that there's a single red panel glowing. To talk to the machine, we touch that Nobody ever has. You may do the honours, Jack.' Jack swallowed. 'Do you think it's safe?'

'It's what we were sent here to do. I haven't the faintest idea whether it's safe or not. Probably not. Go ahead.'

Tentatively Jack reached out for the panel. The red light vanished, and the voice spoke at once.

'You have boarded galactic observation station five, sun two thousand and thirty-six, arm two. The station is an automatic outpost of the Hegemony of Malis, a confederation of solar systems occupying most of the centre of this galaxy. The Hegemony knows that you are aware of these facts and of the fact that your system has been under observation since before your recorded history. It warns

you, as a courtesy, that any damage to this station will be followed by the prompt destruction of your Sun from one of an unspecified number of--her stations.'

'Well, you've already told us that there are at least five,' Langer said grimly. 'However, we intend no damage. We want to communicate directly with the Hegemony.'

'For what purpose?'

'We want to ask permission to visit its territory.'

'Probationers are forbidden to enter any space ruled by the Hegemony. If you survive probation, your system will automatically become a part of that space. There are no exceptions.'

'Do you know how long our probation period is?' Dr Langer de--ded.

'Fifty thousand years.'

'--n you are aware that it has been cut in half. Do you know why?'

'The Hegemony chose to honour the recommendation of the Star Dwellers--those proto-beings you call Angels.'

'Hence an exception has already been made,' Dr Langer pointed out. 'Unless you are programmed to actively disregard the possible consequences of an alliance between a probationer race and the Dwellers, your instructions do not cover such a situation and you are incapable of passing judgment on our request without relaying it to the Hegemony.'

'No such instructions exist,' the machine agreed promptly. 'The Hegemony will automatically be made aware of your request, as it is of everything observed by the stations.'

They seemed to Jack to have reached an impasse, but Langer had not quite fired his last round.

'Without instructions,' he said, 'you have no choice but to regard the situation as an unspecified emergency.'

'Very well,' the machine said to Jack's astonishment. There was a sudden, deep hum which Jack felt through the soles of his boots almost as strongly as he heard it from the earphones, and then--a long silence. He held his breath.

Then there was another voice. It was very faint and spoke in a language Jack did not know. Also, it was a good octave deeper than any voice he had ever heard before. He felt the hairs on the back of his neck stand up.

'Permission is granted,' the machine's voice said matter-of-factly. 'The station is instructed to prepare charts. For this, the specifications of your vessel are necessary.'

'They aren't available at the present time,' Dr Langer said. 'We'll supply them later. Can we call you by radio?'

'Yes. All frequencies are monitored. Simply ask for the station by number.'

'Okay,' Dr Langer said. 'Jack, let's get out of here.'

And once more Jack found himself swung through the colour-splashed caverns of Phobos.

Sandbag Stevens greeted them inside the Ariadne with obvious relief.

'I was beginning to think you were never going to come back out of that hole,' he said. 'I tri--listening in on the suit frequency, but of course I didn't pick up a thing.'

'Not with all that steel in the way,' Dr Langer agreed.

'Briefly, the situation is this: we proposed a trip to the Heart Stars and got nowhere until I played our trump card. Then we got permission without an instant's further argument. I don't know what that implies, but from my point of view it's the worst possible sign.'

Sandbag raised his blond eyebrows. 'Why, sir?'

'Because back home they'll take it to mean that the Hegemony of Malis, which is what the confederation calls itself, is afraid of the Angels. It'll make them doubly eager to try to use the Angels to push us into membership, and there must be a thousand ways in which that can turn sour.'

He sat down at the control board, drumming his fingers and staring out at the savage landscape of Phobos. 'We've got to make them understand that the forces arrayed against any such attempt are absolutely overwhelming--ust for a sampler, Jerry, the computer that runs the station down below warned us, in a completely routine way, that if we damaged anything, it would blow up the Sun.'

Sandbag whistled. 'Is that even possible, sir?'

'Suns blow up by themselves with fair regularity. At least we've always assumed that it was a natural occurrence. Now we'll have to assume that at least some novas occur because the Heart Stars do not like the colour of somebody's necktie. That alone tells you how utterly merciless these people must be--if the history of Mars hasn't told us that already.'



'Then we might not make the trip after all?' Jack said. Despite the obvious advantages of having nothing whatsoever to do with the Hegemony of Malis for the next 50,000 years, he felt vaguely disappointed.

'Oh, we're going, all right,' Dr Langer said, motioning the cadets to their takeoff posts. 'It would be just as dangerous not to go, at this point. We've committed ourselves.'

## **FOUR - The Argo**

It was apparent even to the cadets that the Ariadne, fleet and powerful though she uniquely was, would not be a suitable craft for a voyage of such unprecedented length. Dr Langer's personal cruiser was, to be sure, the fastest thing in space--or at least, the fastest ever built by human beings -but she had achieved that status by virtue of the fact that her Nernst generators were as large as any to be found aboard an interstellar liner and consequently took up more than half the space inside her.

They would still need the power and more, but an even more important consideration was stores. Oxygen was no problem. That would be converted from carbon dioxide, water, and artificial light by the ship's photosynthetic generator, a maze of glassware which worked exactly like a growing green plant, but much more efficiently, since it wasn't also asked to support growth, flowering, or any other of the many complex functions of living plants.

But food and water could not be generated, except for the sugars and starches which the photosynthetic process turned out as by-products. The human diet absolutely requires certain minimum amounts of high-quality animal protein whether synthetic or natural; a

source of the nearly forty vitamins which serve as catalysts in human metabolism; sufficient trace minerals such as cobalt and manganese to permit the construction of cellular enzymes; large amounts of calcium to maintain bone-structures; and similar amounts of phosphorus to make it available and to go into the making of adenosine triphosphate, that marvellous substance through which the cell brings about its energy transfers; and much more. There were no such things as 'food pills', and there were never likely to be any, either.

As for water, the irreducible minimum was a quart per person per day.

'It's the old, familiar, vicious cycle of lengthy space journeys,' Dr Langer was explaining to Secretary Hart shortly after the Ariadne's return to home base. 'The farther you go, the bigger the amount of stores you need; the bigger amount of stores, the bigger the ship; the bigger the ship, the more power you need; the more power you pack in, the smaller the available storage space--either that or you limit the power in favour of stores, which means a slower ship, a longer journey, more stores for the extra months... Anyhow, Dan, I've run off some curves from the course that the computer in Phobos gave us. We have to go about thirty thousand light years each way and allow time for visits, parleying, and, of course, emergencies. I don't want to consume more than two years all told--preferably much less.'

'Why not, sir?' Sandbag put in. 'Two years out of fifty thousand isn't much. It isn't even a very big bite out of a lifetime.'

'True enough,' Dr Langer said. 'But, Jerry, this is neither our first nor our last job. With all due respect, Dan, I've never seen the year when you didn't call on my services at least three times. If I'm going to be out of earshot for as much as two years, you ought to be thinking about training a successor. Remember, the President insists that

both Jerry and Jack go along, which leaves you without both my understudy and your own.'

Jack had not been able to repress a start at the mention of the President. Was he the one behind this highly ill-advised scheme? It seemed wholly unlike him. Secretary Hart, however, was able to read Jack's expression with the ease of long familiarity.

'Howard didn't mean the President of the United States,' he said. 'It's the current president of the Security Council who's been pressing for this policy.'

'M. Savarin?'

'Yes. Of course, he'll only be in office a month, but he's got backing; the notion won't die when he steps down. Howard, I'd be as happy as you to see this junket last a good deal less than two years. What's the minimum ship for that short a time-span? You were about to tell me, I believe.'

'Yes,' the troubleshooter said. 'I make it a vessel about the size of the old Telemachus, fitted out with engines to the Ariadne's design--plus all possible improvements, of course--but sufficiently larger to deliver about twenty per cent more power.'

Both cadets whistled. The Telemachus had been a liner with a capacity of two thousand passengers and crew; Dr Langer was now proposing to build such a ship to carry only three people. Secretary Hart did not whistle, but he got out his slide rule, and after a few quick manipulations managed suddenly to look as sad and worried as a bloodhound.

'About twenty-five million dollars if we can convert the Telemachus, which I doubt,' he said. 'If we have to start from the keel up, it might

run forty million. Well, that ought to make M. Savarin think twice.'

'I doubt it,' Dr Langer said. 'The need for haste is solely to the benefit of the United States; I don't see why the United Nations would mind if we took longer. If we insist upon a maximum mission time of two years, they'll ask us to put up most of the money, that's all--and I don't myself see how we'd get ourselves out of it. Of course, that's your field of competence, not mine.'

'Have you ever tried to bargain with a Frenchman over money?' the Secretary for Space said gloomily. 'And the UN is chronically short of cash, anyhow. You're right. If we want speed, it'll be up to us to pay for it. Hmm.'

Secretary Hart pulled reflectively at his nose.

'Look, Howard,' he said at last, 'engines that size will fill the cargo-hold of a ship like the Telemachus, as well as the formal engine-rooms.'

'True enough. I figured that we'd use the passenger quarters and wardrooms for storage, and we'd stick strictly to officer's country in the nose blister.'

'Yes, I think that would be practicable, providing, of course, that we don't have to build a whole new ship. But Howard, it seems to me that there's a question of efficiency here. We know from Jack's experience aboard the Ariadne that an Angel can run a Nernst generator --that size at about ninety per cent of its --oretical output. With a larger generator, they can do even better--whereas we've never been able to crank the machine much beyond forty-five per cent. Have you considered taking aboard a fourth crew member? Jack's friend, HESPERUS, perhaps?'

The idea made beautiful sense, Jack thought. Even if the size of the planned engines remained the same, they would put out so much more power that the ship could be made substantially smaller, which would, in turn, increase its speed still more and still further reduce the mass of supplies necessary. But Dr Langer was frowning.

'It would work,' he said. 'And I'd like to have an Angel on the trip for several other reasons, too. For example, they know much more about the territory we'll be entering than we do. And HESPERUS is a rather engaging character; I'm sure Jack would welcome his company as much as I.'

'I'm all for it,' Jack said eagerly. 'There might come a time when we'd need him to pop out to say "Boo!" to somebody, too. He'd make good insurance in tight spots.'

'That's exactly what I don't like about the idea,' Dr Langer said heavily. 'To get HESPERUS's co-operation, we'd need to explain the reason for the trip to him, which would mean that it would immediately become known to all the other Angels, including the ones now on Earth. I'm dead sure they'd object to our using the alliance between our two races for a naked power play of this sort. It's contrary to the whole spirit of the treaty, and Dan, that was precisely the argument you used against it before the Security Council in camera. If we let HESPERUS in on what we're doing, we might well be in the gravest of trouble before we even left home.'

'No doubt about that,' the Secretary said. 'Though that's the way it might well wind up anyhow. All right, Major, we'll do without HESPERUS--though it's going to reduce my budget to flinders. Can we re-commission the Telemachus?'

'I think we can. The McCrary Yards have made me some blueprints, a--they look reasonable. Besides, they built the liner originally.'

'Good,' Hart said. 'Let's just be sure we do the cost accounting, not McCrary; he's a slippery customer. What are you going to call this monster, may I ask?'

'For a voyage like this, there's only one possible name,' Dr Langer said. 'It's going to be an argosy. Let's call the ship the Argo.'

'Appropriate,' Secretary Hart agreed. 'Though if you come back with anything remotely like the Golden Fleece, I'll be very much surprised.'

'So,' Dr Langer said, 'will I.'

Because both Jack and Sandbag were good friends of Sylvia McCrary, the young reporter for Trans-Solar Press who was also Paul X. McCrary's daughter, they were to some extent able to follow the conversion of the Telemachus into the Argo in the McCrary Yards, as well as through the reports that flowed daily into Secretary Hart's Washington office. The immense hulk--only a year ago the pride of the run to the colonial planets of the star 40 Eridani, but now obsolete--was being rebuilt in graving docks just outside Dover, New Jersey, in what had been the US Army's Picatinny Arsenal until the world rule of the United Nations had abolished solely national armed forces. The vast holding corporation of which McCrary Engineering was only one of four wholly owned subsidiaries had been more than eager to buy Pica-tinny from the government, and it got a bargain. As for the government, it was delighted to get rid of the graving docks and every other possible collection of the space-travel hardware it had been carrying at enormous losses for decades. It would, of course, continue to regulate the spaceways, but it was delighted to let people like Paul X. McCrary try to make a profit out of them, something the gove--ent itself was forbidden to do.

Picatinny was an easy trip from Washington, and the cadets were able to make frequent visits, though all on their own time, to watch

the liner being turned from a gleaming, slightly over-stuffed flying palace into something almost as grimly functional as a twentieth century battleship. All the vessel's luxury appointments were scrapped, cabin partitions ripped out, lighting systems thinned, plumbing and ventilation abolished completely except in the control blister, the immense galley replaced by a kitchenette no bigger than a closet. In what had once been the main salon, murmuring with music and voices and lit in part by the icy points of stars shining through the astrodome, there was now only rank after rank of crates, their shoulders hunched against the sky. Here Sandbag paused to look about them with some disapproval.

'If it'd been up to me,' he said, 'this is where I'd have put the gunnery deck. Look at all this outside visibility going to waste!'

'I have an idea that any guns we could carry w--dn't be of much use where we're going,' Jack said. 'We might just as well carry fly-swatters.'

'You'r-- cheerful cuss!'

'I'm just going by what your boss tells me,' Jack protested. 'Anyhow, this is supposed to be a diplomatic mission. It seems to me that the last thing we want to do is pick a fight.'

'I know, I know. Let's go on up into the blister. The echoes in this place are awful since they ripped out the carpet.'

That, as it turned out, was their last inspection. As soon as the Telemachus had been stripped down as far as possible -the crates in the main salon had turned out to contain contractor's supplies rather than anything that was destined to go aboard the ship--tugs took it off the ground and put it into an orbit around the Earth about five hundred miles up. All the really heavy machinery, as well as the

supplies, would be installed up there piecemeal. This was partly for reasons of economy, but only partly: the truth was that Haertel overdrive engines of the size necessary to propel the fully loaded Argo could not be operated safely any closer to a large planetary mass.

And it was the Haertel faster-than-light drive, of course, which made interstellar travel possible at all. Until quite late in the preceding century, almost everyone believed flight between the stars (not the planets—that was already a going concern) to be for ever out of the question because of the vast distances involved. Distance can always be conquered by speed, but the prevailing relativity theory of that day had laid it down as natural law that nothing material could ever go as fast as light, which itself took many years to go from one star to another.

There had been another relativity theory under study, by a British astronomer named Milne, which taught that the speed-of-light limitation was only a mathematical convenience, not a natural law. But nobody could think of a way to test this notion, and besides, the accepted Einsteinian relativity was working so well that nobody really bothered to try. Then, in the mid-1960s, another Briton, a man named Dingle, found two subtle but enormous errors in Einstein's reasoning, thus shaking up the study of theoretical physics as thoroughly as Einstein himself once had.

Many great minds sought to close up those two holes, but it was not until 2011 that the great Haertel succeeded by showing that the Einstein theory of relativity was only a 'special case' of Milne's relativity, and Milne's, in turn, only a special case of Haertel's. It was Dr Langer's sober opinion that Haertel had been the greatest theoretic—physicist the world had ever known, and Jack, who utterly lacked the knowledge of highest mathematics necessary to come to his own decision, was happy to take Langer's word for it.



The faster-than-light drive was the practical outcome, one of many, of Haertel's pencil-and-paper achievement, brought into reality only nineteen years after Haertel's epoch-making paper had been published. Interstellar travel by the men of Earth had begun.

It was high time. Though only the highest councils of government knew about it, two of the robot outposts of the Heart Stars had already been discovered: Phobos first, obviously established --watch the extinct Martians; and then the brick-shaped, one-mile-long asteroid, Eros, whose occasional close approaches to the Earth made it an ideal instrument for the observation of mankind. The Heart Stars had in fact inadvertently done the Earth a favour, for the discovery that somebody else already had interstellar flight forced into the discard any theory that said such a thing was for ever impossible. In scientific research, Dr Langer often said, finding out that something can be done is half the battle; finding out just how to do it then becomes relatively easy.

