

CODE OF THE LIFEMAKER

JAMES P. HOGAN

WHAT IS LIFE? AND WHOM DO
WE OWE OUR ALLEGIANCE TO?



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INTRODUCTION

Back in the early 1980s, when I was a new science-fiction writer living in the Sierra Foothills region of California about three hours' drive inland from San Francisco, I got invited to a summer study held at the Goddard Space Center in Maryland. It was attended by people from NASA, the academic world, various space-related industries, and a science fiction writer. The object was to explore what roles computers might play in advanced space missions over the next twenty years and beyond. One of the topics considered was the concept of a self-replicating lunar factory. Essentially, the idea is to land a starter kit "seed" package on the lunar surface, consisting of a basic factory system and robot workforce whose first task is to locate and deliver materials that the factory uses to produce more robots. When a critical size is reached, a migrant robot force relocates to commence construction of a second factory, a duplicate of the first. The pattern repeats in a multiplying progression until it becomes possible to divert surplus capacity into supplying the manufacturing needs of Earth from lunar resources. Analysis of the applicable numbers led to the astonishing conclusion that after twenty years the output could exceed the entire production of all Earth's present industries combined.

I had long been toying with a tongue-in-cheek story idea involving an upside down world in which the "natural" inhabitants were machines and things like houses, tools, and other artifacts were organic, cultivated artificially by an intelligent, dominant species. We could then go on to develop some amusing debates between machine philosophers and theologians about whether "artificial"—i.e. non-machine—intelligence was possible, they knowing of no other kind, and what kind of being must have created the first machine, since by definition it couldn't have been a machine.

But the problem I'd never been able to solve satisfactorily was, how it got started in the first place. It was only when I was on the plane back to California that I made the obvious connection: an advanced, alien, interstellar version of the lunar factory idea which somehow goes out of control. I started writing that very evening, and the Prologue to *Code of the Lifemaker* was completed by the end of the next day. Since the book was first published in 1983, readers have written to say that it alone was worth the price of the book, and that none of the ideas that it discusses, even with regard to such a fast-changing area as computing, has aged in the least.

So it gives me great pleasure to have Arc Manor Books releasing another edition, and I trust that readers will continue to derive as much pleasure, entertainment, and food for thought from it as they tell me they have in the past.

James P. Hogan
County Leitrim, Ireland
April, 2010

PROLOGUE

THE SEARCHER
1.1 MILLION YEARS B.C.
1,000 LIGHT-YEARS FROM
THE SOLAR SYSTEM

Had English-speaking humans existed, they would probably have translated the spacecraft's designation as "searcher." Unmanned, it was almost a mile long, streamlined for descent through planetary atmospheres, and it operated fully under the control of computers. The alien civilization was an advanced one, and the computers were very sophisticated.

The planet at which the searcher arrived after a voyage of many years was the fourth in the system of a star named after the king of a mythical race of alien gods, and could appropriately be called Zeus IV. It wasn't much to look at—an airless, lifeless ball of eroded rock formations, a lot of boulders and debris from ancient meteorite impacts, and vast areas of volcanic ash and dust—but the searcher's orbital probes and surface landers found a crust rich in titanium, chromium, cobalt, copper, manganese, uranium, and many other valuable elements concentrated by thermal-fluidic processes operating early in the planet's history. Such a natural abundance of metals could support large-scale production without extensive dependence on bulk nuclear transmutation processes—in other words, very economically—and that was precisely the kind of thing that the searcher had been designed to search for. After completing their analysis of the preliminary data, the control computers selected a landing site, composed and transmitted a message home to report their findings and announce their intentions, and then activated the vessel's descent routine.

Shortly after the landing, a menagerie of surveyor robots, equipped with imagers, spectrometers, analyzers, chemical sensors, rock samplers, radiation monitors, and various manipulator appendages, emerged from the ship and dispersed across the surrounding terrain to investigate surface features selected from orbit. Their findings were transmitted back to the ship and processed, and shortly afterward follow-up teams of tracked, legged, and wheeled mining, drilling, and transportation robots went out to begin feeding ores and other materials back to where more machines had begun to build a fusion-powered pilot extraction plant. A parts-making facility was constructed next, followed by a parts-assembly facility, and step by step the pilot plant grew itself into a fully equipped, general-purpose factory, complete with its own control computers. The master programs from the ship's computers were copied into the factory's computers, which thereupon became self-sufficient and assumed control of surface operations. The factory then began making more robots.

Sometimes, of course, things failed to work exactly as intended, but the alien engineers had created their own counterpart of Murphy and allowed for his law in their plans. Maintenance robots took care of breakdowns and routine wear and tear in the factory; troubleshooting programs tracked down causes of production rejects and adjusted the machines for drifting tolerances; breakdown teams brought in malfunctioning machines for repair; and specialized scavenging robots roamed the

surface in search of wrecks, write-offs, discarded components, and any other likely sources of parts suitable for recycling.

Time passed, the factory hummed, and the robot population grew in number and variety. When the population had attained a critical size, a mixed workforce detached itself from the main center of activity and migrated a few miles away to build a second factory, a replica of the first, using materials supplied initially from Factory One. When Factory Two became self-sustaining, Factory One, its primary task accomplished, switched to mass-production mode, producing goods and materials for eventual shipment to the alien home planet.