What remained to be discovered about the attempt to penetrate the Heart Stars, however, was an even more fundamental question: whether or not it was worth doing at all. And as usual, there was no way to know the answer to that in advance.

## **FIVE - The Long Fall**

The removal of the proto-Argo to orbit naturally put an end to the side trips. Jack and Sandbag at once found themselves up to their eyebrows in technical briefings, mostly about the vast ship's construction and operation. The scene of the briefings, however, was shifted from the offices of the Department of Space in Washington to the United Nations Building in New York, because the briefing also

included a cram course in all that was known about the Hegemony of Malis, and on possible responses to every imaginable move the Hegemony might make during the trip.

Emerging late one summer afternoon from a particularly maddening session--all of the material about the Heart Stars was imparted in a locked room under the most involved 'security' precautions--they ran into Sylvia. This was no special surprise in itself, for despite the fact that she, too, was just eighteen, she was a full-fledged reporter for Trans-Solar Press, and the UN was her current beat. She was waiting for them by the Pool of the Dolphins, notebook in hand.

'Can't say a word,' Sandbag offered with a grin the instant that they were in earshot. 'Top secret. Fate of the universe and all that.'

'You've already said too much,' Sylvia said, only half jokingly. 'Things do leak now and then, Sandbag. And I've heard just enough about this mission to know that you may not be far wrong--even if you were kidding.'

Sandbag's expression went blank, but Sylvia only laughed. 'Don't worry,' she said. 'This one's not for me, and I know it. Last time I thought I was within my rights to dig out as much as I could manage. After all, my own father was mixed up in it pretty thoroughly. But this mission's out of my province entirely. My lips are sealed, as they say on the three-V.'

'How about mine?' a high, almost quacking voice said. It seemed to come from almost directly below where Sylvia was sitting on the edge of the pool.

Startled, Jack looked down, though he knew at once what he would see. Even after nearly a century of communication between man and dolphin, it was easy for most people to forget that the creatures were

as intelligent as man himself, though in vastly different ways. After all, the average man had so few contacts with them, and the dolphins in the pool, as playful as almost all of their species, enjoyed startling the unwary or the forgetful.

Sylvia, however, only laughed again. 'Why, Tursiops,' she said. 'Don't you know it's impolite to eavesdrop?'

'Not among us,' the dolphin said. Jack could not tell whether the eight-foot--ack torpedo was a personal friend of Sylvia's, though, of course, she must have had many opportunities to make friends --h the denizens of the pool. The name she had used was only the generic name of the bottle-nosed or shoals dolphin and one which these gregarious creatures had adopted as a tribal name. 'Besides, it was only a little one--an eavesdrip.'

'Those puns,' Sylvia said with mock severity, 'have got to go. All the same, if you didn't hear much, you can't babble much. That's a relief.'

For answer, Tursiops rolled swiftly over on one side and splashed Sylvia with a single scud of a fluke. Then he went bounding away in a series of out-of-the-water leaps, emitting from his blowhole a remarkable imitation of S--ia's own laughter.

'Do you know him well?' Jack said. 'Or is it a her?'

'I can't tell, but yes, I know them all. They're very kind and gentle, a lot nicer than most of the people I know, and a lot brighter, too. I hate to see them cooped up in this pool.'

'Why?' Sandbag said. 'They only stay until winter and then go free. In the meantime, they're protected and fed...'

'Protected!' Sylvia said. 'Did you ever get a good look at the teeth in those ever-smiling jaws? All one hundred of them and all sharp as

needles? They don't need to be afraid of anything that lives in the sea, not with those teeth--and those brains. I just wish they had the sense to be afraid of us, or at least a little impatient.'

'We don't hurt them any more,' Jack said slowly. 'We stopped hunting them the minute Doctor Lilly and the others proved they were intelligent. And didn't they agree that ten of them should live in the pool each year, to represent their race and all the other whales? We didn't force them into it, as I remember.'

'True.' The voice of the dolphin came this time from beneath Jack's perch. Their silence and swiftness were astounding.

'Then you don't mind it--not being free?' Sylvia said.

There was the briefest of pauses. Then Tursiops said, 'I am always free. But I can remember... greater happiness.'

For no reason that he could assign, this conversation haunted Jack for all the rest of the week. The next Monday, however, it was driven entirely out of his head--and small wonder.

'The Argo,' Secretary Hart announced, 'is ready to go.'

The very hugeness of the Argo--a ship now manned by three people but built originally for two thousand--made her a creature of silences. Her engines, despite their power, were nearly silent to begin with, and they were so far away from where Jack and Sandbag and Dr Langer lived and worked that not even a whisper of their song came through. The controls, of course, made no noise at all. As for the storage areas, Jack quickly developed a strong distaste for them, for they were so cavernous that every move one made in them produced a slight echo which was much more disquieting than dead silence would have been.

It was very much like being cast away in a deserted ocean liner, and after the first week both cadets stuck as close as possible to the control bubble--itself containing about twice as much space as the whole of the Ariadne--and pretended determinedly that the rest of the Argo didn't exist. The pretence was not very workabl--however. For one thing, Dr Langer frequently went on expeditions into the bowels of the vessel to tend this or that piece of personal apparatus. He had brought along, for example, eight complex cameras and enough darkroom stores and equipment to serve a university library, and he had also a studio-full of high-speed sound-recording equipment to which he devoted much care. Quite frequently, he required a cadet with him on these expeditions.

Then there was the matter of the galley. It would have suited Jack perfectly if Dr Langer had done all the cooking, f--he was an expert chef and could produce marvels even with ship's rations. Almost everything that Sandbag made, even omelettes, came out with the consistency and flavour of baked rubber, and Jack did not think his own cooking was much better. Dr Langer, however, would officiate for one week out of each three, and--sisted that the cadets chop-and-change with him, despite the fact that he obviously found the messes they ma--nearly as inedible as they did.

'This is going to be a long voyage,--e said. 'An ideal opportunity for both of you to learn to cook--a high art and a time-consuming one.'

'Sir, isn't the definition of an art that it's a form of communication?' Jack asked. 'If that's the case, I don't see how cooking qualifies.'

'I don't know anybody who can tell you precisely what music or architecture communicate,' Dr Langer said. 'But it's agreed that they are arts. I think a great deal depends upon the attitude of the practitioner. The average hamburger-burner can't be called an artist; but the author of Larousse Gastronomique, well... if that book isn't

about an art, then neither is Lessing's Laocoon.'

'Uh, I never heard of that,' Sand-- said. 'What's it about?'

'Sculpture, to start with. It's a study of th--hole subject of aesthetics, not an art work in itself, but a discussion of art works. Which is precisely what a great cookbook is.'

Privately, Jack still suspected that Dr Langer was riding a hobby, but he was the captain, so both cadets had to serve their weeks in the galley and in prowling through the echoing storage bins looking for the makings of menus.

In the meantime, the Argo hurtled inward towards the constellation of Sagittarius, the Archer, where the Heart Stars lay, heavily obscured by great dark areas and lanes of dust like the Coal Sacks in Cygnus where men and Angels had first met. As the Argo flew, aimed at the east-pointing part of the constellation which is often called the Milk Dipper, the stars of Sagittarius crawled away from each other, so slowly at first that only the spectroscope could show it, but the time would come when that movement would be visible to the naked eye. The Argo was already consuming nearly a light year an hour and even so was nowhere near up to cruising speed.

She had already passed that rather ill-defined boundary line--a pure fiction in space where everything is in motion all the time--which marked the outermost limits of human exploration in this direction--ut she still had a long way to go before reaching the marches of the Hegemony of Malis. The Heart Stars had, of course, explored this far out, and farther--for had they not penetrated the system of Sol itself?--but they had not settled it and did not consider it an integral part of their realm. 'That doesn't mean we wouldn't get shot at fast enough if we deviated from the course they've laid out,' Dr Langer said. 'This region of the galaxy isn't a part of the Hegemony, but they aren't

going to let any upstart make free with it, either.'

'Sort of like a protectorate?' Jack asked.

'Yes, or like mandated territory.'

'Are we really being watched that continuously?' Sandbag said. 'I thought a ship on the Standing Wave wasn't detectable.'

'We used to think that. No more.'

'You remember the Angels had no trouble following the Ariadne back to Earth,' Jack reminded the other cadet.

'Well, I do and I don't. I know that it happened, now that you remind me, but I was kind of out of my mind during the actual flight, so I don't remember it happening. Sir, is this just deduction? The Heart Stars may not have all the abilities the Angels have; in fact, this whole trip is based on the hope that they don't!'

'True enough,' Dr Langer agreed. 'But so far I've accumulated three pips on the scanner, which ought to be dead while we're on the Standing Wave. All three are the same shape and one I've never seen before. So I assume that it's a ranging impulse of some kind-- may be something we'll eventually call Haertel radar.'

'Hmm,' Jack said. 'If they can make the Standing Wave do anything but stand, they are too tough for us.'

'That's more than possible,' Dr Langer said, but he did not seem much ruffled by the idea, at least, not yet. --the end of the first month, one more of the strange pips traced its-- out on the scanner. Watching the tiny thermo pen form it on the scanner's heat-sensitive paper, the cadets could no longer doubt that the Heart Stars had some way of slamming an impulse into the supposedly closed,

independent un--rse of a ship on Haertel overdrive, and, presumably, g--ing it back out again, bearing precise information.

Now, however, they were approaching the first official touching point, where the prescribed course required that the Argo come off the Standing Wave and make a first direct contact with an outpost world of the Hegemony. Oddly, when the huge ship dropped back into normal space, where her 'real' speed was only a little more than half that of light, Dr Langer could find no solar system at all within any reasonable distance. The Doppler camera said that the nearest star, the cool red giant, Antares, was nearly three light years away, and furthermore it was in the wrong direction, back along the way they had come.

'If Antares has any planets left, it'll be a nasty shock to the cosmologists back home,' Dr Langer said slowly. 'I'm more inclined to think that my astrogation was out a percentage point somewhere.'

'There's something funny about these plates,' Sandbag complained. 'A lot of the spectral lines are doubled in the blue region. It's Antares' spectrum, all right, but something's skewed a part of it.'

Dr Langer's head came up sharply. If he had been a puppy, Jack thought, he would have cocked his ears and yelped. 'What? Let me see!'

Sandbag passed him the spectra; Dr Langer bent over them, a j--ller's loupe screwed into one eye. Then he began to feed the computer.

'What is it, sir?' Jack asked when the computer had responded with a long strip of tape.

'Companion star,' Dr Langer said with obvious relief. 'A seventh



magnitude job that goes in a very wide orbit around Antares. I'd quite forgotten about it. It's a beautiful emerald green, and right at this moment it's on a straight line between us and Antares itself. That accounts for the mixed spectra. That must be our stop. Anyhow, let's give them a call and see.'

The recognition signal went out, by phase-velocity transmission, a method of getting around Einstein which the discovery of the laser had made possible. It involved using a principle familiar to everyone who, watching a caterpillar, has noticed that the waves that go along the caterpillar's body go faster than the caterpillar himself does. Inside a wave-guide or in a tight laser beam, radiation could be made to behave in the same way: the resulting message travelled about 25 per cent faster than light, though the light itself plodded along at 186,000 miles per second, just as always.

The answer came back almost at once--within two days, which was shockingly fast over interstellar distances. Evidently it was being relayed to a nearby robot station from the vicinity of the green sun by some unknown means, and the station then translated it into a phase-velocity message and bounced it on to the Argo.

There was no vision transmission. Only a harsh, gargly voice in heavily accented English: 'Yu-o met-sage retseeved, Ar-go. Yu-ah sed-u-ahl its con-feermed. Pro-tseed ahs de-reck-tsed. Celery pie.'

'Celery pie, my foot,' Dr Langer said under his breath. 'Jerry, they've been studying your cooking! Hello, the Hegemony base? Do you have new co-ordinates for us? We don't seem to be anywhere near your system.'

'Yu-o ah ahn dze bound-ah-dzer-eetz ahv owoo my-ahn-feeyelt,' the gargly voice said. 'Close-ah ap-proatschtz its for-beedy-en. Tzis its a meeleo-tzaireo air-eeoo. Pro-tseed.'

'As directed.' Dr Langer replied. 'But we are getting rather low on water.'

'Dzat wazt ahn-teezupatted. Yu-o veal pie cheeven wah-tzer aht ohe nachst kon-stagt pooncht. End tzans-muttzon.'

There was a loud snap and the carrier wave went dead.

'Celery pie to you, too!' Dr Langer said. 'And also--owoo and och! But I guess the instructions are clear enough, despite that molasses-coated bogus Armenian accent. We go on and we get water at the next stop.'

'Goody,' Sandbag grinned. 'And in the meantime, I'll make a veal-and-cheese pie with trans-Galactic mutton -and close apporkchops on the side.'

'If you do,' Jack shot back, 'I'll serve up nothing but boiled laundry when it's my turn again.'

'No joke,' Dr Langer said. 'Take your posts. The course plan leaves us only an hour to get back into overdrive. Unless I misunderstood the instructions completely, we're actually to touch down on the next planet. And I certainly hope so. I don't see how we'll refill our water tanks otherwise.'

'What do you make of that outfit, s--' Jack said. 'They're not much interested in us, it seems to me.'

'No, not at all. I have an idea or two, but I'd rather sit on them for the time being. Let's get cracking. If we don't hit the next touch-down precisely, we'll have dry throats for a long time thereafter. Posts!'

Dry throats, however, did not turn out to be the problem. There was

indeed water where they were going--plenty of water.

In fact, over the whole surface of the planet, they could see nothing else.

Even a close approach, in orbit about the planet, did not modify this impression more than slightly. The world was Earth-like in size, atmosphere, and distance from its sun, which, in turn, was very like Sol, but it had no continents at all, nor did it have polar ice caps. The universal ocean which covered it was so heat-conservative that its climate was uniformly subtropical. Even the closest observation--not an easy matter, since about 80 per cent of the surface was always obscured by masses of clouds--disclosed no breaks in the rolling sea except for a number of what looked to be coral atolls. They were big ones by earthly standards, but not even the biggest could properly be dignified with the name of island. And anyhow, they were deserted and bare.

All the same, from the planet to the Argo poured a steady stream of information and directions, in machine-translated and hence readily understandable English. There was a civilization here, a civilization with an advanced technology, and one with access to the knowledge and resources of the Heart Stars. But where was it?

Obviously it was under water. Jack had immediately suspected a dominant creature something like Earth's dolphins but with flukes sufficiently modified to handle and make tools, and with a civilization centred, most probably, around underwater cities built inside the lagoons formed by the atolls. But the picture that gradually emerged contradicted his idea at almost every point.

There were whale-like mammals here, all right, but they were not the planet's rulers, were not, in fact, as far advanced as their parallels on Earth. The dominant creature was actually not even a vertebrate. It

was a mollusk or something very like one.

The closest resemblance to an earthly animal Jack could think of was the octopus, which has marvellously developed eyes rivalling those of any mammal and is capable in a crude way of learning from experience. There was nothing crude about the decapod squids of this planet, however. They were vastly intelligent in a quite inhuman way--garrulous, solemn, self-important, seemingly quite without humour or any sense of beauty.

'That's not an unknown combination of character traits among human beings,' Dr Langer said when Jack reported this impression, for it was to Jack th--the task of talking to the decapods had been assigned. 'But I agree that among humans it's never be--wide-spread. All the same it's common elsewhere. All hive cultures are like that.' This is a hive culture?' Sandbag said in astonishment 'How could such a thing evolve among free-swimming animals?'

'Bees are free-flying,' Dr Langer pointed out.

'Yes, but they go through the whatyoumaycallum insects go through--the metamorphosis. They're born as grubs that have to be protected.'

'Well, something like that is going on here,' Dr Langer said. 'What do you make of those big hydra-like things, like animated trees or giant sea anemones, that build the coral reefs?'

'Just what you just said,' Jack said promptly. 'They're hydroids; they belong to the coelenterates, not to the mollusks. They're as far away from the decapods on the evolutionary line as the decapods are from us.'

'Jerry, do you agree? No connection between the atoll creatures and the decapods?'

'I can't see any,' Sandbag said. 'These atolls sure aren't the squid cities we first guessed they were.'

'But they are,' Dr Langer said calmly. 'We were just using the wrong definition of a city.'

'There's nothing in them, sir,' Jack objected. 'Nothing in the lagoons but fish, and nothing on the reefs but the hydroids. The decapods have their machinery scattered all over the ocean floor; they ignore the reefs entirely.'

'True,' Dr Langer said. 'Because the reefs are hives, not centres of commerce or thought. A hive is a breeding machine. You see, gentlemen--to put a complicated matter as simply as it allows--we were guilty of thinking too rigidly in terms of what we know on Earth--here there's a long distance between the mollusk and the coelenterate. But evolution didn't follow the same course here as it did on Earth, and here there's no such firm distinction. Here the decapods and the hydras are both the same creature.'

'But, sir,' Jack said. 'The hydras are just vegetables! I don't mean that they're plants. But they're rooted to the spot; they don't do anything but catch fish; they don't even have a brain!'

'And they reproduce by budding,' Dr Langer added, 'all true enough. They are a little like the bee grubs Jerry mentioned. The life-cycle of these creatures is what we call "alternation of generation". The hydras reproduce with--sex, by budding. But they also produce sexual buds, male on one individual, female on another. Out of the fertilized egg comes a free-swimming form, the medusoid stage. This swims around for the "balance of its lifetime, then settles down, roots itself, turns into a hydroid--and starts a new colony, a new atoll. Thus far, what I've said would apply equally well to Earth's coral polyps... but here the medusoid stage is not a jellyfish but a squid--a

molluskoid, if you like. They do the thinking and the organizing. The hydroid forms are the breeders.'

'And the reefs are the hives,' Jack said. 'It fits, all right. But what about the central lagoons of the atolls? They can't have been formed by Darwin's system, because this planet never had any low volcanic islands to sink into the sea. Still, these atolls look as if they were built up on the run of a crater. How come?'

'That's the clue that got me started thinking about this in the first place,' Dr Langer said. 'Why the similarity of shape when the mechanism couldn't be the same? But the crucial difference turns out to be one of size. The reefs we --e here are very large and built on drowned plateaus-- what's essentially a rather shallow sea. They have plenty of room to expand, and they do. But coral isn't a strong structural material; it's just a loose network of glassy splinters that won't bear a lot of weight. As the atoll here spreads out, its centre gets crushed down by the weight of trapped water, silt, and additional coral, and there you have your lagoon.'

'Notice, by the way, that this process very much favoured the way evolution has gone here. The polyps are sessile -fixed to one spot-- so they can't hunt fish; the fish have to come to them, something that even fish would have better sense than to do. On the other hand, if the molluskoid forms had to herd fish for the benefit of their sessile parents, they'd have no time to develop a civilization, especially since herding fish is by no means so easy as herding sheep. The lagoon solves that problem: fish get trapped in there by storms, by tides, by sheer blundering, and in an emergency, schools of fish can be herded in there. Thus, the --roid stage of the creature can largely feed itself from the warehouse, so to speak, and the free-swimming form can prosecute other concerns. One of those concerns, I would gue-- is protecting the defenceless hydroids from being picked off by natural enemies--sharks or whatever the local equivalent is.'

'One thing still bothers me, sir,' Sandbag said. 'The whole set-up sounds to me like it would last for ever. The creatures don't have nations, they don't have wars. In a word, they've got it made. Why do they need to belong to the Hegemony? What good does it do them? I don't think any other planet would bother trying to conquer a thawed-out snowball like this.'

'No. Water-breathing races don't develop space flight in the first place, because they never see the sky,' Dr Langer agreed. 'So these people don't need military protection from possible predators. But, Jerry, highly stable cultures are just what the Heart Stars are interested in most of all. It's not only that they won't admit unstable cultures; they can't afford not to take in the stable ones for the sake of the overall stability of the Hegemony. I suspect that this planet joined the Heart Stars because it had to, not to protect itself from some single rival but in self-protection against the Hegemony itself.'

If you can't lick 'em, join 'em?'

That looks to me to be how it was. But it's time to lower the bucket. All --are supposed to care about here is the water. Jerry, I think it'd better be you who flies the gig down. It handles rather like a low-power Ariadne, and you've had more experience than Jack has with this kind of craft. Just make sure those water tanks are full before you come back, and if there's any sloshing, you'll be in trouble!'

'Can I go along?' Jack asked.

'What for? You'd better stay here and talk with the decapods in case Jerry runs into any hitches.'

'I don't have any good reason,' Jack admitted. 'But I was hoping for a look at the mammals--those whale-like creatures. I wish I knew better

just how intelligent they are.'

'Well, so do I,' Dr Langer said. 'But I don't see any real use for the knowledge, so I'm afraid we'll have to pass it by fo--he time being. Our course time leaves us no margin for snooping, and I suspect that wasn't an accident.'

'I guess I agree,' Jack said reluctantly. 'But, Sandbag, keep your eyes open, will you?'

## **SIX - From Erewhon to Nowhere**

When they were in flight again, Jack thought of something else that he had overlooked.

'Dr Langer, a while back you said you had an idea or two about our first contact--not the decapods but that outfit around the green star near Antares. Can you tell us what they were?'

'I don't see why not,' Dr Langer said. 'They're still on the formless side, though. It's just that I was disappointed by the utter indifference that outfit showed towards the Argo. I'd rather hoped for something a little more defensive -maybe even some outright hostility.'

'Why?' Jack and Sandbag said simultaneously.

'Well, we have to bear in mind that the attitudes--both political and technical--that were built into the Phobos station reflect what the Heart Stars were doing and thinking nearly a million years ago, when the satellite was first hollowed out. And the very first thing that it did



when we got in touch with it was to threaten us. I take that to mean that the Hegemony felt vulnerable somewhere; a really invincible culture would have been aloof. Then, you'll remember, we were put in touch with the modern Heart Stars, though we still don't know exactly to whom we were talking, and they were already on the defensive because the Angels had been mentioned. That again indicates that they sense some weakness in themselves, or so I guessed. I was hoping to find that weakness and make use of it--as ordered.

'But if such a weakness exists, the people on the--ompanion-of-Antares station have never heard of it, or their attitude towards us would have been something other than complete indifference. I suspect the safest course is to assume that it doesn't exist at all.'

'I don't see why you expected anything else, after eight hundred thousand years,' Sandbag said. 'Surely, sir, the attitudes of the modern Heart Stars have to have changed a lot, and their guns got bigger and bigger, too.'

'Inevitably,' Dr Langer said. 'Still, Jerry, the Hegemony is a highly stable society; indeed, its whole *raison d'etre* is its stability. I was hoping that it might turn out to be a--rt of vastly augmented Egyptian empire, in which the rate of technological innovation would be extremely slow--in fact almost non-existent--compared to the rate of innovation we're used to on Earth. However, so far all the evidence is negative, and there isn't even very much of that. We're just going to have to go on as before and hope for some positive clues.'

'Any guesses about our next touchdown?' Jack said.

'No. Except that it'll be earth-like and inhabited by a--ghly civilized race.'

"With --ind of civilization we'd find impossible to corrupt even if we

wanted to,' Jack added thoughtfully. Langer shot him a surprised look, but after a moment the surprise dissolved into a grin.

'Elementary, my dear Watson,' he said.

When they found that the inhabitants of their second stopover planet had no name for the place--or rather, had long forgotten it--Jack wanted to name the world 'Kybernetes' in dubious honour of its many machines. Sandbag promptly astonished his companions with a flashback to his compulsory classical language courses, which neither Jack nor Dr Langer would have dreamed he had retained, even in this age of intensive secondary education. 'No, let's call it "Palinurus". "Ky--netes" is Greek for "helmsman", and "cybernetics" is the science of guiding machines. But Palinurus was Aeneas's helmsman who was washed overboard on the way to Italy. And that sure is what's happened on that planet!'

'A singularly appropriate choice,' Dr Langer said. 'I was going to call the place "Erewhon", but your name is much better, Jerry.'

Now it was Sandbag's turn to look puzzled, and Jack was sure that his own expression was equally blank.

'Why "Erewhon"?' Jack said finally. 'I suppose it would help if I had read the Butler book.'

'So it would,' Dr Langer said with a wry grin. 'Tell you later.'

From the moment that the Argo had come off the Standing Wave, there had been no question but that Palinurus was inhabited. Even from two million miles away, it glittered of mac--ery as their preceding stop -- gleamed of water. Again they were provided with ample instructions in excellent computer-translated English; and this time, since there was a large landing area which appeared to

present very few problems, Jack was allowed to take the gig down to pick up the necessary supplies.

At first, Palinurus seemed to him to be remarkably earth-like, with a few differences, to be sure, but these much smaller than the many similarities. The people were small primates, reminding Jack irresistibly of picture-book illustrations of gnomes; and the landscape was completely industrialized, reminding Jack of the steadily expanding city limits of Gary, Indiana, which, since his boyhood, had been threatening-- swallow up the whole of several --tes. Here apparently they had swallowed a planet. Otherwise, Palinurus seemed to present him with nothing in the least unexpected.

But in the course of directing the loading of the gig, he gradually became aware of something very singular and strange. Though the gnarly, knobby people were co-operative and even cautiously friendly, they all seemed dazed and without any real comprehension of what it was they were doing, even where the task was relatively small. All of Jack's instructions had to be given to the computers that ran the spaceport on which the gig was set down, and every significant response that he got to anything he asked also came from the machines. The people merely scurried, toted, and scurried again.

Thoroughly puzzled, Jack sought an opportunity to look about the spaceport in hopes of seeing what these people did when they were not waiting upon him. In so far as he could tell, the answer appeared to be: polishing metal. Since everything that he saw being polished was stainless steel, there was no obvious reason for even this activity.

Along with the supplies, he took this report back to Dr Langer, who said slowly, 'So that's it. I had been wondering. While you were down there, I was monitoring the radio transmissions on this world, and I was unable to pick up anything but coded reports from one machine

to another -not a sound of one living being talking to another, except for a single channel that seems to be devoted to an almost brainless kind of entertainment, worse than twentieth century commercial television. It fits in quite neatly with what you tell me. Evidently on this world the machines are in charge.'

'A revolt of the robots?' Sandbag said. 'I thought it had been proven that that couldn't happen.'

'And so it can't, but there are greater and more subtle dangers in a machine civilization, Jerry. One thing that can happen--and it's obviously happened here--is that people may become so dependent upon the ultra-high speed of computer thinking as to trust every decision that a computer makes, no matter how vitally it affects the life of the people who are supposed to be the machine's bosses. If, for instance, you trust machines to help you carry on a foreign policy, the machines, which have no sense of values, may very well come up with "solutions" which, on the machines' terms, are technically victories, yet they will fail to preserve a single one of the non-material values you wanted your foreign policy to protect. The danger is always inherent in the theory of games, of which a computer is only a physical embodiment. It's all very well to maximize your gains and minimize your losses, but there are some things you can't weigh by addition and subtraction--things like freedom, privacy, equality before the law, and what I will have to call, rather vaguely, the unique: a moment of understanding, a work of art, a human life. It's one hundred per cent impossible to teach machines this, and those who would be the masters of machines have to keep that fact in mind, or go under--as they obviously have down below.'

It was then that the question of giving a private name to the unhappy, totally mechanized world had come up. It had been interrupted by the necessity to put the Argo back on the Standing Wave on time and on course, but as soon as that was accomplished, it resumed promptly.

'Why did you want to call it "Erewhon", sir?' Jack said.

'Because precisely the same situation obtained on Butler's reverse Utopia. He proposed then that the time might come when the machines would be so important in the life of man that he would be reduced simply to crawling over them and tickling them a little bit, like plant lice crawling over a leaf. A lot of people scoffed at the notion, but actually the human--ce escaped that outcome by the na--west of margins. On Palinurus, it has come to pass very much as he foresaw it. But there's lots more to Butler's book than just this idea, which is why I said that Jerry's name for the world struck me as a better idea than mine.'

'I think I can see why Palinurus belongs to the Hegemony, too,' Sandbag said. 'Like the water world, it's a stable society, so the Heart Stars have to have it. And, of course, the Heart Stars give it protection.'

'I think both those reasons apply,' Dr Langer said slowly. 'But I have had a dreadful additional thought about which I can only hope that I'm totally wrong. Those machines, we know, are not running Palinurus for the benefit of its live people; what they do and what they produce has very little relationship any more to what the people need. This makes it a very nice--operty for a larger political entity. If the Heart Stars suddenly need two million cases of plastic doughnuts, Palinurus can fill the order--and never mind whether the people of Palinurus can eat plastic doughnuts or not. Judging by what Jack saw, the people could be dispensed with entirely. And the Hegemony is ruthles--nough to do exactly that.'

After a long moment, Jack said: 'I'm not so sure Palinurus is a good name, after all. How did Aeneas ever get to Italy without a helmsman? It looks to me as though, if you lose your helmsman, you

are lost with all hands.'

'Not quite,' Dr Langer said. 'Somebody may take you in tow. But, of course, you may not want to go where he's going.'

Within the humming, echoing cave of the Argo, it was becoming more and more difficult to believe that any other world existed, particularly during the long weeks while the great hull was riding the Standing Wave, a universe in itself. But regularly there came through that closed universe the undeniable, uniformly shaped pips of the Hegemony's detection beams, reminding the Argo's crew that though they could see nothing of the galaxy while they were in transit, the Heart Stars were watching them constantly.

Then the Argo burst once again out of its self-made, invisible cocoon, and beneath it rolled a world of green hills and cloud-dappled blue skies so like the Earth that Jack felt an acute pang of homesickness. Surely this planet, so calm, so pastoral, so domesticated, could not present any unpleasant surprises. That just wouldn't be fair.

But it did. Earth-like the planet was, geophysically, but its people had never heard of the Earth and had no intention of living like Earthmen. The life that they lived in the gigantic stone temples they had built upon pylons in the middle of the sea was centred in music, which in turn was based upon the ceaseless rolling of the broad combers of the waves. They vaguely understood that the gig was something like the small, high-pooped, lateen-sailed carracks with their dragon's-head forecastles-- which they cruised their ocean, but they looked with horror out of their frog-like eyes upon the star travellers, and were obviously happy to be rid of them. They did not fit anywhere into the completely ritualized life of this culture, where even the smallest act or gesture was ceremonial as well as functional and had its appropriate five-note melody. The last thing Jack and Sandbag

heard as they quitted that world was a cacophonous skirling of pipes and horns, at once both mournful and aggressive, as though the people were hoping to blow them off the face of the planet.

Yet the world from which these constant chants and pipings arose was immensely wealthy, and immensely powerful. It was the first Heart Star planet that they had seen that was impressive enough, despite its peculiarities, to seem to merit full membership in a union as all-embracing as the Hegemony of Malis.

'All the same,' Sandbag said, 'if I ever get to be Earth's ambassador to that crew, the first thing I'm going to do is turn off my hearing aid.'

Far behind them, quite another sort of argument was going on, though no human being could have recognized it as an argument, let alone understood what it was all about. Even the stage on which it was taking place would have been strange to all but a few Earthly eyes. It lay inside that vast dust cloud called the Greater Coal Sack, near the constellation of Cygnus or the Northern Cross, visible to the naked eye from Earth only as a 'hole' in the Milky Way. It is, in fact, not enormously far from Earth as interstellar distances go, for it lies in the real vicinity of 61 Cygni, a star so close that it was the first to have its distance measured by the parallax method, and the first sun other than our own to be discovered to have planets.

But the actors in the drama were not planet-bound. Their country, their home, their nest--no word in human experience quite covered what it actually was--was nothing less than the whole of the nebula itself. Inside the curtaining storms that bordered the nebula was a cluster of new-born stars, almost all of them of type B; Earth's sun was a thousand times older than they. Their formation had swept that heart of the nebula free of gas and dust, creating there a hidden universe in miniature. Some of these stars had planets, but they were even younger than their primaries: cold, lifeless aggregations of

rubble, awaiting the passage of millions of years for gravitation pressure and radioactivity to heat them up enough to begin their unpredictable histories.

Here, in their thousands, the Angels orbited and danced, creatures older than the planets, older than the suns, many of them as old as the universe itself. Every now and then they had young, born by the same process that had given birth to the suns, but they died only of the rarest and most improbable accidents.