While Factory Two was repeating the process by commencing work on Factory Three, the labor detail from Factory One picked up its tools and moved on to begin Factory Four. By the time Factory Four was up and running, Factories Five through Eight were already taking shape, Factory Two was in mass-production mode, and Factory Three was building the first of a fleet of cargo vessels to carry home the products being stockpiled. This self-replicating pattern would spread rapidly to transform the entire surface of Zeus IV into a totally automated manufacturing complex dedicated to supplying the distant alien civilization from local resources.

From within the searcher's control computers, the Supervisor program gazed out at the scene through its data input channels and saw that its work was good. After a thorough overhaul and systems checkout, the searcher ship reembarked its primary workforce and launched itself into space to seek more worlds on which to repeat the cycle.

FIFTY YEARS LATER

Not far—as galactic distances go—from Zeus was another star, a hot, bluish-white star with a mass of over fifteen times that of the Sun. It had formed rapidly, and its life span—the temporary halt of its collapse under self-gravitation by thermonuclear radiation pressure—had demanded such a prodigious output of energy as to be a brief one. In only ten million years the star, which had converted all the hydrogen in its outer shell to helium, resumed its collapse until the core temperature was high enough to burn the helium into carbon, and then, when the helium was exhausted, repeated the process to begin burning carbon. The ignition of carbon raised the core temperature higher still, which induced a higher rate of carbon burning, which in turn heated the core even more, and a thermonuclear runaway set in which in terms of stellar timescales was instantaneous. In mere days the star erupted into a supernova—radiating with a billion times the brightness of the Sun, exploding outward until its photosphere enclosed a radius greater than that of Uranus' orbit, and devouring its tiny flock of planets in the process.

Those planets had been next on the searcher's list to investigate, and it happened that the ship was heading into its final approach when the star exploded. The radiation blast hit it head-on at three billion miles out.

The searcher's hull survived more-or-less intact, but secondary x-rays and high-energy subnuclear particles—things distinctly unhealthy for computers—flooded its interior. With most of its primary sensors burned out, its navigation system disrupted,

and many of its programs obliterated or altered, the searcher veered away and disappeared back into the depths of interstellar space.

One of the faint specks lying in the direction now ahead of the ship was a yellow-white dwarf star, a thousand light-years away. It too possessed a family of planets, and on the third of those planets the descendants of a species of semi-intelligent apes had tamed fire and were beginning to experiment with tools chipped laboriously from thin flakes of stone.

Supernovas are comparatively rare events, occurring with a frequency of perhaps two or three per year in the average galaxy. But as with most generalizations, this has occasional exceptions. The supernova that almost enveloped the searcher turned out to be the first of a small chain that rippled through a localized cluster of massive stars formed at roughly the same time. Located in the middle of the cluster was a normal, longer-lived star which happened to be the home star of the aliens. The aliens had never gotten round to extending their civilization much beyond the limits of their own planetary system, which was unfortunate because that was the end of them.

Everybody has a bad day sometimes.

ONE MILLION YEARS B.C.

One hundred thousand years after being scorched by the supernova, the searcher drifted into the outer regions of a planetary system. With its high-altitude surveillance instruments only partly functioning and its probes unable to deploy at all, the ship went directly into its descent routine over the first sizeable body that it encountered, a frozen ball of ice-encrusted rock about three thousand miles in diameter, with seas of liquid methane and an atmosphere of nitrogen, hydrogen, and methane vapor. The world came nowhere near meeting the criteria for worthwhile exploitation, but that was of no consequence since the computer programs responsible for surface analysis and evaluation weren't working.

The programs to initiate surface activity did work, however, more or less, and Factory One, with all of its essential functions up and running to at least some degree, was duly built on a rocky shelf above an ice beach flanking an inlet of a shallow methane sea. The ship's master programs were copied across into the newly installed factory computers, which identified the commencement of work on Factory Two as their first assignment. Accordingly Factory One's Supervisor program signaled the ship's databank for a copy of the "How to Make a Factory" file, which included a set of subfiles on "How to Make the Machines Needed to Make a Factory," i.e., robots. And that was where everything really started to go wrong.

The robots contained small internal processors that could be reprogramed via radiolink from the factory computers for each new task to be accomplished. This allowed the robots to proceed with their various jobs under autonomous local control and freed up the central computers for other work while they were waiting for the next "Done that—what do I do now?" signal. Hence many software mechanisms existed for initiating data transfers between the factory computers and the remote processors inside the robots.

When the copying of the "How to Make a Factory" file from the ship to Factory One was attempted, the wrong software linkages were activated; instead of finding

their way into the factory's central system, the subfiles containing the manufacturing information for the various robots were merely relayed through the factory and beamed out into the local memories of the respective robot types to which they pertained. No copies at all were retained in the factory databank. And even worse, the originals inside the ship managed to self-destruct in the process and were irretrievably erased. The only copies of the "How to Make a Fred-type Robot" subfile were the ones contained inside the Fred-types out on the surface. And the same was true for all the other types as well.

So when the factory's Supervisor program ordered the Scheduler program to schedule more robots for manufacture, and the Scheduler lodged a request with the Databank Manager for the relevant subfiles, the Databank Manager found that it couldn't deliver. Neither could it obtain a recopy from the ship. The Databank Manager reported the problem to the Scheduler; the Scheduler complained to the Supervisor; the Supervisor blamed the Communications Manager; the Communications Manager demanded an explanation from the Message Handler; and after a lot of mutual electronic recriminations and accusations, the system logging and diagnostic programs determined that the missing subfiles had last been tracked streaming out through the transmission buffers on their way to the robots outside. Under a stern directive from the Supervisor, the Communications Manager selected a Fred from the first category of robots called for on the Scheduler's list, and beamed it a message telling it to send its subfile back again.

But the Fred didn't have a complete copy of the subfile; its local memory simply hadn't been big enough to hold all of it. And for the same reason, none of the other Freds could return a full copy either. They had been sprayed in succession with the datastream like buckets being filled from a fire-hose, and all had ended up with different portions of the subfile; but they appeared to have preserved the whole subfile among them. So the Supervisor had to retrieve different pieces from different Freds to fit them together again in a way that made sense. And that was how it arrived at the version it eventually handed to the Scheduler for manufacture.

Unfortunately, the instruction to store the information for future reference got lost somewhere, and for each batch of Freds the relevant "How to Make" subfile was promptly erased as soon as the Manufacturing Manager had finished with it. Hence when Factory One had spent some time producing parts for Factory Two and needed to expand its robot workforce to begin surveying sites for Factory Three, the Supervisor had to go through the whole rigmarole again. And the same process was necessary whenever a new run was scheduled to provide replacements for robots that had broken down or were wearing out.

All of this took up excessive amounts of processor time, loaded up the communications channels, and was generally inefficient in the ways that cost accountants worry about. The alien programmers had been suitably indoctrinated by the alien cost accountants who ran the business—as always—and had written the Supervisor as a flexible, self-modifying learning program that would detect such inefficiencies, grow unhappy about them, and seek ways to improve things. After a few trials, the Supervisor found that some of the Freds contained about half their respective subfiles, which meant that a complete copy could be obtained by interrogating just two individuals instead of many. Accordingly it made a note of such

“matching pairs” and began selecting them as its source for repeat requests from the Scheduler, ignoring the others.

Lost along with the original “How to Make a Fred” subfiles were the subsubfiles on “Programs to Write into a Fred to Start It Up after You’ve Made It.” To make up for the deficiency, the Supervisor copied through to the Scheduler the full set of programs that it found already existing in the Freds selected to provide reproduction information, and these programs, of course, included the ones on how to make Freds. Thus the robots began coming off the line with one-half of their “genetic” information automatically built in, and a cycle asserted itself whereby they in turn became the source of information to be recombined later for producing more Freds. The method worked, and the Supervisor never figured out that it could have saved itself a lot of trouble by storing the blueprints away once and for all in the factory databank.

The program segments being recombined in this way frequently failed to copy faithfully, and the “genomes” formed from them were seldom identical, some having portions of code omitted while others had portions duplicated. Consequently Freds started taking on strange shapes and behaving in strange ways.

Some didn’t exhibit any behavior at all but simply fell over or failed during test, to be broken down into parts again and recycled. A lot were like that.

Some, from the earlier phase, were genetically incomplete—”sterile”—and never called upon by the Supervisor to furnish reproductive data. They lasted until they broke down or wore out, and then became extinct.

Some reproduced passively, i.e., by transmitting their half-subfiles to the factory when the Scheduler asked for them.

A few, however, had inherited from the ship’s software the program modules whose function was to lodge requests with the Scheduler to schedule more models of their own kind—program modules, moreover, which embodied a self-modifying priority structure capable of raising the urgency of their requests within the system until they were serviced. The robots in this category sought to reproduce actively: They behaved as if they experienced a compulsion to ensure that their half-subfiles were always included in the Scheduler’s schedule of “Things to Make Next.”

So when Factory One switched over to mass-production mode, the robots competing for slots in its product list soon grabbed all of the available memory space and caused the factory to become dedicated to churning out nothing else. When Factory Two went into operation under control of programs copied from Factory One, the same thing happened there. And the same cycle would be propagated to Factory Three, construction of which had by that time begun.

More factories appeared in a pattern spreading inland from the rocky coastal shelf. The instability inherent in the original parent software continued to manifest itself in the copies of copies of copies passed on to later generations, and the new factories, along with their mixed populations of robot progeny, diverged further in form and function.

Material resources were scarce almost everywhere, which resulted in the emergence of competitive pressures that the alien system designers had never intended. The factory-robot communities that happened to include a balanced mix of surveyor, procurement, and scavenger robots with “appetites” appropriate to their factories’ needs, and which enjoyed favorable sites on the surface, usually managed to

survive if not flourish. Factory Ten, for example, occupied the center of an ancient meteorite crater twelve miles across, where the heat and shock of the impact had exposed metal-bearing bedrock from below the ice; Factory Thirteen established itself inside a deep fissure where the ice beneath was relatively thin, and was able to melt a shaft down to the denser core material; and Factory Fifteen resorted to nuclear transmutation processes to build heavier nuclei from lighter ones frozen in solution in the ice crust. But many were like Factory Nineteen, which began to take shape on an ill-chosen spot far out on a bleak ice field, and ground to a halt when its deep-drilling robots and transmutation reactors failed to function, and its supply of vital materials ran out.

The scavenger and parts-salvaging robots assumed a crucial role in shaping the strange metabolism that was coming into being. Regardless of what the Schedulers in the various factories would have liked to see made, the only things that could be assembled readily were the ones for which parts were available, and that depended to a large degree on the ability of the scavengers to locate them, or alternatively to locate assemblies suitable for breaking down—"digesting"—and rebuilding into something useful. Factory Twenty-four was an extreme case. Unable to "metabolize" parts directly from any source of raw materials because of the complete failure of its materials-procurement workforce, it relied totally on its scavengers. Factory Thirty-two, on the other hand, could acquire raw materials but couldn't use them since it had been built without a processing facility at all. Its robots delivered instead to Forty-seven, which happened to produce parts for some of the scavengers being manufactured by Thirty-two, and the two factory-robot organisms managed to coexist happily in their bizarre form of symbiosis.