To the human eye, an Angel is a glowing ball of light four to seven feet in diameter, ranging in colour from yellow to deep red, with a rapidly changing, complex internal structure. What the Angels actually were still could not be said exactly. The best speculation was that they were stable, self-contained electromagnetic fields, rather like ball lightning, but this description did not satisfy anyone, since nobody understood ball lightning, either.

Besides, 'stable' was the wrong adjective, for the Angels were more than stable. They were multi-stable--that is, alive. They were the oldest intelligent life in the universe.

They were arguing now--partly by an exchange of radio messages on hundreds of different channels at once; partly by delicate variations in their visible light; partly by that ceaseless ballet of their movements among themselves which stitched the star-cluster in the Coal-ck together; and almost certainly by many other means unknown a--not even guessed at by man. No human being could possibly have eavesdropped on them, or even identified which one was speaking at any given moment. Only the greatest of good fortune has left us a very rough record of that discussion.

Those arguing were divided into two groups: THE FIRST BORN, the oldest of the Angels; and the younger Angels, like LUCIFER who had



been the first Angel to visit Earth. Though LUCIFER was not, in fact, in the Coal Sack at the time but on Earth, he might well have been a party to the argument. In any event, it is convenient to use him as a spokesman for the cadet Angels, since we cannot know the facts.

LUCIFER: The Earthlings are now deep into the Heart Stars. But they do not yet recognize what they see.

THE FIRST BORN: They are too ephemeral to understand.

LUCIFER: We underestimated them before, First Born. They are not the usual sort of ephemerids.

THE FIRST BORN: The differences are not all in their favour. They are unwontedly aggressive, for example.

LUCIFER: True. Yet despite this, they have passed the first stage of evolution for such creatures. They have come to terms among themselves.

THE FIRST BORN: The first stirrings of an infant. They still seek to take advantage of every other life form they encounter.

LUCIFER: They did not do so with us, First Born.

THE FIRST BORN: What else are they doing at this moment? Actually they are the first race of ephemerids to find it even possible to take advantage of us.

LUCIFER: In what way? I do not understand.

THE FIRST BORN: By this very vent-- into the Heart Stars. They seek to use our sworn agreement with them in a petty bid for temporal power. This is presumption.

LUCIFER: That is true, First Born. Yet it is also the beginning of the second evolutionary stage. They find other creatures than themselves ancient, well-entrenched, and asserting over them an authority they cannot tolerate. As pioneers, they defy this power and become the agents of change.

THE FIRST BORN: What value should we place on change, my brother? All change goes in but one direction, towards the long death of all that is. These local stirrings are but islands of organization. Quickly they decay into chaos again. How often have we seen it happen before?

LUCIFER: It always happens, First Born. But some are more elegant than others and make for a more alive time.

THE FIRST BORN: Then how should we prefer one over another? By that alive time which endures the longest? We alone were born with the universe; we alone will witness the approach of its cold ending. Of all the ephemerids, only the Heart Stars has shown the potential--and it is only that--of becoming a society of companion creatures, if only for a few more galactic years.

LUCIFER: There are hints that the Earthlings...

THE FIRST BORN: Yes. Hints, whispers, nothing more. We know what the half-life of the Heart Stars will be; there have been many such societies in this local galactic cluster. How can we expect the Earthlings to outlast them? Experience offers us no such hope.

LUCIFER: We lack evidence, First Born. If all goes well, we should have it soon. Much depends upon our absent brother.

THE FIRST BORN: Much or--little. But we shall wait. Why should we not? We have time. The First Cause has given all other races to

time. We alone can wait.

Like sparks in a column of smoke, the argument whirled and danced away into the Coal Sack, and into the reaches of some topic even the rudiments of which had never entered a human mind.

## **SEVEN - The Zoo Keepers**

It did not at all surprise Jack to find that the people of Ss'pode--the apostrophe stands for a suction tick, usually written 'tsk' in English, but Dr Langer thought the Swahili spelling convention a good deal more economical--were green, or rather, copper-coloured. He knew well that even on Earth, the Caucasoid complexion was a trait of only a tiny minority and might well be extinct before many more generations passed.

What did surprise Jack was that they were so human, and that all the land-dwelling aliens they had met thus far had been roughly of the humanoid type.

'When you think of all the millions of accidents that evolution depends on,' he said to the troubleshooter, 'it wouldn't have surprised me if Earthmen weren't the only humanoid types in the Universe.'

'You forget convergence,' Dr Langer said. 'No matter what the stock, evolution is conservative. Is a whale a fish? Or was a mososaur? Or is a penguin? Three different phyla--mammals, reptiles, birds--but they all look like fish.'

'That's for getting through the water,' Sandbag objected. 'But land animals come in all kinds of models.'

Not really. They all have bilateral symmetry, brains at the front end, sense organs close to the brain, and so on. And the most highly evolved specimens of each type tend to assume the erect position so as to free the front limbs. That's true of all birds; then there's the kangaroo, the tyrannosaur--and, of course, Man. And the convergence goes deep inside, too. I'll bet that if we could see an autopsy of a Ss'podan, w-- find that he's got a pteropsid circulatory system--venous circulation completely separated from the arterial except where the change-over is made in the lungs. On the other hand, gentlemen, let me repeat my warning about eating anything but our own stores while we're on Ss'pode. Not that their food would poison us, but we'd starve to death on it.'

'I still don't understand why,' Sandbag said.

'Because all the amino --d molecules on this planet turn a beam of light passed through them to the right,' Dr Langer said patiently. 'All Earthly life uses the left-handed aminos. It--an invisible difference, but it's much more important than whether you have two arms like a man or eight like an octopus.'

The visible differences were startling enough for Jack. The masters of Ss'pode were an ancient race, and an immensely wealthy one. Their wealth, and the fact that only one person in every ten thousand had to do any work at all, had produced a culture so formal, elegant, and glittering as to make ancient Byzantium look like a used-car lot. Wherever one turned in the streets or halls of Ss'pode, one saw a bewildering kaleidoscope, and the other senses were as easily confused. Everywhere there was jewellery, perfumes, music, ritual, dance, fabrics of every possible texture and hue, elaborate coiffures, fo--l gardens, outlandish ar--tecture, fads and fripperies and furbelows in the luxurious abundance possible only to a rich and highly educated people with nothing to think about but amusing itself.

But of all the oddities of Ss'pode, the one Jack found hardest to adjust to was the fact that he could never tell what he was looking at or talking to. The Ss'podans had long ago solved their population problem by the most direct and the most brutal method: compulsory sterilization of everyone except those who filled the steadily dwindling number of productive jobs.

One outcome was that everyone dressed as he chose and went about mad. Since a deep voice was not, on Ss'pode, a secondary sex characteristic of the male, the sex of casual acquaintances--and of public figures as well--could easily be disguised, and always was. It made no difference in an almost wholly sterile society which had abolished the family.

Maybe so. But the whole system struck Jack as hopelessly comic and possible only to a people already almost out of its collective mind with boredom. Masquerades with many resemblances to this one had often evolved on Earth, and many, such as the Fasching, the Mardi Gras, and the Carnival had proved remarkably durable. But to live one's whole life on such a basis seemed more than a little hysterical. Kicking over the traces, he thought, is something everyone would like to do. I could stand it then and now; but always? Never!

The masquerade was only one facet of a code of Ss'podan manners so elaborate that no one could hope to master even its rudiments without having been born on Ss'pode and having spent every minute since soaking it in--almost through the pores. Furthermore, it was subject to change without notice, the changes sweeping around the planet five or ten times a year, a froth riding atop the capricious combers of fashion.

For this reason, they were assigned a combination guide and guardian, a minor noble, the Banish of Bane, whose name--not the

full name but the only part of it they could pronounce--was Baxx Terr and whose gender was, as usual, a mystery. Dr Langer and the cadets spoke of the Banish, when out of the guide's presence, as 'he' simply for the sake of convenience. In any event, it was always easy enough to address the Banish of Bane as 'you'.

It was part of Baxx Terr's assignment to shepherd the Earthmen through their many inevitable social gaffes and to protect them from the coldly polite rage of the many Ss'podans they were bound to insult. For this purpose, he donned a sapphire velvet headband which centred on his forehead a black jewel rather like a glorified lump of coal, a sign that he was a member of -- Ss'podan equivalent to the medical profession, a class deemed exempt from the codes of politeness by virtue of the often urgent nature of their errands. The Earthmen were none too sure that they understood Baxx Terr's explanation of this, for his description of the class involved seemed to suggest that it was as much law-enforcing as it was healing. This, in any event, was one of the most important of several dozen reasons why the Earthmen themselves could not wear the headband.

The fact that the Banish of Bane himself did not belong to this profession did not seem to make any difference. As an aristocrat, he could profess any art, so long as it was thoroughly understood that he was above them all. But Jack strongly suspected that this fact might go some distance towards explaining why his description of the profession was so hard to follow.

And, of course, Dr --ger and the cadets did breach the codes, often and horrendously; but somehow, even the worst of these social breaks did not produce the consternation or outrage that they had been led to expect. Nor was this entirely and only because Baxx Terr was fronting for them. There were several occasions wherein their transgressi-- had been obviously wholly inexcusable under even the most lax --Ss'podan interpretations. Yet the Ss'podans had only

giggled appreciatively and, on one such occasion, even seemed to be congratulating the Banish of Bane.

Only a few such incidents were necessary to confirm in the minds of the visitors a suspicion that they had formed even earlier: that their social awkwardness was part of their charm, or maybe even all of the charm they had, as far as Ss'pode was concerned. They were looked upon as amusing barbarians and were being used by a jaded society purely for their entertainment value. It was Dr Langer's hypothesis that the Banish of Bane must recently have done his government some useful but not highly important service, for which he had been rewarded by being made the impresario for this troupe of off-world clowns. Clearly, on a world where almost everyone was bored almost all of the time, a man who could introduce a new form of entertainment would find his social status heightened considerably.

To be treated by a planet presumably high in the hierarchy of the Heart Stars simply as though they were trained bears seemed to Jack to be the ultimate insult. Not even the virtually all-powerful Angels had been half so patronizing. Sandbag obviously felt the same way; in private, he muttered and fumed like a boiling kettle.

Not even Dr Langer could be completely stoical about it, but he said only, 'Keep your shirt on, Jerry. I agree with you. I think these fancy-breeches have got us dead wrong. In a way, that suits me; I think we're getting to see more this way than we would if they were wary about us. And bear in mind that they might instead be entirely right about us. Whichever is true, we're going to have to play it absolutely deadpan. We've still got a long way to go, and we're not going to get there by losing our tempers.'

That Ss'pode stood relatively high in the councils of the Heart Stars was an unavoidable assumption. The antiquity and social stability of

its people were as evident on the surface as the wealth of the planet and its political power among the several nearest solar systems were equally undeniable. Furthermore, beneath the rich fabric of Ss'podan society there was considerable iron, as was shown by the absolute obedience of all the rest of the population to the timocracy that ruled it. In addition, some of the iron was hardware of the most unmistakable sort. Though Ss'pode had no visible or expectable enemies, it obviously supported a tremendous war machine, suitable for carrying on anything from a small harassing operation to utter destruction over large interstellar distances.

The paradox so provoked Dr Langer's curiosity that he asked Baxx Terr about it, which seemed to Jack to be rather dangerous; but perhaps the Doctor was counting upon his privileged status as a clown outside the codes to bridge any chasm he might have been treading near.

'On our planet we used to pile up armaments for only three reasons: because we had enemies we were afraid of; because we needed the arms industry to support a creaking economic system; or because we were planning to go out and attack somebody. All those reasons are now obsolete for us and must have been obsolete for you for many thousands of years. Why then, do you need all this armament? Isn't it a burden to you?'

The Banish of Bane laughed lightly, proving still again that Earthmen were never likely to understand the Ss'podan sense of humour.

'No, it is not a burden. As you say, our economy can support it without strain. We have some primitives who find it morally questionable, but I have little patience with them. After all, everyone must die and always under circumstances which he finds inconvenient. What can it matter what the manner of his death is? And what can it matter to one person how many other people happen



to die by the same means? Everyone, in the last analysis, dies alone, even though millions may also die in the very same incident. His death is not multiplied by theirs; his is still, to him, the only death that counts.'

'But don't you find it aesthetically offensive?' Dr Langer went on. 'After all, the same explosion that destroys a planet also destroys all its accumulated art works. I should think that would be very important to you, no matter how you felt about the still-living people who were extinguished at the same time.' 'But there again--we are not overwhelmingly interested in primitive art. Occasionally it comes back into fashion, but invariably it is so inexpressive of any but the rawest kinds of emotion and meaning that no one with even the rudiments of good taste pays any attention to it once its novelty has become an old story.'

'All right,' Dr Langer said, rather more grimly than Jack thought he had intended. 'But that still leaves my question. What is the use of this war machine? Why do you have it at all?'

'We have it because we belong to the Hegemony of Malis,' the Banish of Bane said with exaggerated patience, as though any idiot could see that this must be the reason. 'Like all other members of the confederation, we contribute armaments in proportion to our ability and are given protection according to our needs.'

'But you don't need it. What happens if the Hegemony decides to make war on someone else? You're still required to participate, aren't you?'

'Yes,' Baxx Terr said. 'But the relationship is complicated. Forgive me, but I fear you will never understand it.'

Dr Langer did not respond, but his expression told Jack plainly that

he thought he understood it all too well.

It was when their time on the planet was at last up that Ss'podan society really showed its teeth--characteristically in a polite and indulgent smile. The Ss'podans had observed the re-commissioning of the Argo without any hindrance or even any comment.

But when Dr Langer and the cadets went to make their formal good-byes to the Banish of Bane, he said: 'I have a happy surprise for you. I did not tell you about it before because something might well have prevented it at the last minute. But now it is official.'

Dr Langer, his face expressionless, managed to make a noise of polite inquiry without actually saying anything.

'You will be pleased to hear,' Baxx Terr said, 'that the peoples I have taken you to visi--iked you almost on sight, and they became even more fond of you as your stay continued. When it became known that you were preparing to leave, they petitioned our Council for permission to keep you. The reply was slow in coming, since our Council also has important things on its mind, as I am sure you will appreciate. However, it arrived this morning and it is favourable. Permission has been granted!'

Sandbag's long-standing irritation with the Ss'podan attitude, never under very good control, responded to this ultimate test with a loud bang.

'Keep us?' he growled, turning bright red. 'Like pets? Or zoo animals? That's the most...'

Dr Langer raised his right hand sharply and Sandbag's explosion was chopped off short. His voice as cold as his face, the older man spoke.

'We thank the Lord of Bane and his kind peoples, but I am afraid the proposal is quite out of the question. We must go-.'

Even behind the mask, it was plain that Baxx Terr was thunderstruck. Apparently the possibility that the Earthmen might refuse had never even entered his head.

'But you have everything to gain,' he said at last. There is nothing ahead for you but a long dreary trip, with an unknown reception at the end of it. I can assure you that when you get to where you -- going, you will not like it. We, on the other hand, are a civilized society, as even you can see, and we have done you an honour. It is only your youth and impetuosity--endearing in themselves--which prevent you from seeing this.'

'It is more than that. It is a sense of obligation,' Dr Langer said carefully. 'We have been sent on this trip by the peoples of our planet, and we have contracted with the Hegemony to complete it in accordance with the route specified.'

'It does you credit that you feel this loyalty to your species,' the Banish of Bane said. 'It is one of the qualities which has made you so attractive to us. But clearly you will be doing them no disservice by staying here. As for the Hegemony, you are really not equipped to deal with that. We will take care of that side of the question; you need not concern yourself about it in the least.'

'I am afraid that it is you who do not understand,' Dr Langer said. 'We are obligated to go on, and that is what we wish to do. We do not want to violate that obligation and have the violation squared for us by somebody else. Among our people that's a specific sin called "fixing a ticket".'

Baxx Terr turned to the cadets. 'Surely reason must prevail

somewhere among you,' he said. 'While you have been among us, you have been clothed, housed, entertained, protected and pampered, almost better than a native creature of Ss'pode. You have seen wonders beyond the powers of your home to produce or even to understand. You have been shown every possible kindness. Can you deny this?'

The question carried Jack's memory back instantly to the conversation that he and Sandbag and Sylvia McCrary had had with the dolphin in the pool before the UN Building. For the first time, he thoroughly understood the reply that Tursiops had given to Sylvia's casually crucial question. And it was the only possible reply to the Banish of Bane.