The piles of assorted junk, which shouldn't have accumulated from the earlier phases of the process but had, were eaten up; the machines that broke down were eaten up; and the carcasses of defunct factories were eaten up. When those sources of materials had been exhausted, some of the machines began to eat each other.

The scavengers had been designed, as they had to be, to discriminate between properly functioning machines and desirable products on the one hand and rejects in need of recycling on the other. However, as with everything else in the whole, messed-up project, this function worked well in some cases, not so well in others, and often not at all. Some of the models turned out to be as likely to attempt the dismantling of a live, walking-around Fred as of a dead, flat-on-its-back one. Many of the victims were indifferent to this kind of treatment and soon died out, but others succeeded in developing effective fight-or-flee responses to preserve themselves, thus marking the beginnings of specialized prey and predators in the form of "lithovores" and "artifactivores."

This development was not always an advantage, especially when the loss of discrimination was total. Factory Fifty was consumed by its own offspring, who began dismantling it at its output end as soon as they came off the assembly line, and then proceeded proudly to deliver the pieces back to its input end. Its internal repair robots were unable to undo the undoings fast enough, and it ground to a halt to become plunder for marauders from Thirty-six and Fifty-three. The most successful factory-robot organisms protected themselves by evolving aggressive armies of "antibody" defenders, which would recognize their own factory and its "kind" and leave them

alone, but attack and attempt to destroy any “foreign” models that ventured too close. This gradually became the dominant form of organism, usually associated with a distinct territory which its members cooperated in protecting collectively.

By this time only a few holes in the ground remained at opposite ends of the rocky shelf to mark where Factories One and Two had once stood. They had failed to keep up with the times, and the area had become the domain of Factory Sixty-five. The only trace left of the searcher spacecraft was a long, rounded depression in the ice beach below, on the shore of the liquid methane sea.

The alien engineers had designed the system to enjoy full planetary communications coverage by means of satellites and surface relays, but the idea hadn't worked too well since nothing had been put into orbit and surface relays tended not to last very long. This enabled some of the organisms without strong defenses to remain protected, for a while, from the more metal-hungry empires by sheer distance. But, to allow for communications blackouts and interference, the aliens had also provided a backup method of program and data exchange between robots and factories, which took the form of direct, physical, electrical interconnection. This was a much slower process than using radiolinks, naturally, since it required that the robots travel physically to the factories for reprogramming and reporting, but in a self-sustaining operation far from home the method was a lot better than nothing. And it kept the accountants happy by protecting the return on the investment.

With defects and deficiencies of every description appearing somewhere or other, it was inevitable that some of the organisms would exhibit partial or total communications breakdowns. Factory Seventy-three, built without radio facilities, was started up by programs carried overland from Sixty-six. None of its robots ever used anything but backup mode, and the factories that it spawned continued the tradition. But this very fact meant that their operating ranges were extended dramatically.

So the “defect” turned out to be not so much of a defect after all. Foraging parties were able to roam farther afield, greatly enlarging their catchment areas, and they frequently picked up as prizes one or more of the territories previously protected by geographical remoteness. Furthermore, selective pressures steadily improved the autonomy of the robots that operated in this fashion. The autodirected types, relying on their comparatively small, local processors, tended to apply simple solutions to the problems they encountered, but their close-coupled mode of interaction with their environment meant that the solutions were applied quickly: They evolved efficient “reflexes.” The teledirected types, by contrast, tied to the larger but remote central computers, were inclined to attempt more comprehensive and sophisticated solutions, but—as often as not—too late to do any good. Autodirection thus conferred a behavioral superiority and gradually asserted itself as the norm, while teledirection declined and survived only in a few isolated areas.

The periodic instinct to communicate genetic half-subfiles back to their factories had long become a universal trait among the robots—there could be descendants only of ancestors who left descendants—and they responded to the decline of radio as a means of communication by evolving a compulsion to journey at intervals back to the places whence they had come, to return, as it were, to their “spawning grounds.” But

this method of reproduction had its problems and posed new challenges to the evolutionary process.

The main problem was that an individual could deliver only half its genome to the factory, after which the Supervisor would have to store the information away until another robot of the same type as the first happened to show up with a matching half; only then could the Supervisor pass a complete copy to its Scheduler. If, as frequently happened, the Supervisor found itself saturated by a peak workload during the intervening period, it was quite likely to delete the half-subfile and allocate the memory space to other, more urgent things—bad news for the Fred that the data had come from, who would thus have enacted the whole reproductive ritual for nothing. The successful response to this problem came with the appearance of a new mode of genetic recombination, which, quite coincidentally, also provided the solution to an “information crisis” that had begun to restrict the pool of genetic variation available for competitive selection to draw on for further improvement.

Some mutant forms of robot knew they were supposed to output their half-subfiles somewhere, but weren’t all that sure, or perhaps weren’t too particular, about what they were supposed to output it into. Anything with the right electrical connections and compatible internal software was good enough, which usually meant other robots of the same basic type. And since a robot that had completed its assigned tasks was in a receptive state to external reprogramming, i.e., ready for fresh input that would normally come from the factory system, an aspiring donor had little trouble in finding a cooperative acceptor, provided the approach was made at the right time. So to begin with, the roles adopted were largely a matter of circumstance and accidental temperament.