'No,' he said. 'But I can remember greater happiness.'

The masked eyes swung to Sandbag. 'And you?'

'I'm having a lot of trouble even being polite about this,' Sandbag said, h-lips white. 'All I'll sa--s, I don't see much of a future for us on a planet where the food is poison to us.'

'A bagatelle,' Baxx Terr said, with the odd little flourish of his hands that was the Ss'podan equivalent of a shrug when one was talking to children or animals. 'Since even your primitive little kennel of a world knows about stereoisomerism, do you think it beyond the capacity of ancient Ss'pode to reverse it at will? A naive notion, to say the least.'

Dr Langer spoke again. 'It is not a bagatelle. My cadets are right. The dextro-rotatory amino acids are a symbol of the liberty that Cadet Loftus was speaking for. We will not have it abrogated for any form of luxury and kindness whatsoever. We must live among our own customs and on our own foods, alike. We must proceed, with thanks, for we know you mean us no ill.'

Then you force me to unmask the true face of the situation which, in that same kindness, I hoped to conceal from you,' the Banish of Bane said in the land of voice one might have addressed to a disorderly puppy. 'Since the peoples and the Council of Ss'pode wish you to stay, then stay you shall. For the sake of your virtues, we have forgiven you transgressions you could not even understand, but disobedience cannot be one of them. That is what is.'

Dr Langer looked down at the tessellated stone floor. To the Ss'podan, it must have seemed a gesture of submission, but Jack knew that behind Dr Langer's carefully neutral, harmless, kindly face, the most dangerous living Earth brain had gone into emergency overdrive. After only a moment, he raised his head.

'The inevitable must, of course, be faced honestly. I trust you will in turn honour our custom of communicating such decisions to our people. They represent no possible threat to you, as you know, but it would be intolerably impolite to desert them, as they would have to view it, without a word.'

'You cannot use our apparatus.'

'I know that. I desire to send one of my cadets to the Argo to transmit the message. The other cadet and I will remain below, as hostages for good behaviour.'

'Certainly. Designate one.'

The troubleshooter turned to Sandbag and spoke to him briefly in a language Jack not only didn't understand but couldn't identify. With a rueful grin, Sandbag responded with a single word, whereupon Dr Langer shifted gears. This time the language was obviously Latin, enabling Jack to guess that the first had been Greek, but beyond that he was not much better off than he had been before. His still usable

knowledge of that language was entirely legal, not conversational. Sandbag, however, listened with a frown of concentration almost painful to behold, then nodded.

'What is that?' the Banish of Bane said sharply. 'You must not give instructions that I cannot understand.'

'My apologies, my Lord of Bane. That is what we call the Ritual of Farewell, for which that language is reserved. I was explaining to my cadet which form of the ritual seems most suitable for this unprecedented situation. For the rest, Jerry, you need only take the gig aloft to the Argo, send out our problem and our decision, speak the poem and come back here. We have no other choice.'

True,' Baxx Terr said indulgently. 'This ritual is touching. You may proceed.'

Sandbag bowed and went out. Only Jack and Dr Langer could have detected the glitter of mischief in his eyes. Dr Langer's lie, Jack thought, was a truly lovely one, perfectly calculated to appeal to the ceremony-ridden assumptions of Ss'pode. He would have felt happier about it, all the same, had he been able to understand more than a few words of what Dr Langer had actually said.

Nor did Dr Langer have a chance to talk to Jack in private thereafter; the Banish of Bane kept them to heel in his quarters until Sandbag's errand should be completed.

The end came in the midst of a conversation as meaningless as it was formal. Sandbag was re-admitted to the palace of the Banish, looking frighteningly grim and unable to convey to Dr Langer more than a fraction of how his errand had gone. Only minutes later, a prismatic object about the size and shape of an egg came floating through the air out of nowhere, nestled for a moment against Baxx

Terr's temple, and vanished in a small puff of rainbows.

Baxx Terr's hands flew to his throat, and in the next instant he was tearing open the priceless work of art that was his garment. The material of which it was made had been engineered to last a lifetime. As it tore, it also tore his hands, but he did not even seem to feel it.

'So this is the nature of your loyalty!' he said, in a voice white with fury and anguish. 'Not only do you run away -but you do so to our harm! You have by your thanklessness increased our taxes fivefold! Go at once--go! go!'

Behind the mask, his eyes glistened so alarmingly that the three Earthmen lost no time in seizing their advantage. Jack's last impression of the doomed aristocrat was the rent, blood-dappled shirt, which revealed the fact that the sponsor they had decided arbitrarily to think of as 'he' was indeed a male. Jack had suspected otherwise for so long that the surprise temporarily knocked all of his more urgent questions quite out of his mind.

Not so Dr Langer. 'What was the answer?' he said the minute the gig was safely out of Ss'pode's atmosphere. 'Obviously it worked, but Jerry, you look far from happy about it.'

'Baxx Terr was right. We may get where we're going but we're not going to like it when we get there,' Sandbag said, staring straight ahead. 'I had no trouble reaching the Hegemony, or explaining that the Ss'podans were holding us up. But I'd only got about three sentences into the story when there was a real blast from the other end. Doctor Langer, whoever it was that I was talking to, he's a devil--a monster -I can't come up with any word to tell you about that voice. A five hundred per cent increase in military assessments is only the beginning of what's going to happen to Ss'pode. They're going to be paying for this trick for ever!'

'Jerry, are you sure? I'm sorry you were put on the spot, but isn't it possible that you're exaggerating?'

'I kept tapes,' Sandbag said. 'You listen to them, sir, and then tell me. I hated those zoo keepers, but I wouldn't have wished this on them. But that's only part of it. We're going to pay for the trick, too. Our orders are to drop all the other stops we had scheduled and go directly to the Heart world of the Hegemony--at whatever hardship. And Doctor Langer, we've got almost no food. I haven't had a chance yet to ask the computer for an inventory, but we've been eating out of our own stores all the time we've been o--s'pode and getting nothing back. When I tried to tell the guy that, do you know what he did?'

'Calm down a bit, Jerry. Evidently he wouldn't listen. We ought to be used to that by now.'

'He listened,' Sandbag said. 'And then he laughed at me.'

Very, very slowly Dr Langer's eyes closed.

'Oho,' he said, almost in a whisper. 'Well, well. You know--suddenly I'm a little out of patience with the Heart Stars myself.'

'Me, too,' Jack said, when he could get his jaw muscles unclenched. 'But, sir--what do we do?'

'We throw on full emergency Haertel drive,' Dr Langer said, 'and tighten our belts, and get there! As of now, gentlemen and comrades, your cooking lessons are discontinued -until we fry this other fish.'

The joke did not raise even the faintest of cheers. Dr Langer grinned crookedly at the failure.



It looks bad, I know,' he said. 'But we have learned something of enormous value: there is no hierarchy in the Heart Stars! Ss'pode is a slave planet, and so are they all. The Hegemony is an absolute dictato--ip. We need to go directly to its home planet, and this incident has given us just the excuse that we need to do that--with the dictatorship's own approval. And somehow, in some way, we are going to do it.'

## **EIGHT - The Heart of the Hegemony**

There was no way of minimizing the length of that journey, let alone ignoring it. In the first place, the distances were prodigious beyond imagination, even with the aid of the Haertel drive. That the trip was possible at all--and it was only just barely possible--was due largely to just three factors:

First: the abundance of hydrogen, the fuel upon which the Nernst generator fed, everywhere in the universe, ev--in the spaces between the stars; Second: the fact that no molecule of water ever left the Argo; it was constantly recycled and reclaimed, even from human wastes, a requirement of all forms of manned space flight so absolute that it had not so much as raised an eyebrow for more than seventy-five years; Third: the ship's colony of Chlorella, the blue-green alga housed in many miles of transparent plastic tubing in what used to be the hold of the Argo, irradiated by fluorescent lamps and constantly in circulation in the nutrient bath in which it grew. -- primary function of these uncountable millions of microscopic, one-celled plants was to renew the ship's oxygen and remove the carbon dioxide prod--d in breathing by Dr Langer and the cadets, but they could also be eaten, for the plant would vary its production of

proteins and carbohydrates dutifully in accordance with whatever nutrients were added to its bath. No one really enjoyed eating it, for no matter how it was dried, processed and seasoned, it had a persistently, monotonously fishy taste. But for by far the larger part of the journey, it was the only reason that they were not starving.

But there was no way to compensate for time. Though the trip was, objectively, slightly shorter than several of the earliest rocket-powered interplanetary trips, in many respects it was much worse. To begin with, on the Standing Wave they were cut off from all possible contact with home or with any other source of messages. Indeed, they were cut off from the universe outside, whether sensate or inanimate; they could not even see the stars. In addition, there were only three of them. After all, that epic five-year-long expedition to the Jovian moon o--anymede--it still held the record as--e longest continuous space flight of any kind--had been made by a fleet of ships, comprising altogether more than two hundred men. The ships had always been in communication with each other and, in addition, the voyage had been enlivened--though the word is somewhat callous, it is accurate--by a series of small and large disasters en route. It was, in short, anything but dull.

The passage from Ss'pode to Malis was unspeakably, excruciatingly dull. Dr Langer and the cadets passed a small fraction of the time playing chess, reading, listening to tapes, holding jury-rigged classes, and arguing with each other, not only about what might be facing them at the end of the trip, but also on every subject upon which they could possibly dredge up a difference of opinion.

Early on, the arguments between the cadets began to grow acrimonious, not only because their personalities differed sharply, but because a good, angry shouting match at least temporarily relieved the boredom. At the moment before this self-stimulated anger turned into abiding, irrational enmity, Dr Langer separated the

contestants by shifts and forbade them even to see each other for a solid month, at the end of which time they both bitterly hated Dr Langer and were almost childishly delighted to see each other once the restriction was lifted. Not even the impulsive Sandbag had any difficulty in drawing the moral, and thereafter the arguments among all three of them were increasingly conducted under the protective shield of a feeling of human solidarity against the encroaching loneliness and isolation.

Somewhere along the line, too, they came to need the arguments less and less, as each cadet in his own way discovered some of the negative beauties of silence. During the latter half of the trip, a whole week would sometimes pass without more than a few words being exchanged among the three of them, yet without the slightest feeling of unfriendliness—indeed, quite the contrary. The discussions that followed these long periods of withdrawal into the labyrinths inside their own skulls were so rewarding that each succeeding period of silence was longer, as the cadets formed the habit of thinking through more and more intensively the implications of what had been said and of the positions that they had taken. As this three-way intellectual exchange matured, inch by inch, Dr Langer lectured the cadets less and less; he thought more and more about the opinions that they offered him.

Though Jack had never thought of himself as being very talkative, particularly when compared to Sandbag's good-humoured glibness, the process gradually forced upon him the conviction that almost everything he had said in his life up to now had been mostly a waste of breath. Some of this had been showing off in an attempt to impress others with the notion that he already knew what they were trying to tell him. He was appalled now to think how often he had finished others' sentences for them, losing, in his rude eagerness, whatever point they had been hoping to make. Even worse had been the compulsive chatter, good only for convincing himself that he really

existed in a world and a civilization thousands and thousands of years older than he could ever hope to be or ever hope to understand in its entirety.

He tried, not without pain, to explain some of this to Dr Langer. But the troubleshooter didn't help him, except to listen with an intent seriousness, punctuated just once by a slight nod. At the end, it was Sandbag who summed it up.

'I think,' he said hesitantly, 'that there's something in the Bible about this. I wish I could quote it exactly, but it's only one of hundreds of lines in the Book that I wish I had exactly right and don't.'

'The Bible is as hard to remember verbatim as a thesaurus of familiar quotations,' Dr Langer said quietly--'and for very much the same reasons. Go ahead anyhow, Jerry, please.'

'Well then... it says that, approximately: "He who darkens counsel without knowledge isn't earning his keep." Isn't that what you mean, Jack?'

'Yes. And I remember the line, too, just as vaguely. It never meant anything to me before. Doctor Langer, what real good is written wisdom when we can't understand it until after we come to the same conclusions ourselves through our own experience?'

'Not very much good, in my opinion,' Dr Langer admitted. 'Written wisdom, it has always seemed to me, is like an algebraic formula: it states the general case as elegantly as possible, but all the terms in the equation are parameters which you must fill specifically in terms of your own experience. You need to have led a rich and thoughtful life before the formula becomes applicable to you. If you are, in addition, especially thoughtful, you may in the long run be able to refine the formula itself. But that doesn't happen very often. It's a

noble ambition, though, I think.'

'Is it yours, sir?'

'Yes, Jack, it is. Otherwise, I have no excuse for having spent my life dashing from planetary pillar to stellar post -I have no interest in action for its own sake. I'd be sitting happily at home, watching three-V, brushing up on my cooking, and cherishing my children.'

Of all the surprises that Dr Langer had sprung on him in the past three years, this now seemed to Jack to be the most stunning. He had never before known that Dr Langer was even married.

When the long jump from Ss'pode to Malis had begun, Jack had been on the down side of eighteen years old. When the alarm exploded and the Argo came off the Standing Wave, he had turned twenty. But it felt much more like eighty.

Here in the vast nucleus of the Milky Way, the brilliance of the skies was overwhelming. Although Jack had known in advance that the distances between suns here averaged only one light year, instead of the four that was normal to the part of the galaxy he had come from, he had not stopped to think of what the result would be in terms of vision. Faced with such a spangling of stars, how could any people ever have begun to group them into constellations, even through an atmosphere which would cut down their apparent numbers somewhat?

Malis itself was quite as astonishing in its own way. Technically, it was an Earth-type planet, but of that class it was a monster, a good 10,000 miles in diameter, or about 31,500 miles around at its equator. And yet, like all Earth-type planets, it was only a minor member of its system. Its sun, a blue-white giant, had a family of twenty-four planets, of which the grandest was a gas giant so huge

that it was almost a 'grey ghost'--a dwarf semi-star just slightly short of the mass that would have kindled it into nuclear flame. This body had nineteen satellites, one of which was itself as big as Venus or the Earth; the number of satellites in the Malis system as a whole was more than a hundred. The outermost world of this immense, complex array was almost a third of a light year away from its primary. Anyone unfortunate enough to have to live on its eternally frozen surface would have been unable to tell by the naked eye which of the thousands of stars in his sky was his sun.

And someone did live there. The computer, making a quick sweep with all the Argo's detectors, reported that all of the planets, except the fourteen gas giants, and every satellite with a diameter greater than a thousand miles were occupied in one way or another. Some of these settlements, like the one on the outermost planet, were obviously only the equivalents of small garrisons; others, like the one on the Earth-size satellite of the grey ghost, were so large that one would have to call the world 'populated'. Of these, which were only colonies and which were truly inhabited was a question the computer found itself unable to settle, except for Malis itself which was so obviously the kingpin of the whole complex that the computer did not hesitate to rule that the race that lived on Malis had evolved there.

'Surface gravity, one point-six-seven gees,' Sandbag reported. 'Getting around down there is going to be like trying to walk in the world's worst express elevator. The air looks all right: oxygen, about five per cent, but the computer says the surface air pressure is twenty-one pounds per square inch, so we won't have to wear respirators.'

'Anything potentially poisonous, Jerry?'

'No, sir; nothing but the situation. But there is one oddity. The spectograms show almost all the noble gases. It's strongest on

xenon, but there is even a faint helium line.'

'Not too surprising,' Dr Langer said. 'Anybody who could charge the inside of a Martian satellite with xenon had to have a readily available supply of it. And that, in turn, presupposed a big, heavy planet. But what about radon? Inert or not, I don't think I'd want to breathe much of that. After all, it's radioactive, and this planet is plenty big enough to have held on to its whole supply since creation.'

'Almost none,' Sandbag reported. 'Only the helium line is fainter.'

Looking very pleased with himself, Dr Langer addressed himself to the keyboard of the computer. The machine promptly clattered and spat out a piece of tape.

'Just on the basis of simple radioactive decay, this planet is a minimum of six million years older than the Earth is. The more likely figure is about thirty-five million years. No doubt about it--Malis had to be the dominant world in all the Heart Stars, and is probably the world that organized the Hegemony in the first place. Gentlemen, we are about to meet a people that has been civilized for longer than the whole evolutionary history of the human race.'