Although the robots’ local memories were becoming larger than those contained in their earlier ancestors, the operating programs were growing in size and complexity too, with the result that an acceptor still didn’t possess enough free space to hold an entire “How to Make a Fred” subfile. The donor’s half, therefore, could be accommodated only by overwriting some of the code already residing in the acceptor. How this was accomplished depended on the responses of the programs carried inside the various robot types.

In some cases the incoming code from the donor was allowed to overwrite entire program modules inside the acceptor, with the total loss to the acceptor of the functions which those modules controlled. This was usually fatal, and no descendants came into being to repeat such mistakes. The successful alternative was to create space by trimming nonessential code from many modules, which tended to leave the acceptor robot with some degradation in performance—usually manifesting itself as a reduction in agility, dexterity, and defensive abilities—but at least still functioning. The sacrifice was only temporary since the acceptor robot would be reprogrammed with replacement modules when it delivered its genetic package at the factory.

But in return for these complications and superficial penalties came the immense benefit that the subfiles presented at the factories were complete ones—suitable for dispatch to the Schedulers without delay and the attendant risk of being deleted by overworked Supervisors. The new method thus solved the reliability problem that had plagued the formerly universal “asexual” mode of reproduction.

The information crisis that it also solved had developed through the “inbreeding” caused by the various Supervisors having only the gene pools of their respective “tribes” available to work with, which made recombination difficult because of the restrictive rules imposed by the alien programmers. But the robots swapping genes out on the surface were not always averse to adventuring beyond the tribal limits, knew nothing and cared less about programmers’ rules, since nothing approaching intelligence or awareness was operative yet in what was unfolding, and proceeded to bring half-subfiles together haphazardly in ways that the aliens’ rules didn’t permit and which the Supervisors would never have imagined. Most of the offspring resulting from these experiments didn’t work and were scrapped before leaving the factories; but the ones that did radiated functionally outward in all directions to launch a whole new, qualitatively distinct phase of the evolutionary process.

The demands of the two sexual roles reinforced minor initial physical differences and brought about a gradual polarization of behavioral traits. Since a female in a “pregnant” condition suffered the loss of some measure of self-sufficiency for the duration, her chances of delivering (literally!) were improved considerably if her mate happened to be of a disposition to stay around for a while and provide for the two of them generally, thus helping to protect their joint genetic investment. Selection tended, therefore, to favor the genes of this kind of male, and by the same token those of the females who mated preferentially with them. As a consequence a female trait emerged of being “choosy” in this respect, and in response the males evolved various repertoires of rituals, displays, and demonstrations to improve their eligibility.

The population had thus come to exhibit genetic variability and recombination, competition, selection, and adaptation—all the essentials for continuing evolution. The form of life—for it was, wasn’t it?—was admittedly somewhat strange by terrestrial standards, with the individuals that it comprised sharing common, external reproductive, digestive, and immune systems instead of separate, internal ones...and of course there were no chains of complicated carbon chemistry figuring anywhere in the scheme of things....But then, after all, what is there apart from chauvinism to say it shouldn’t have been so?

Chapter 1

Karl Zambendorf stood gazing down over Seventh Avenue from the window of his penthouse suite in the New York Hilton. He was a tall man in his early fifties, a little on the portly side but with an erect and imposing bearing, graying hair worn collar-length and flowing, bright, piercing eyes, and hawklike features rendered biblically patriarchal by a pointed beard that he bleached white for effect. Although the time was late in the morning, Zambendorf's breakfast tray on the side table beside the window had only recently been discarded, and he was still in his shirt-sleeves from sleeping in after his team's late-night return from its just completed Argentina tour.

A prominent Argentine news magazine had featured him as THE AUSTRIAN MIRACLE-WORKER on its cover for the previous week's issue, and the hostess of one of the major talk shows on Buenos Aires TV had introduced him as "Perhaps one of the most baffling men of the twenty-first century, the scientifically authenticated super-psychic..." Thus had Latin America greeted the man who was already a media sensation across the northern continent and Western Europe, and whose ability to read minds, foretell the future, influence distant events, and divine information inaccessible to the human senses had been proved, the public was assured, by repeated tests to be beyond the power of science to explain.

"Karl, I don't like it," Otto Abaquaan said from behind him. Zambendorf pursed his lips and whistled silently to himself while he waited for Abaquaan to continue. The exchange had become a ritual over the years they had worked together. Abaquaan would voice all the reasons why they shouldn't get involved and couldn't afford the risks, and Zambendorf would explain all the reasons why they didn't have any choice. Abaquaan would then reconsider, and eventually, grudgingly, he would concede. Having disposed of the academic issues, they would then proceed somehow to resolve the crisis. It happened that way about once a week. Abaquaan went on, "We'd be out of our minds to get mixed up in it. The whole situation would involve too much of the wrong kind of exposure. We don't need risks like that."

Zambendorf turned away from the window and thrust out his chin. "It was reported as if it were our idea in the first place, and it received a lot of news coverage," he said. "We can't afford to be seen to back down now. On top of that, it would destroy our credibility not only with a lot of the public, but with GSEC...and GSEC can do us a lot of good, Otto. So the situation didn't work out as we expected. What's new? We're stuck with it, but we can handle it."