Jack mopped his forehead. 'It makes me feel like a fly looking down the mouth of a cannon.'

'Hmmm,' Dr Langer said. 'Now there's an idea! Nobody ever aims a cannon at a fly intentionally. Do you gentlemen think you might manage to impersonate flies while we're on Malis? You especially, Jerry?'

'Why -I guess so, sir. Sure! Why not? No, what I mean is--sure. But why?'

'Well, I think we've pretty much had our fill of being pets. And I think

that the more insignificant we make ourselves seem, the more we're likely to come through this all right and with the information we were sent out to get. Nobody ever makes pets of insects, either--not that I ever heard of.'

'I'm going to enjoy watching Sandbag trying to be insignificant,' Jack said, grinning.

'Why, you ape, I can be twice as insignificant as you without half trying!'

'And in twice as loud a voice, too.'

'Stow that,' Dr Langer said sharply. 'Prepare for landing.'

This, Jack thought with no little awe, is what I've always imagined the Hall of the Mountain King would look like. The audience room of the Hegemon of Malis was so huge that its ceiling could not be seen; Jack had the uneasy feeling, which he knew to be nonsense but could not dismiss, that its roof might be obscured by clouds. It was rather like being inside the world's--or the universe's--most enormous cathedral, though there was nothing in the least cathedral-like in its atmosphere.

The place was artificially lit, and along the walls at regular intervals were placed a large number of machines, no two alike. About half of them seemed to be control consoles, but the functions of the other--ouldn't even be guessed. But there was no clutter; the general feeling was one of great austerity. This was the chamber of judgment of a warrior race, and if it was now becoming decadent or was in any other way in decline, as Dr Langer had hoped, Jack could see no evidence of it around them.

There was a good reason for the size of the hall. On this planet it was



difficult to tell the difference between architecture and geology, especially from a distance. The Malans had long ago been through the metal-and-glass building fad and the insane waste of scarce raw materials it involved; they had gone back to the m--mental masonry style of their earliest civilized ancestors, except that the present titanic piles of stone had really been built to last nearly for ever. Like the local mountains they resembled, nothing could destroy them except weathering or a geological overturn, since the Malans had --it none of them in any of the planet's earthquake zones; and the Malans had so well-developed a science of volcanology that they could predict for millions of years in advance when a period of crustfolding or subsidence would begin, and where.

Yet somehow the Hegemon himself did not in the least seem dwarfed by all this gigantism. Like all his race, he was a giant himself. Jack estimated that he was more than eight feet tall, with a blocky body, and obviously powerful arms and legs which his black, undecorated tunic left bare.

His head seemed disproportionately long even for this heroic torso. Deep-sunk green eyes looked unblinkingly out from under --y ridges as promin-- as those of a gorilla. His nose was extraordinarily long by human standards, and under it was a seemingly lipless mouth that ran straight across his face like a slash. And his expression never seemed to change. Indeed, he reminded Jack vividly of the pictures he had seen of the statues on Easter Island, their faces fixed in a perpetual sneer of cruel arrogance.

'You are the ephemerids whom the Banish of Bane wished to detain,' he said in perfect English. His voice was as deep as Jack had thought it would be and as expressionless as his face. At the sound, Sandbag turned white. Jack guessed that until now, the cadet had not guessed that the entity to whom he had spoken from the Argo, back above Ss'pode, was in very truth the absolute ruler of the heart

of a whole galaxy.

'That is true, Your Magnificence,' Dr Langer said. Oddly, he responded in a higher voice than his normal speaking tone. Jack could not understand why, but he decided to pick up the cue anyhow--if necessary.

'No such form of address is required. I am the Hegemon,' the stony voice rumbled. 'As for the Ss'podans, the penalties for such an act are written. You are also the ephemerids who have made a treaty with the Star Dwellers--those you call the Angels.'

'Yes,' Dr Langer admitted after the slightest of hesitations. There was, after all, no way of denying the fact, since the Angels had already talked to the Hegemony about Earth several times.

'You are in no way eligible to be admitted to the Hegemony, since your stability remains untested by time,' the Hegemon said. 'That, too, is written.'

'We are well aware of that, Hegemon,' Dr Langer said, still assuming his oddly squeaky voice. 'We make no such application.'

'What you ask or would wish is not at issue here,' the star-emperor rumbled. 'We know more about you and about your history than you know yourselves. In the view of the Hegemony, you are nothing more than gnats and might in law be swatted before you can sting. There is ample precedent for this, as well.'

'We deserve no more,' Dr Langer said meekly.

'That would be my order,' the Hegemon continued relentlessly, 'were it not for the machines. They point out that to do so would earn the Hegemony the certain enmity of the Star Dwellers who have powers that we do not possess. They are quite capable of collapsing an

entire galaxy if they wish, and have in fact done so before, the last time as recently as three million years ago. Their reasons for this remain unknown. We have no wish to risk losing our entire, ancient realm--and the whole stellar structure upon which it is founded--merely for the relief of brushing away a minor irritation. That would be contrary to scientific principle.'

'To what science do you refer, Hegemon?' Dr Langer said.

'Warfare,' the Hegemon said, and for the first time, Jack seemed to detect the faintest trace of an --ression upon his granite face. It was one of surprise. 'But there is an alternative in the law. Your world may be incorporated into the Hegemony immediately, not as a member but as a subject state. Since the Dwellers have already asked that --r trial period for admission be cut in half, the machines predict that such a move would not be contrary to the trend of their wishes. Therefore, I so order. You may now return to your quarters.'

## **NINE - Three Slaves**

The quarters were luxurious by Malan standards; the food, though completely strange, was excellent; and the three Earthmen were unguarded. But their mood alternated only between dismay and despair. They well knew that from the moment the Hegemon had pronounced his ruling, they were slaves, with the whole population of Earth and the Sol system soon to follow.

Of course they talked about it endlessly, but the argument always seemed to be going around the same circle, with that unchanged, unavoidable fact in the centre.

'I think the first thing we have to admit,' Dr Langer said, 'is that we got

what we came for, and that it's turned out to be a disaster. The Heart Stars are stable, all right, but the solution they've worked out for the problem is an absolute tyranny, and we can't accept that. From our point of view, it belongs to the intellectual childhood of our race.'

'But it certainly is stable,' Sandbag said. Even in the worst possible situation, he could never resist the temptation to play Devil's Advocate. 'And it's successful in a lot of other ways, too. For instance, they seem--to have the communications problem licked, though how the--ie together so many worlds across such enormous distances still baffles me.'

'You saw the answer to that on Ss'pode,' Dr Langer said. 'Even with computer help, it would be my guess that eighty per cent of the working population of every Heart Star planet belongs to the bureaucracy.'

'Well, why not? At least they're working, and that's more than most of the population of the Earth is doing right now. Or, take warfare. If they've got it down to an exact science as that monster implies--and I don't doubt him for a minute--then, effectively, they don't have wars any more, just experiments. I'll bet that their last internal war took place back somewhere in the Miocene Era--if they ever had one at all. This campaign they're going to run off against us will be just a sort of miniature police action, and if there's any fighting at all, we'll lose all the battles. All of them--not just most!'

'I don't doubt any of those things,' Dr Langer said. 'We won't have a chance unless the Angels decide to intervene, and I'm inclined to agree with the Hegemon that they won't. They've never shown any interest in what specific political structure we have on Earth, even though we've got five or six that differ interestingly from each other. And if the Angels react by collapsing the galaxy, that's not going to do us much good either--although it would destroy the Heart Stars

perhaps a hundred thousand years before it wipes out the Earth.'

'Are there really such things as collapsing galaxies, sir?' Jack said.

'Yes, we know of several, although they're all very remote from our galaxy, in both space and time. They're all strong sources of radio waves, and one of them--3C273--is actually the brightest object in the known universe, though it's so far away that, from the Earth, it's no more than a thirteenth-magnitude star.'

'As far as eliminating warfare is concerned,' Jack said thoughtfully, 'we seem to have done that pretty successfully, too, by wiping out national boundaries, at least for all practical purposes. And I must say, I like our method much better than theirs. Turning warfare into an exact science strikes me as just another example of making the end justify the means.'

'I agree,' Dr Langer said. 'It just goes to show that it's perfectly possible to be a million years old and be dead wrong about something all the same.'

'Well, all right. Let's look at it from another angle,' Sandbag said. 'Is the --anny really as absolute as we think it is, sir? Nothing in the World is ever going to make me like the Hegemon, but on the other hand, he doesn't strik--e as being very much like any of the dictators we've had in our own history. He doesn't give orders just to please himself. Remember how many times he said that the law ruled this way or the law ruled th--way? And half the time he seemed to be relying on machine interpretation.'

'He's as much a slave as we are, I'm sure.' Dr Langer said surprisingly. 'I would guess that he is chosen for his office by machine and on the basis of highest administrative aptitude, and that he had no choice whatsoever about taking on the job. But I'll also bet

that those laws he invoked so frequently haven't been amended or added to for millennia and that there's no way any way they can be changed. That's not a government of laws as we know it. What we have here is a situation of absolute legal rigidity. And social rigidity, too.

'It's pretty much what I had been looking for, and hoping for, but I was looking in the wrong place. I was looking for clues of the kind of stabilization that froze the ancient Egyptians, but that's not what's happened here at all, in my judgment. These people—the Heart Stars, in general—went all the way along the road into the most complex possible form of high-energy civilization and then froze there. Culturally that's where we were just at the turn of the century; we're now in a definite post-civilization period. It's so new to us that we don't even have a name for it yet, but it's clearly a fourth stage in cultural morphology. And the Heart Stars never got there at all.'

'What's the difference?' Jack said. 'Things don't seem very different now than they were in the twentieth century. We have just about the same situation they had back then, only more so.'

'Jack, the differences are radical. We now have a society where there is so much energy available for the taking—mostly electrical energy, but that's only because that's the most convenient form—that it's very difficult to put a price on it at all, any more than you'd charge people for breathing. We have a society where three quarters of the work and perhaps as much as half of the thinking are routinely done by machines and with almost no supervision. And yet at the same time, we have a society where nobody needs to be poor, even the unemployed, because our resources are such that production could vastly outstrip consumption—if we were foolish enough to let it. And we have done all this without infringing any freedoms except the size of the family, and the right of the franchise. Any high-energy society is forced to do both, but we stopped there.'

'We solved that one in one package, by restricting the right to vote, and the right to multiply, to those who are employed. In a highly complex technological society, this almost ensures an intelligent electorate, though not necessarily an informed one. That remains the responsibility of the individual. And in addition, it preserves the gene pool by limiting the multiplication of the incompetent. Cruel, but necessary, and n--so cruel as it appears on th--urface, because people don't really mourn children they have never had--they only wish they could. And, of course, we have the cadet system, as represented here by you gentlemen, by which we try to make sure that we keep the talent pipelines filled and anticipate future needs for the talent to cope with problems that now are still in their infancy, or perhaps are not more than even marginally apparent.

'This all seems perfectly natural to you, of course, but I assure you that a twentieth-century man suddenly imported into our century could only conclude that the most drastic kind of revolution had taken place since his death--and what's more, he'd be right! These are some of the consequences and characteristics of the stage of culture I've called "post-civilizatio-- and the Heart Stars, despite their enormous age, haven't yet reached that stage. I don't think they ever will. They're civilization addicts, and there's no power in our galaxy that could bring them to take the cure--except the Angels, who not only don't care but probably can't even begin to understand the problem.'

'I don't see why the Heart Stars, would object to--uh post-civilization, though, sir,' Sandbag said, 'if it turns ou--to be stable--and it looks like it's going to be. After all, stability is their number one test for membership. We've known that all along.'

'No, it isn't stable, Jerry. There's a big difference between stability and equilibrium. The one is static, the other, dynamic. What the Heart Stars have is stability--or, to use the exact word for it, stasis--which,

even at the very best, results in a going downhill. The entropy gradient applies to societies as well as to energy relationships and communications. You cannot hold anything firmly in place; it will leak somewhere.

'But on the Earth, we have what chemists would call a dynamic equilibrium, constantly changing, yet constantly in balance. To be sure, we don't know where we're going, but we're a--east in motion, whereas it's clear that this isn't true of the Hegemony of Malis. Nor can the Hegemony tolerate it. What we have preserved throughout our experiment in world control of people's lives is the freedom to be dissident in one's own mind, which is precisely the greatest talent we can contribute to such a multi-racial complex as the Heart Stars--and is exactly the one that they would be unable to accept. Obviously, wherever the hand of the Hegemony has rested, this has disappeared; and we have nothing else to give. And they do not and cannot want it--

There was a long, long silence.

At last, Jack said, 'We've got to get out.'

'Yes,' Dr Langer said, as matter-of-factly as though the idea was a possible one. 'But to what purpose? What should we do then?'

There seemed to be no answer to this. But at last Jack spoke tentatively.

'Well, we're back again to where we started. We were under orders--try to make this alliance with the Heart Stars and now we're all agreed that it shouldn't ever happen. So even if we do get away, we shall be disobeyin--ur own orders.'

'That's the least of my worries now,' Sandbag said gloomingly. '--ind



of like disobeying orders now and then. But we're stuck.'

'No, wait, Jerry,' Dr Langer said, a flicker of interest passing over his bland, deceptively youthful face. 'Go ahead, Jack. Have you got something?'

'I doubt it, sir, but perhaps we ought to try it on for size. The Sol system is a--ng, long way from the Heart Stars, and I --nk it'll take even the Hegemony a little time to mount the kind of attack that it's decided to make on us. If we could get back home first and tell the Earth our story, that would deprive the Earth of all hope of joining the Heart Stars for ever.'

'A good start. What then?'

'Well, then, we're so far away from the centre of the galaxy that we might set out to build a separate set of alliances out towards the rim, and maybe we'd be able to build our federation to a model nearer to this ideal of individual freedom we've been talking about. And still we could keep separate the things that freedom is supposed to keep separate: languages, traditions, myths--all those things that people cherish and can't do without. We've done it on the Earth. We could do it --ween planets. I don't know what you'd call it, but I think I see what it'd be like. A sort of--of federal feudalism, if that makes any sense at all.'

'It makes a lot of sense. But don't mistake the term for the idea. Defend it.'

'All right. While I was listening to you, it seemed more and more to me that this idea is the thing which the whole of our history--up to now, anyhow--seems to be shooting toward. And we'll never make it if we become a part of the Hegemony of Malis.'

Sandbag snorted. 'Who are we going to ally ourselves with?' he demanded scornfully. 'The Aaa? They've got no use for us, and besides, they don't even have paws good enough for building huts! Or the dolphins? How many armoured divisions do they have, and how'd they get out of the water to help us?'

The dolphins could help us think,' Jack said. 'It wouldn't be the first time they've given us a new angle on a major problem--not by a long shot! As for the Aaa, of course, I don't have any hope of getting any help from them. They're far too independent even to co-operate with each other. I didn't mean to say that this was going to be easy, even if we do get out of this jail. But all the same, it seems to me that this is the only thing worth trying. The Earth is in a galactic backwater. The Heart Stars might not hear that a sort of rival federation was in the making for--well, how long? I can't guess. Centuries? I don't know. And maybe it's a bad idea. But I think it just might work out.'

Sandbag looked at Dr Langer, but the older man simply shook his head slightly. He was only listening.

'I think you're still depending on the Angels,' Sandbag said to Jack. 'And I don't think they'll help us.'

'Neither do I,' Jack said. 'That's been one of the worst dangers from the beginning--that this whole mis--n we're on would be labelled by the Angels a violation of our treaty with them. I'm not depending on them at all. But we've got to start somewhere.'

'You mentioned the dolphins,' Dr Langer said une--ctedly. 'They're an important part of the problem. Do either of you gentlemen see that?'

'I've been thinking about it,' Jack said slowly. 'I think they're important, too, somewhere. But I don't quite see where.'

'I've had an idea there,' Sandbag said. 'Remember the--l-water world, whe--those coral-reef things, the squids, were running the place to suit themselves? I've been wondering what would happen if we were to go back there in a decade or so and drop a couple of hundred of our dolphins--of both sexes, naturally--into that ocean. In about ten years, there wouldn't be a reef-builder left!'

'Ingenious,' Dr Langer said. 'We just might do that as a sort of opening gun. But after all, that's only one planet. It's the whole Hegemony we have to worry about.'

That's true,' Jack said, 'but all the same --hink it's a great idea. With no killer whales to have to dodge, the dolphins would find that planet a paradise, and they'd have it running like a watch in no time. Those glorified squids wouldn't have a chance.'

'All my ideas are great ones,' Sandbag said modestly. 'But in the meantime, the main question is: how do we get out of here?'

'Surprisingly enough,' Dr Langer said thoughtfully, 'we do have several factors on our side. For instance, we'r--ot guarded. Secondly, we can visit the Argo as often as we like; the Malans expect and understand that we will occasionally need things from it that they can't supply or won't want to take the trouble to supply. They know that we couldn't reach the Earth from here with any of our communications systems--they could but we can't--so that aspect of it doesn't worry them. Third, they also know that even their ordinary --ht cruisers could catch the Argo in a stern chase with no trouble at all, even on the Standing Wave, and they know that we know it. So they won't be expecting us to do anything so silly as to try. That will give us a little head start. Fourth, we won't have to be gentle about the manner of our leaving. We can go directly out of orbit into Haertel drive, without any preliminary edging away from Malis.'

'But what about the shock wave?' Jack said. 'It'll shake the whole planet. Won't they take that in itself as an act of war?'

'No, Jack, I don't think so. Because here the ancient Malans have put their modern descendants into our hands without either party being aware of it. Of course, if we go directly on to th--tanding Wave from orbit, --re'll be a planet-wide minor earthquake. But you've seen the way these people build. Do you think a minor earthquake is likely to do anything more to this planet than smash some crockery and shake up a lot of dust? Besides, I'm hoping for some minor damage to delicate equipment. That might delay their chasing us a little longer. And I am certainly counting on a good deal of confusion when the whole planet rattles at once.'

'Great!' Sandbag crowed. 'Let's go!' Dr Langer held up a cautionary hand. 'I'm all for trying,' he said. 'But even with the advantages I've listed, even with all of them working in exactly the way I hope they will --which isn't very likely--we are still probably not going to get away with it. With that firmly in mind, are you gentlemen still game?'

Neither of the cadets spoke for a moment, but apparently what Dr Langer saw in their faces was enough.

'Very good,' he said. 'Then there's no point in our standing around. The time to start is now.'

## TEN - Stowaway

It wasn't that easy, however, as Dr L--er had to explain before the cadets had taken more than three eager strides towards the invitingly open, unwatched door. Actually, they had to wait for more than a month, carefully hoarding all of the non-perishable food that

they were given and making trips to the Argo only frequently enough to keep the hoard from becoming obvious. Their captors unwittingly helped. Dr Langer complained that while he was doing nicely on the diet provided, his cadets were growing youngsters who needed more, and the Malans obligingly doubled the young men's rations. Dr Langer warned them to leave some scraps behind thereafter—which they did not find too difficult to do, although, because of the actual halving of their meals for hoarding purposes, they were always a little hungry.

'Shortly you'll be hungrier,' Dr Langer prophesied grimly.

But they never reached their target day. On what was to have been the next-to-last ferrying trip to the Argo, they were confronted at the spaceport by an unusually huge Malan in uniform, planted squarely between them and the airlock of the gig.

'Good afternoon,' Dr Langer said in his assumed falsetto. 'Is there some problem, officer?'

'Your movements are at the limit of the probable,' the Malan said in a voice like the grinding of millstones. 'The machines report that there would be no explanation for any trip to your orbiting vessel after this one. Therefore, we will now inspect your spacecraft for such an explanation.'

Jack's heart sank, but Dr Langer only nodded respectfully. 'Of course, sir. When is this inspection to take place?' 'Now.'

That did seem to surprise the troubleshooter a little. He said, 'We can't possibly carry an inspection crew in our gig. You'll need another vessel.'

'There is no need for a crew,' the Malan grated. 'I am the inspector

assigned. Admit me to your ferry.'

'Certainly.'

The Malan moved aside while Dr Langer opened the airlock, and then, with cold arrogance, he climbed in ahead of them. Dr Langer waved the cadets in after him.

It was a silent trip to the Argo. The Malan took only a perfunctory look around the gig before settling himself without comment. Neither of the cadets could think of anything disarming to say and Dr Langer offered them no clues.

When they made the transfer, the Malan inspector made straight for the control bubble as though he knew the Argo by heart--as he probably did. Gesturing to the cadets to stay behind him, Dr Langer followed.

It was dark in the bubble, except for some l--ts on the boards, for Dr Langer had taken every precaution he could think of to make the Argo continue to seem wholly inactivated. But the darkness did not discommode the Malan. He strode to the boards and scanned them.

'Your engines are tuned,' he rumbled, almost at once. He swung back toward them. 'What...'

He broke off. In Dr Langer's right hand was a slender instrument which was pointed squarely between the Malan's eyes.

'Over-confidence,' Dr Langer said in an almost friendly voice, 'is the besetting sin of tyrannies. Lock your hands behind your head, officer.'

The Malan remained motionless. His formidable size, his stony expression, his obvious courage, and the vast pressure of the Heart

Stars behind him--all made Dr Langer's gambit seem hopeless indeed.

At last the Malan said, 'That instrument is well known to us. It is harmless. Put it away and explain to me why your engines are tuned.'

'You are vastly mistaken.' With a sudden flick of movement, Dr Langer pointed his instrument at the ceiling where there appeared for an instant a spot of light about the size of a dime. Then the instrument was pointing at the Malan again. 'The weapon is disguised to make it seem what you think it is. Would you like to examine the spot above me where it just struck? While you are doing that, I'll happily cut off your head.'

'You would have done that already if it were possible.'

'Indeed I would have,' Dr Langer said, and suddenly his voice had dropped to a deep, throbbing bass almost as resonant as the Malan's own. 'But I don't want my control room sticky with blood if I can prevent it. Do as I say.'

Slowly, like a man in a nightmare, the Malan officer locked his hands at the back of his neck.

'Jerry, take this gazootavitch from me--d keep it aimed at our friend. You're a better shot than I am, anyhow.'

Sandbag edged forward and assumed custody of the slim object, with a grin of pleasure at being given something so obviously deadly. His long familiarity with it would have been obvious to a child, let alone a soldier. The Malan's eyes widened, and he remained frozen while Dr Langer prowled behind him and relieved him of his one weapon, a perfectly obvious sidearm in an equally obvious holster.

'All right. Now, officer, we bear you no malice personally. Nor do we

have any place for you here. Would you like to get away--clean?'

'I will report you,' the Malan said.

'No, I don't think so. We'll put you in our gig, which you probably know how to manage, and give you about three minutes to pull clear. Then our ship will go into overdrive -direct Your only chance of survival will be to get as far away from Malis as possible in those three minutes. If I were you, I wouldn't waste a second trying to send any messages.'

Though Jack would have thought it impossible, the granite-coloured Malan turned even greyer.

'What you propose might kill some of my brood-brothers, as well as myself. I am pledged to them. I shall use the three minutes to send warnings, not to escape. I am not so base as to sell my brood for my life.'

There was quite a long silence. At last Dr Langer said, 'You must have been almost human--once. Very well, officer, lie down on the deck.'

'You plan to kill me?'

'No,' Dr Langer said. 'Do as I say. Jack, get a Syrette.'

As the giant carefully stretched himself out on the control room floor, Jack began to understand what Dr Langer now had in mind. He got a Syrette of morphine from the nearest locker and passed it to Dr Langer.

'What if it doesn't work?' he asked hesitantly.

'I don't know. For all I know, it might work too well. But their metabolism is mostly like ours or we couldn't use the same food.'



Shut up before you betray us.'

The prone giant lifted his head, but at the same instant, Dr Langer stabbed the Syrette through his clothing at the hip and broke it. The Malan tried to lunge to his hands and knees, but the movement was never completed. He buckled and fell, and within less than a minute, he was in coma. Dr Langer knelt beside him and felt for his pulse.

'Perfect. He'll be out for hours, but the drug isn't toxic to him. All right, gentlemen, stuff him in the gig, and shoot him off towards the emptiest star field you can find. By the time he comes -- he'll have all he can manage to do, just figuring out where he is.'

'He's going to be a handful,' Sandbag said. 'But he doesn't really look as big as he did, now that he's snoozing so nicely.'

'He stopped looking so big to me,' Jack said, 'when you scared him with a fountain pen. And he knew what it was all the time. Why did it scare him?'

'Because it isn't a fountain pen,' Dr Langer said, with a sudden chuckle. 'It's a pen-light I'd been using to read the labels on the cases down in the cargo hold, mostly while it was my turn to cook. When he saw me make a spot of light with it, he had to assume that it was a radiation weapon of some kind. And when he saw Jerry handle it with so much confidence, he was convinced. A lot of diplomacy consists in knowing what the other man thinks he knows tha-- actually dead wrong. Now shovel him out of here, fast, before the Malans send up someone smarter. We don't dare make our last ferry trip-- we've got to go.'

A few moments later, the Argo had got away clean and without further incident. There was, of course, the inevitable tectonic shock on Malis, and Jack would have given a good deal to have been able

to see just how well those grim rock piles of the rulers of the Heart Stars had withstood it. But that was impossible in the very nature of the situation.

Then they were off and running on full emergency drive. They were as aware as ever that this was not very much better than a crawl compared to the speed possible to even the smallest ships of the Heart Stars' immeasurable armada, but they tried--not very successfully--not to think about it.

They spent four days settling back into ship's routine, expecting every minute to be overhauled and plucked off the Standing Wave as effortlessly as a man might take a floating bottle into a rowboat. But nothing happened. Even Dr Langer could not prevent himself from expressing amazement, and then worry lest the shock wave of their departure might actually have done sufficient damage, after all, to be taken by Malans as a hostile act. Surely it would not have taken them this long to recover from minor damage? Their hopes and their fears gradually became more intense, until Jack surprised himself by wishing momentarily that the Heart Stars would snatch them to get it over with. It was only a flash of irresolution, but it left its mark. Luckily, he had not spoken it aloud.

To distract themselves, they still had the ship's library, but it did not now seem to be of much help. Even tapes and books that had fascinated Jack on the way in, works of so much substance that he knew he could not exhaust their rewards in three lifetimes, now seemed at worst meaningless and at best simply irrelevant. Sandbag could not settle down at all, and in obvious desperation set himself to trying to write down from memory, word for word--and line for line, the entire text of the Aeneid, and was doing surprisingly well at it until the moment when he suddenly put down his stylus, glared at the manuscript before him, and said, 'You know what? I hate Virgil. The stuff is jingly -that's what it is.'

Dr Langer rose to the argument like a fish striking at a bait, a feeling both cadets recognized, surprised though they were to find their leader sharing it.

'That's too strong a word, I think, Jerry,' he said. 'It's mannered, of course, but all decadent poetry is, and it's always seemed to me that Virgil was the master of every possible poetic device t-- Latin could offer. Wh--s the line that set off this explosion?'

'"Quadrupedante..."'

'Ah, yes, that must be the second most quoted line in the whole poem. But what's wrong with it?'

'It's all of a piece with the rest of it. These doggone alliterations make my teeth itch.'

'But here it's not alliteration. It's onomatopoeia. He's using the language to imitate the sound of the galloping horses at the same time that he's advancing the story. He overdoes it, of course, very much like Swinburne, but he didn't do it just to show off.'

'Well, all honour to him and all that, but right at the moment he gives me the snits.'

As the days of the Argo's flight lengthened into weeks without the faintest sign of any action from the Hegemony, their uncertainties gradually grew into nightmares. If the Heart Stars were not, after all, pursuing the Argo, then what were they doing? Did they perhaps have some way of strewing the equivalent of mines in Haertel space in advance of the Argo? Or were they playing a cat-and-mouse game? Or had they already launched their police action against the Earth? These and scores of other questions thronged in their minds, but there were no answers to any of them.

'The dolphins!' Jack said suddenly.

'Hmmm?' Dr Langer said.

'I've just thought of another way that they belong in this problem. Maybe it's what you were thinking of, sir. I don't know.'

'Shoot.'

'Well, Dr Langer, it just occurred to me that the whole dolphin culture--the whole whale culture except for the killers--is stable in just the ways that the Heart Stars want a culture to be stable. But all the same, I don't think it'd be possible for the Hegemony to have a race like the dolphins inside it. With all the sea to swim in, the whales are too free for the Hegemony. It's that same unlimited freedom that's made them as stable as they are; they've never had any need to fight among themselves--again with the exception of the killers. And that's not warfare. It's just that some creatures eat other creatures, and the sea's no exception. It's--what did you call it?--it's another kind of equilibrium. And the Hegemony could never tolerate that, either. If the dolphins came to own the water planet, the way Sandbag proposed, the Hegemony would have to exterminate them. They wouldn't be controlled--and couldn't be.'

'Good for you, Jack,' Dr Langer said sombrely. 'That's indeed exactly what I had in mind. As for Jerry's proposal, though, I don't think that this necessarily dooms it. The water planet already has mammalian forms rather like the dolphins, except that they're not sentient. A good many centuries might pass before even the squids, let alone the Hegemony, might realize that the new species is truly intelligent--to say nothing of suspecting that it didn't show up on the planet in the natural course of evolution. After all, it took us about five thousand years to cotton to the fact that the dolphins are every bit as intelligent

as man, yet we both natives of the same planet, and there were clues aplenty strewn around.'

'And they wanted to be friends,' Sandbag added. 'We finally caught on when they talked to Dr Lilly. They wouldn't talk to the decapods, I'll bet.'

'They might. That would be strictly up to them. But if they consented to the operation at all, I think myself that they'd carry it out in such a way that the Hegemony wou--'t notice it for millennia, and by then we migh--e in a position to protect them. It's eminently worth trying, anyhow, if the dolphins agree.'

And on another day, Sandbag said suddenly, 'I've been thinking about the observation stations. They've been reporting everything we do, and they're going to go right on doing it. We're going to have to do something about them or else we're sunk.'

'Yes, but what?'

'We could poison them, --, I think. If they're all like the one over Mars, they've got an atmosphere of xenon or one of the other noble gases. The only good reason for that t-- I can think of is tha--ases of that kind don't corrode metal and don't react with anything else, either, and it may have something to do with all those laser connections between the machines. If it does, then the gas is ionized slightly, anyhow, and we c--d use that.'

Dr Langer frowned. 'I'm not following you very well, Jerry.'

'Sir, supposing we blew in a couple of million cubic metres of fluorine? The ionized xenon atoms would grab it. It'd take a long time, but at the end there wouldn't be any xenon there any more, and I'll bet that darned little of that equipment would function without it--or with

crystals of xenon hexafluoride scattered at random all through the circuit--'

'And the long time lapse would be in our favour,' Dr Langer said thoughtfully. 'It might well seem to the Hegemony that the satellite is simply failing of old age, and even the Heart Stars can't prevent that.'

'How would you get the fluorine in there without the Hegemony catching you at it?' Jack said. He was vaguely surprised to find that it was now he who was playing the role of Devil's Advocate.

'Oh, that's no problem,' Dr Langer said. His face wore the abstracted expression of a man totally absorbed in a technical problem. 'These stations of theirs are so old that they must all have been hit by meteorites of all sizes too many times to bother to count, let alone worry about. Our gas missile will simply be just another one of those. The first station that we hit should be the one that's most likely to be hit by a meteor not necessarily the one that's nearest to Earth. Very gradually, over as many centuries as it takes us, we can hit them all and poison them all. And, by the Charter, there's something else that we can do when the time comes! When we're almost ready to oppose the Heart Stars directly, we can charge all the satellites with water vapour in one attack. The fluorine will go back into gas and attack whatever metal still remains, including the linings of the stations, and the crystals will turn into xenon trioxide, which is explosive at the slightest jar. We won't even have to detonate it! The next natural meteor impact will set it off on an irregular schedule we won't be able to predict, one which the Heart Stars will find extremely difficult to blame on us. It will seem irrational to them because there won't be any pattern to it.'

'And then, we'll be out from under their surveillance for the first time in our whole history. That will be a great day -though none of us will live to see it.'