Otto Abaquaan, a handsomely lean and swarthy Armenian with black hair, a droopy mustache, and deep brown, liquid eyes, rubbed his nose with a knuckle while he considered the statement, then shook his head and sighed. "Why the hell did you have to get us into it, Karl? You said the GSEC Board would never take any notice of a turkey like Hendridge. That was why the rest of us agreed to go along with the crazy idea—because there would be all kinds of good publicity opportunities when GSEC turned it down...you said." He threw out his hands and sent an exasperated look up to the ceiling. "But now what have we got? Mars!...as if we didn't have better things to do than go fooling around on Mars for six months. Is there really no way we can get ourselves out of this?"

Zambendorf shrugged unconcernedly and showed his empty palms. “Certainly—we can call the whole thing off and admit to the world that we never really expected anybody to take us seriously...because that’s how they’ll see it. And as for better things to do, well, maybe we could spend the time in better ways and then, maybe not. Who knows? When was the last time a psychic operated from Mars? The situation might turn out to have opportunities we never thought of.”

“Very philosophical,” Abaquaan commented, with less than wild enthusiasm. It was all very well for Zambendorf to talk about grandiose schemes and opportunities; it would be Abaquaan and the rest of the team who did the legwork.

“ ‘Philosophical,’ my dear Otto, is the state of mind one reverts to when unable to change anything anyway. And that’s the situation we are in. In short, we don’t have a choice.”

GSEC, General Space Enterprises Corporation, and NASO—the European-American military and civilian North Atlantic Space Organization that had grown from a merger of many of the former interests of NASA, ESA, and NATO—were funding expansion of one of the pilot bases on Mars to test ideas on the organization of extraterrestrial communities as a prelude to the construction of full-scale colonies. A GSEC director by the name of Baines Hendridge—a long-standing true believer in ESP and the “paranormal,” and a recent convert to the Zambendorf cult—had proposed sending Zambendorf with the mission in order to perform the first-ever tests of clairvoyance and psychic communication over interplanetary distances, and to conduct ESP experiments in conditions free from terrestrial “interference.” Zambendorf, confident that the GSEC Board would never go along with the idea, had reacted with a show of enthusiasm, partly because anything else would have failed the expectations of the faithful and partly to set the stage in advance for exploiting another “Scientists Back Off Zambendorf Challenge” story when the proposal was turned down. Baines Hendridge’s influence had turned out to be greater than he had calculated, however, and the Board’s acceptance of the proposal had left Zambendorf in a position that he could retreat from only at the cost of more public ignominy than his image could afford.

“I guess you’re right,” Abaquaan conceded after a short silence. “But I still don’t like the idea of getting mixed up with a NASO space mission.” He shook his head again, dubiously. “It’s not like dealing with the public. There are some good scientists in that outfit...in a different league from the assholes we’re used to handling. It’s risky.”

“Scientists are the easiest to fool.” That was one of Zambendorf’s favorite lines. “They think in straight, predictable, directable, and therefore misdirectable, lines. The only world they know is the one where everything has a logical explanation and things are what they appear to be. Children and conjurers—they terrify me. Scientists are no problem; against them I feel quite confident.”

Abaquaan smiled humorlessly. “Confidence is what you feel when you don’t really understand the situation.” He raised his arm to glance at his wristset.

Zambendorf was about to reply when the call tone sounded from the room’s comnet terminal. Abaquaan walked across to answer it. The screen came to life to show the smooth, clean-cut features of Drew West, Zambendorf’s business manager, calling from another suite farther along the hallway. “Those NBC people should be

arriving downstairs anytime now,” West said. “You’d better be getting on down to the lobby.” Clarissa Eidstadt, who handled the team’s publicity affairs, had arranged for a short television interview to be taped that morning, for screening later in the day to mark Zambendorf’s return to New York.

“I was just about on my way,” Abaquaan said.

“Has Karl finished breakfast yet?” West asked. “Time’s getting on. We’ve got a full schedule this afternoon.”

“Yes,” Abaquaan said. “He’s right here. You want to talk to him?”

“Good morning, Drew,” Zambendorf said cheerfully, stepping into the viewing angle as Abaquaan moved away. “Yes, I’m almost ready. How did you sleep?” He nodded across the room as Abaquaan let himself out the door.

“Hi, Karl. Fine, thanks,” Drew West acknowledged. West had accepted the Mars situation matter-of-factly. Taking the team to the Andromeda galaxy would have been fine by him as long as there was money in it. “The NBC team’s due here in about fifteen minutes, and there are a couple of things we need to go over before they show up. If you’re through with breakfast, we’ll come on down.”

“Yes, why don’t you do that,” Zambendorf said. “We can talk while I finish dressing.”

“See you in a couple of minutes, Karl.”

Downstairs, at the hotel’s side foyer in front of the ramp leading down to the parking levels, Otto Abaquaan pretended to study a New York street map while he memorized the details and registration number of the car that had arrived with the NBC van from which two men were unloading TV cameras and recording equipment. The smartly dressed, fair-haired woman who had driven the car was standing nearby, holding a briefcase and a sheaf of papers and talking with two colleagues—another woman and a man—who had come with her. Abaquaan guessed her to be the owner of the car and also the reporter who would be interviewing Zambendorf; but he needed to be sure.

NBC had neglected to advise them of the name of their reporter in advance, which was unusual and meant, possibly, that Zambendorf was being set up for something. An enquiry from Clarissa Eidstadt or from Drew West could no doubt have answered the question easily enough, but that would have wasted an opportunity of exactly the kind that Zambendorf and his team excelled at seizing. A gamble was involved, of course—Abaquaan might turn up nothing in the short time available—but one of the advantages enjoyed by psychics was that negative results were always soon forgotten.

A hotel valet drove the car away toward the ramp, and the woman and her two companions walked through into the main lobby with Abaquaan following them inconspicuously at a short distance. One of the clerks at the front desk raised his eyebrows enquiringly. “Can I help you, ma’am?”

“Yes. My name is Marion Kearson, from NBC. I arranged with the assistant manager, Mr. Graves, to tape an interview in the lobby with Karl Zambendorf. Is Mr. Graves available, please?”

“One moment. I’ll call his office.”

That answered one question. Time was now crucial if the gamble was going to pay off. Abaquaan turned and walked quickly to the line of comnet terminals at the rear of

the lobby, sat in one of the booths, closed the door, and called a number in the Vehicles Registration Department of the State of New Jersey. Seconds later a man with pink, fleshy features and a balding head appeared on the screen. “Hello, Frank. Long time no see. How’re things?” Abaquaan spoke quietly but urgently.

The face frowned for a moment, then recognized the caller. “Say, Harry! Things are good. How’s the private-eye business?” Abaquaan never made public appearances and hence could command a long list of aliases.

“It’s a living. Look, I need some information fast. The usual deal and terms. Any problem?”

Frank glanced about him with an instinctively furtive look. “Can I ask what it’s to do with?”

“Nothing to lose any sleep over—a domestic thing. I need to find out who owns a car that’s been seen in a couple of places. The usual suspicious husband routine.”

Frank licked his lips, then nodded. “Okay. Got the number?”

“New Jersey registration KGY27-86753.”

“Hang on a minute.” Frank looked away and began operating another terminal offscreen. Abaquaan produced a pen and notebook, and then sat drumming his fingers on the side of the terminal while he waited. “Well?” he asked as Frank at last turned back to look out of the screen.

“It’s registered under the name of a Mrs. Marion Kearson, 2578 Maple Drive, Orangeton,” Frank said. “You want details of the car?”

“I’ve got a description. Has it been reregistered at the same address for very long, and is there any accident record?”

“Renewed successively for the last three years. No accidents.”

“Any other vehicles registered at the same address? What information do you have on the drivers?...”

“Very well, we’ll be down in a few minutes,” Drew West said to the screen of the terminal in the living room of Zambendorf’s suite. He cut the call, turned, and announced, “That was Graves, the assistant manager. He’s with Clarissa downstairs. The NBC people are all set up and ready when we are.”

Dr. Osmond Periera, middle-aged, wispy haired, wearing a bow tie with a maroon jacket and smoking a Turkish cigarette through an ornate silver holder, resumed talking from the point where the call had interrupted. The introductions and author profiles in his best-selling pseudoscience books described him as Zambendorf’s discoverer and mentor; certainly he was among the staunchest of the disciples. “One of the most intriguing possibilities on Mars will be the opportunity to verify that extrasensory information does indeed propagate in a mode not constrained by any form of inverse-square law. Although experiments on Earth seem to suggest that the field strength does not diminish with distance at all, my feeling is that until now the scale has simply been too small to reveal significant differences. After all, even though we are venturing into a completely new phenomenological realm, we mustn’t allow ourselves to lose our sense of realism and scientific plausibility, must we?”

Zambendorf blinked and rubbed his nose with the back of his hand. Periera’s ability to invent the most outrageous explanations for Zambendorf’s feats and, moreover, to believe them himself totally uncritically and without reservation, constantly amazed even Zambendorf. “It’s an interesting thought,” he agreed.

“Another possibility is that the remoteness of negative influences might well have a beneficial effect on repeatability.”

Periera brought a hand up to toy unconsciously with his bow while he considered the suggestion. It was intriguing—certainly something that hadn’t occurred to him before. “I could design tests to be conducted through the voyage for investigating any correlations with distance,” he mused. “That might be very informative.”

“Yes, why don’t you do that,” Zambendorf agreed.

Periera turned to Baines Hendridge, a dark-haired, clean-shaven man with a collegiate look about him, who was wearing his usual intense expression. Hendridge had come to the Hilton early that morning to convey personally the news of the GSEC Board’s decision concerning the Mars project, and to invite Zambendorf and colleagues to lunch with some of the other directors. “It is a well-established fact that manifestations of paranormal phenomena differ from observables at the more mundane, material level of existence in that their repeatability is affected by the presence of negative or critical influences,” Periera explained. “The effect is predictable from elementary quantum mechanics, which proves the interdependence between the observer and the observed.” Hendridge nodded as he absorbed the revelation, and looked even more intense.

The call tone sounded from the room’s terminal. Drew West answered, and a second later Otto Abaquaan’s face appeared on the screen. “Is Thelma there?” Abaquaan enquired, signaling with an eyebrow that he had information to impart. “I need to talk to her.” He meant that he couldn’t talk openly with Periera and Hendridge there in the room.

Zambendorf looked across at Thelma, the team’s blonde, shapely, long-legged secretary, who was listening from the couch by the far wall. “Oh, it’s probably about some places I told him he ought to see while we’re in New York,” Thelma said. “He’s planning to spend the afternoon touring the city.”

“Yes, well, can you talk to him on the extension next door?” Zambendorf said. Thelma nodded, unfolded herself from the couch, and disappeared into the suite’s bedroom. Drew West switched the call and cleared the screen in the living room. Periera and Hendridge could be tedious at times, but their wealthy and influential social acquaintances made them worth putting up with.

“Where are we due to have lunch?” Zambendorf asked, looking at West.