'Even if we get home at all,' Sandbag said grimly. 'Here they come, Dr Langer. The pip just came on to the screen. They're finally on our tail!'

The strange, characteristic, unmistakable form of the Hegemony's detection pulse was at first very faint on the scope. Sandbag had caught it, apparently, not very long after the first moment when it could have been detected at all. But it grew stronger and brighter as they watched.

This time, too, it was not merely a passing pulse but a continuous track, remaining on the screen constantly, like the nose of a bloodhound following a scent.

There was nothing they could do about it but watch it. They did not even know how it was produced, nor how the Hegemony managed to penetrate into the supposedly private and unique universe of a ship in Haertel space. This technology was three million years older than that of the Earth, and there was no likelihood of an Earthman understanding it for many centuries to come.

But they knew very well what it meant.

After two days of hopeless watching, they saw the now brilliant pip broaden and then separate into two, which in turn proceeded to broaden and blur into each other, barred with the stripes of interference fringes. After two more days, four traces were broadening and barring; and by the end of the week, there were six such wave forms passing in a continuous train across the screen.

'They've got us bracketed,' Jack whispered. 'Six ships overhauling us fast. No wonder they took their time about chasing us! They knew that they could grab us whenever they were good and ready, with no trouble at all.'

'Grab--or shoot?' Sandbag said.

'That depends on whether they're inside our Haertel bubble, or travelling in their own,' Dr Langer said, frowning. 'If they're in their own, they can't shoot from one to the other--at least I don't think they can.'

'Sir, they're doing the impossible right now, just picking us up,' Jack said gloomily.

'I know. I don't underestimate them, believe me. But if they meant to blow us up, they wouldn't have sent six ships. One would be sufficient. They know the Argo isn't armed; they inspected her from stem to stern the moment we went into orbit around Malis. No, this looks to me more like a recapture mission. Not that we can do anything about it, one way or the other.'

The pips blurred, broadened, striped, redoubled. At the end of the second week, there were sixteen. On a hunch, Dr Langer made a series of photographs of the screen and measured the spectra that he got for blue shift. If the Doppler effect applied on the Standing Wave--and all the theories said that it didn't--the Argo's pursuers were travelling at something like nineteen times the relative velocity that even the mighty heart of their quarry's Nernst generator could produce at its utmost--as it was doing now. Furthermore, with sixteen wave trains now occupying the screen, there was so much interference, fogging, and trace persistence that soon not even an expert would be able to read it, and there were none such aboard the Argo, anyhow.

The Argo was now almost to the half-way point in her flight back to Earth. But it was quite clear that she would never cross that imaginary dividing line. Flutter though she might, the Heart Stars



were caging her in.

When it was too late, they found out what the multiple traces meant. The Hegemony's ships were indeed travelling inside their own Haertel bubbles, and when the moment of capture came all those bubbles joined, with a clamour of conflicting metrical frames that wrenched the huge interstellar vessel as though she were nothing more than a plastic container going over a rapids. If the sixteen humiliatingly small Hegemony ships which appear around the Argo at that moment experienced any similar battering, there was no way to tell it from their behaviour. They closed in purposefully. Every alarm in the Argo went off, but neither Dr Langer nor the cadets knew how to answer them. They could only watch and wait.

'So that's the system,' Dr Langer said thoughtfully, picking himself up off the deck. 'We could have prevented that if we'd known what was coming.'

'How, sir?' Sandbag said.

'By modifying our engines back to the original Haertel overdrive. And I mean the real original, the Mark I, the one that took Garrard to Alpha Centauri on the first interstellar trip we ever made. It was abandoned because it produced a sine-wave differential variation between  $t$ -time and  $\tau$ -time. To the Mal--' detectors, it would seem as though our Haertel bubble shrank down to nothingness only to balloon up again a good distance farther on--and so, over and over again. They could predict the course, naturally, but they couldn't--ter that kind of Haertel space.'

'If we could modify our engines that way, I don't see why they couldn't modify theirs, too,' Sandbag objected.

'Well, for the initial practical reason that the technique is probably

prehistoric to them--a lost art. They might not even be able to interpret what we had done. But even if they did make the necessary changes, it still wouldn't do them any good, because one effect of the drive is to immobilize the people aboard the ship. It throws you into a physical state called "pseudo-death"--highly unpleasant. That's the reason why the Mark I drive was abandoned after only one expedition.'

'It's a dirty shame that we can't get the information back,' Sandbag said. 'We could have all ships equipped to throw in a Mark I drive automatically at the first detection pip from outside, and then to throw it off when the pip disappears.'

'I was taping as I spoke,' Dr Langer replied. Turn on the radio, Jerry, and if there's the faintest chance, we'll squirt the tape out by ultrawave. Earth won't get the message for a couple of thousand years, but it's the best we can do.'

While they were speaking, the Malan ships had efficiently arranged themselves into a sphere around the Argo with a radius of about twenty-five miles. A moment later, there was a multiple howl of protest from below decks, and a red light flickered on the instrument panel.

'Overload!' Sandbag yelled.

'Might as well turn them down,' Dr Langer said resignedly. 'I'd rather be captured in a whole ship than get away in a ruined one.'

There was a minute of tense silence; and then...

... and then, the whole glory of the heart of the galaxy came blazing into being behind them, glancing blindingly off the Malan ships to the side and ahead of them, and turning the ones to the rear into in--lack

silhouettes.

'They've dragged us back into normal space!' Sandbag shouted, unnecessarily.

But he got an answer instantly and from the most unexpected source of all: the open radio.

'Indeed they have,' a familiar voice said calmly from the speaker, 'and that is just what I have been waiting for them to do. They--e now about to get the biggest surprise in ah\* their military history.'

There was a moment of stunned silence. At last, Dr Langer asked raggedly, 'Who are you?'

'This is HESPERUS, Dr Langer. Did it never occur to you that the Dwellers could not allow this expedition to proceed without hav-- an observer on board? I have been stowed away inside your Nernst generator the entire time, and I must say in all fairness that it has been a most alive time for me.'

'And--and you're on our side?' Jack whispered.

'Indeed I am, Jack! We have never investigated the Hegemony of Malis as closely as we should, because our First Born decreed that no confederation of ephemerids could be of real interest to us. In my opinion, it is a blot on the face of the galaxy and I shall recommend that we sever all relations with it.'

The control room rang with the cheering of the two cadets, but HESPERUS interrupted them at once.

'There will be time for joy later,' the Angel said. 'Now we must extricate ourselves from the immediate situation. I advise you all to don space suits and retire to the acceleration tank. We are about to

leave this vicinity with great suddenness, and if you are not anchored in the oil bath, you will be injured.'

Nobody understood the theoretical basis of the Angels' method of travelling among the stars, involving as it did the attaining of velocities many times that of light without ever leaving normal four-dimensional space. Jack, however, had had some experience with it before, during the expedition to the Coal Sack nebula, so that he knew--at least in practical terms--approximately what was going on.

To begin with, the energy being could increase the efficiency of the Argo's hydrogen fusion generator to nearly one hundred per cent; that was the Angels' principal usefulness back home. Then, the Angel effectively became the ship, using her circuits as nerves, her drivers as muscles, her instruments as sense organs. No Earth ship not so powered and so guided had a chance of keeping up with an Angel-operated vessel, and this proved to be equally true of the far faster Malan ships. In the tiny viewscreen in the helmet of his space suit, Jack watched the Malan fleet dwindle and disappear as though it were falling back into the great flaming mass of the Heart Stars.

HESPERUS kept them in the suits for two days, nibbling frugally at the concentrated rations stored inside them and trying, not very successfully, to sleep in such cramped quarters, before he let up and announced that they could come out. They hosed off each other's suits with live steam, doffed them, and almost ran to the control room to see what had happened.

'We still have a long way to go,' the Angel said. 'But at least we are now outside the domain of the Hegemony, so it can set no traps. As for the fleet that tried to capture us, it could never catch up to us now. In fact, it does not even know where we are.'

'A thousand thanks,' Dr Langer said. The cadets echoed him

fervently.

'We have a treaty,' the Angel responded. 'As for the present position, I could bring us home in about a week. But I think you would find it more comfortable to make the trip more slowly on your customary overdrive; there is no longer any danger in adopting it. And I will, of course, continue to operate the fusion generator, since I am no longer in concealment. That will add a little more than your usual speed.'

'Let's do it that way by all means,' Jack said earnestly. 'Just the idea of spending a week in that tank is enough to give me the horrors.'

'I agree,' Dr Langer said. 'Set her up and let's go.'

The miracle had happened. They were going home--free.

## **ELEVEN - The Decision**

The four of them came out of the United Nations Building on to the Plaza: Dr Langer, Jack, Sandbag--and HESPERUS. For the Angel's benefit, they were talking in the presence of a small portable radio since HESPERUS could not hear sound waves--he was exclusively a creature of the electromagnetic spectrum.

The radio was the property of Sylvia McCrary, who was with them, too. Her eyes were shining; she had got her story at last. It was the story of the century and she knew it, 'For a minute there, I thought the Secretary was going to bust when we told him that any treaty with the Heart Stars was out,' Jack said, with a chuckle.

'There was no real danger,' Dr Langer said. 'Dan has his troubles

and his temper always was a little short, but he has an infinite respect for the facts.'

'All the same,' Sandbag said, grinning, 'he's not going to have an easy time convincing the Security Council that its pet alliance would actually be a disaster.'

'No, Jerry,' Dr Langer said, 'but there's no reason to worry about him on that account. He'll do it. It's his job, and he's good at it.'

They sat down beside the dolphin pool, with the glowing ball of light that was HESPERUS hovering over the water. The dolphins eyed him with intense interest. They had heard about the Angels, of course, but very few of them had ever seen one. Jack noticed, however, that the fascination of the Star Dweller did not prevent one of the dolphins from drifting over to where the men were sitting; they were incurable eavesdroppers.

'And we've learned one thing more that I hope the world will never forget,' Dr Langer said. 'Sylvia, I hope you can see some way to work it into your series. It ought to be on the record in print.'

'Anything you say,' Sylvia said. 'After all, you're my source.'

'This is it: An unstable culture and a short lifetime are both positives--not handicaps, as we have always thought. Longevity doesn't necessarily mean wisdom. Sometimes it does, but it can also mean stagnation--ven senility. Look at the planets we stopped at on our way in to Malis. Even the ones that didn't harbour hive cultures were all content to b--nder somebody else's domination--and that includes the Malans themselves, who are slaves to their own laws and the machines that interpret them. All these planets are also very low on curiosity, except in very limited areas, and they make sure to keep those areas harmless. The result is that they're intellectually non-

productive; all their curiosity amounts to is the pursuit of novelty to relieve a boredom that they don't even recognize is boredom.

'If you have an unstable culture and a short lifetime, you gain more than just personal freedom and the right to put up an argument. You gain a creativity, such as that mankind has been pouring out in torrents for most of its recorded history. The Heart Stars have lost it. I think they will never get it back.'

'We have always found these things to be so,' said a voice behind them. They turned to look down at the dolphin.

There came back to Jack with a rush the memory of how near they had come to being made the pets of the people of Ss'pode. He looked slowly around the circle of the dolphin pool.

At last he said, slowly, 'As a first step, this thing has got to go.'

Not very far away, as interstellar distances now had to be reckoned, a very similar discussion was going on, though no human being could have recognized it as a discussion, let alone understood what it was all about.

Inside that vast dust cloud called the Greater Coal Sack, the Angels orbited and danced in their thousands, creatures older than the planets, older than the suns, many of them as old as the universe itself. They were talking now, as always, partly by an exchange of--dio messages on hundreds of different channels at once, partly by delicate variations in visible and invisible light, partly by that ceaseless ballet of their movements which stitched the star cluster inside the Coal Sack together, and almost certainly by many other means unknown and not even guessed at by man.--

Nevertheless, we now know, at least approximately, what it was that

they were talking about, for one of the speakers was HESPERUS, who actually was not in the Coal Sack at the time but on Earth. It is certain, because he has told us so, that he was in conversation with his brothers in the nest at the same time that he was engaged in the discussion beside the dolphin pool. And this, he tells us--and because it is he that tells us, we know it to be true--is as close a transcription of that exchange in the Coal Sack as human language can encompass:

HESPERUS: The Hegemony of Malis is highly various, First Born, but in ways that are actually of no importance. The differences among the Earthlings go much deeper and range over a much wider spectrum.

LUCIFER: This I have seen, First Born. And the differences are of significance, which is apparently untrue among the Heart Stars.

THE FIRST BORN: Yet it remains true that the Hegemony of Malis has lasted for a million Earth years and, should it last for several million more, it offers us again the possibility of companionship in the loneliness of our near-endless lives.

LUCIFER: Yet, First Born, consider that we have been in error ten times in embarking upon such a venture. We were so seriously in error in three of those that we were forced to collapse a whole galaxy, and the life-guilt of many innocent races is our ineluctable heritage for those three irremediable acts. Shall we never learn that we were wrong?

THE FIRST BORN: There is always Lope.

HESPERUS: My brothers, I tell you from what I have lived that the relative longevity of the Heart Stars is an illusion. These peoples stopped changing long ago, which is an offence against the law of



negative decay upon which all life is based, our own included. Were the peoples of the Hegemony of Malis to survive to the last moment of the heat-death, they could never be brother creatures to us.

LUCIFER: This is also true, First Born. But the Earthlings may be such creatures more quickly than we can imagine now. We can unite them with others even younger than they, who would with them make a more worthy society of free companions than the Hegemony of Malis will ever become. They have already met the beademungen of the centaur twins, and retreated from the--n confusion because the terms in which the two cultures th-- are superficially so unlike. We could help to bridge that gap; we know them both. And we could bring these two cultures--and the sea people of the Earth--into further contact with ephemerids who share in their potentials, and again interpret for them as well as we know how.

THE FIRST BORN: Yes, that would be simple. Yet to breach our immemorial aloofness for ephemerids flies in the face of our tested customs.

LUCIFER: We, too, must change, First Born; that is the equation that governs us as it governs all else. And our brother has shown us that one of the aspects of reality we must change is our definition of an ephemerid. These frozen, complacent slaves of the Hegemony of Malis are, it is quite clear, the true ephemeridae of this galaxy.

THE FIRST BORN: Yet have the Earthlings really changed? What, for instance, of this relationship with their subject race?

HESPERUS: This is the new thing that I have to relate to you, my brothers. The dolphins never were a subject race, and it has taken the land-dwelling Earthlings only a hundred orbits of their planet around their sun to realize this. As I speak to you now, that decision has just been made, and will be abided by.

LUCIFER: I, too, have heard this decision. And it is final. The sea people and the land people are now to live side by side in amity and partnership, although they differ so sharply from each other that they might as easily inhabit different planets. Having made this accommodation, they are both now in a position to understand and live with other races of like mind everywhere.

THE FIRST BORN: Shall we then again make ourselves a prey to so much fear and so much hope, over so short a fraction of a galactic year? HESPERUS: The risks are great, I grant. It is more than probable that we shall be disappointed as we have been disappointed before. But, First Born, I ask you again: Shall we not have done with these stable confederations which have disappointed us ten times before since the creation of the uni--se, and have done in turn with t--life-guilt of destroying another galaxy built by that First Cause which we have the privilege of serving? Let us, I petition you, abandon this foredoomed cause and serve instead--with all the risks entailed--that aspect of the creative force which has given life to us, to the stars, and to all those creatures who have not yet perverted it. I speak from youth, as I am well aware, but, in worship of the First Cause, I cannot remain silent.

THE FIRST BORN: Worship has been invoked. Therefore, we may not rule. Our brothers everywhere in light, what say you to this?

THE STAR DWELLERS: Yes!

Like sparks in a column of smoke, the discussion whirled and danced away throughout the galaxy and throughout the universe and into the reaches of some subject even the rudiments of which had never entered a human mind, and almost surely never would. But as it vanished into mystery, some quiet voice whispered a judgment: 'It is decided: We abandon the Hegemony of Malis. The men of Earth,

the dolphins of Earth, the beademungen of the twin radiocelles, the coming children of the Aaa, and those others of which we know, or which we can foresee -these are the races that will rule with us. This has been written where what is willed must be.'

Jack Loftus never heard that whisper, nor even dreamed of it. Nor did his great-great-grandchildren. But he already had more than enough reasons for joy.