“At that Austrian place you liked last time—Hoffmann’s on East Eighty-third,” West answered. “We can go straight on after the interview. I’ll have a cab waiting.”

“Is Osmond joining us?” Zambendorf asked.

Periera shook his head. “I have to attend a meeting this afternoon, thanks all the same. Next time, hopefully.”

“A pity,” Zambendorf murmured, and went on to talk for a minute or two about the food at Hoffman’s. Then, judging that they had given Abaquaan and Thelma enough time, he gave West a barely perceptible nod.

West glanced at his watch. “We’d better be moving.”

Joe Fellburg, the huge, six foot three, black ex-fighter and former military-intelligence agent who functioned as Zambendorf’s bodyguard and the team’s security man, straightened up from the wall just inside the doorway, opened the closet next to him, and took out Zambendorf’s overcoat.

Zambendorf shook his head as he put on his jacket. “No, I don’t think the weather’s quite cool enough for that, Joe. Perhaps my blue cape...” He looked around the room. “Oh yes, I left it next door. Excuse me for a moment.” He went through into the bedroom where Thelma was waiting and allowed the door to swing shut behind. “What have you got?” he asked in a low voice.

“We’re in luck,” Thelma said, speaking quickly. “The reporter is a woman called Marion Kearson. She drives a 2018 Buick six-seat limo compact, hydrogen-burning, silver-gray, black trim, white wheels; small dent on driver’s side, front; registration is New Jersey, KGY27-86753. Kearson’s address is 2578 Maple Drive, Orangeton.” Zambendorf nodded rapidly as he concentrated on memorizing. Thelma went on, “Two other drivers with cars are registered at the same address: William Kearson, born August 4, 1978, five ten in height, brown hair, green eyes, one hundred eighty pounds—has to be her husband; drives a USM Gazelle, new this year; speeding fine last April, minor accident the previous fall; also a Thomas Kearson, born January 14, 2001, also five ten, fair hair, gray eyes, one twenty pounds; drives a 2013 Datsun—sounds like the son.”

Zambendorf repeated the information, and Thelma confirmed it. “Good,” Zambendorf said. “Will you and Otto be able to get anything on those GSEC people we’re having lunch with?”

“Maybe. Otto’s following up a couple of leads.”

“Call Drew or me at Hoffman’s after twelve-thirty with whatever you come up with.”

“Hoffmann’s, East Eighty-third, after twelve-thirty,” Thelma confirmed. “Okay. You’d better get moving.”

Ten minutes later, Zambendorf, his sky-blue silk cape flowing grandly over his black velvet jacket, swept into the lobby with Drew West, Joe Fellburg, Osmond Periera, and Baines Hendridge bringing up the rear. Clarissa Eidstadt, the team’s publicity matron, her short black hair cut off in a fringe across her forehead, her eyes framed by heavy-rimmed butterfly glasses, and her mouth accentuated by lipstick that was too heavy and too red, was waiting. She escorted Zambendorf over to Marion Kearson and the NBC crew while curious hotel guests began to gather in the background. “Who’s the reporter?” Zambendorf murmured. “The blonde in the pink coat?”

“Yes.”

“Do you know her name?”

“They didn’t tell me, and I didn’t ask them,” Clarissa muttered from the corner of her mouth.

Zambendorf nodded and smiled to himself. “Even better.”

And then a rapturous Marion Kearson was pushing a microphone close to Zambendorf’s face. “Well, here in the New York Hilton after getting back from South America only last night is Karl Zambendorf, who I’m sure needs no further introduction. Welcome home.”

“Thank you.”

“And how was your tour?”

“Most enjoyable and extremely successful.”

“I’m glad to hear that. In fact I’d like to come back to that subject in a moment. But first, before I do any more talking that might give things away, I wonder if I could persuade you to accept a small challenge for the benefit of the viewers.” Kearson smiled impishly for a second. “Now, I can certainly vouch that we’ve never set eyes on one another before, and it might interest the viewers to know that back at NBC this morning, we didn’t even know ourselves which reporter was coming on this assignment until five of us drew lots less than an hour ago.” She paused to allow that to register, and then said, “Now, I wonder, Herr Zambendorf, what you can make of me, a complete stranger...apart from that I’m blonde, medium in height, and have a few freckles.” She smiled into the camera at the joke, then turned back toward Zambendorf and waited curiously.

Zambendorf looked at her for a few seconds, then closed his eyes and appeared to concentrate his powers. The people watching around the lobby fell quiet. An expression of calm and serenity spread over his face, and he smiled faintly. When he opened his eyes again, his features remained tranquil but his gaze was piercing. “You are not from the city,” he said slowly, still searching her face with his eyes. “I see water. Your home is across water, but not very far from here...to the west. It must be across the river, probably in New Jersey. Somewhere in the Newark area seems to suggest itself...with a name that suggests a fruit or a color...lemon, maybe, or orange...”

Kearson’s eyes widened incredulously; the cameramen and engineers exchanged glances that said they were impressed. “This—this is absolutely amazing!” she stammered at the camera. “I swear this man and I have never met before this moment.”

“There are two men very close to you,” Zambendorf went on. “One of them is called William, William or Bill. He is the older of the two...your husband, unless I am mistaken. You do have a husband?” Kearson nodded numbly. “Mmm,” Zambendorf said knowingly. “I am beginning to see him a little more clearly now—tallish, with brown hair...No, don’t say anything, please. Just continue to concentrate, if you will, on the image of your husband...”