

"You're the physicist, Buzz. Can we make it go?" Ed Alderman asked, his deep bass voice deliberately reasonable and friendly.

Buzz Baxter tilted his lean frame back in the too-tall and narrow control chair in weary patience. He was bone-tired and irritated, but the thought that he had to accept orders from Ed for six more years kept him civil. "I honestly don't know. This is a smaller fusion engine than we thought possible, and according to what I know of plasma confinement it can't work. Presumably it does, somehow. I need more time."

Ed gave him a cool, level stare. He was the only member of the team with a military background, apparently the reason he had been selected as commander of the first interstellar expedition. He had also taken a minor in physics, making him back-up man to Buzz in that field. But they had discovered in their first year out that the preflight psych matching tests were faulty. The short astronaut and the tall physicist got along best at a respectful distance. There had been no major problems during the six slow years they crawled toward Alpha Centauri, but Buzz often felt that was only because Interstellar B was available to each married couple every third week. He and Elinor, and Ed and Jan occupied the A spacecraft together only one week in three.

"Buzz, you know we have just four more days. After that it's short meals and reduced oxygen all the way back. Marjorie says positively no, her tests show our group stability factor as just above the red line now. We leave on schedule, with or without understanding this confounded miniature power system. And, with no profit to show, we just may be the first *and* last expedition. Can I help you in any way?"

Buzz shook his head immediately, and saw that the quickness of the rejection jarred Ed. But there was no point in bringing in another person who knew less than himself; Elinor provided all the physical help he needed. Her work as expedition biologist was over. She had taken numerous soil samples from the surrounding area, thoroughly searched the broken ship, and photographed and measured every personal use artifact she could reach. Neither on planetoid or ship was there any trace of life. She had been assisting her husband for the past three days.

"All right; I'm going to send the daily report up to Jan." Ed pulled on his helmet and turned toward the air lock. Buzz knew their commander wanted some encouraging news for Jan, who would start it on its four-year journey to Earth. He watched Ed enter and manually close the inner door. The fact that the engine room had its own air lock was a lucky break for them, and a good indication of the differences in thought patterns. Humans would never have installed two air locks on such a small spaceship.

Elinor returned from what they had decided was the spare parts room, carrying her camera. Her long brown hair was pulled into a severe ponytail, and there was a smear of dust on her left cheek. "All through with the recording and inventory," she said, in the low voice that always soothed his taut nerves. "Ed seems to be getting a little impatient with us. Sure you shouldn't have let him help?"

"I'm sure. Let's recheck the circuitry in our patchbox and make another run."

Elinor took the meter leads and started checking the contacts he indicated. It had taken Buzz two weeks to isolate the drive and its master console, tie in a battery from their shuttle for control power, and activate the unit. Now the drive's moving parts, primarily a series of control rods, moved smoothly back and forth in their cylindrical vacuum chamber. He could even release deuterium and start the heating process that would turn it into a plasma. And there he had stalled, completely lost. The alien's magnetic field was totally inadequate, and he could see no way to strengthen it. Long before the hydrogen heated to the required 80 million degrees Kelvin it blew away in tattered streamers. There was something basic in the operation of this device he did not understand.

Buzz confirmed Elinor's quietly spoken checks with low grunts, his mind elsewhere. They had used up their allotment of luck; now they had to depend on ability. After six slow years of flight the two spaceships had passed by Proxima Centauri closely enough to be certain it had no planets of any size, and found only scattered rocks around the KS component of the twin suns. They had spotted this unnamed planetoid slightly smaller than Earth's moon, circling in lonely elliptical orbit 120 million miles out, when they approached the G2 star. Far too small to possess an atmosphere, it had seemed only a

barren sphere of rock, but they had orbited and started scanning because it was the only solid body of any size at all . . . and found the wrecked ship on the second day.

They would hear the acknowledgment to their jubilant message announcing proof of other life in the galaxy during the fifth year of their homeward flight. But they could imagine the mingled joy and fear that would sweep over the planet; they had experienced it in miniature themselves. Men had walked on Earth's moon, on Mars, on Jupiter's Ganymede and Callisto, on Saturn's Titan, in a wasted search for life. Unmanned probes had explored the hot surfaces of Mercury and Venus, the seas of frozen hydrogen, helium and methane covering Jupiter and the other gas giants, the cold desolation of iron and rock that formed Pluto, and nowhere in the solar system was there the slightest trace of life. The believers in the space program, after years of periodic ups and downs, had persuaded the World Science Council to finance the greatest trip of all, to the nearest star. And now the major question of the past century was answered in the affirmative, and, if they could carry back knowledge worth billions in research money, the space program would never again be in danger.

Both the joy and fear had faded when they landed their small shuttle and explored the alien vessel. It had been a short, sturdy cylinder designed to land nose-up on six spidery legs; apparently they had not developed the shuttle concept. On this landing two of the legs had come down on the roof of a large hidden cavern. The thin rock had collapsed after the engines were off and the vessel had fallen on its belly. The center had impacted on the farther wall of the cavern, breaking the body almost in two. The front end was a twisted maze of titanium alloy which the humans had neither the time, or equipment, to untangle. The back third was relatively intact, with most of its length suspended over the open cavern. And the back contained six comparatively small nuclear rockets and a heavily shielded room with a cylindrical vacuum chamber that had to be their source of power.

Steve Lord, their geologist, had found the imprint of the alien's companion ship only a few hundred yards away. By the time-scale worked out on the Moon, the prints were less than eighty years old. It seemed clear that another intelligent species, one taller and thinner than *Homo sapiens*, but biologically similar, had dispatched an exploration party to Alpha Centauri. When one ship suffered a disastrous landing, the second came down and took off the survivors, a close parallel to their own planning if one Interstellar failed.

The aliens were technologically ahead of Earth, but only slightly . . . which meant it should be possible to learn from them. Man had explored beyond his solar system at the earliest possible moment, using relatively crude fission-powered ships with supplementary ion drives. The aliens had fusion power plants small enough to be practical in a spaceship. This seemed the one item that might give Earth a large gain in technology, and, since it was far too heavy for the shuttle to lift, they had to learn its secret on the ground. Ed Alderman wanted Buzz to produce, and was bearing down hard. Buzz had felt that he was progressing nicely, until he discovered they apparently contained controlled hydrogen fusion with a magnetic field that wouldn't hold a metal wrench off the field.

The air lock opened again and Steve Lord came in, carrying his sample case. He unsuited and joined them. "Any closer to solving the problem, Buzz?"

"Afraid not," Buzz answered. "Learn anything new yourself? Find the missing bodies?"

"No, I'm convinced they preserved their dead and took them back home, wherever that is. Anyway I can be of help to you and Elinor?"

"Yes, you can keep Ed off my neck," Buzz said with a grin. Like Elinor, Steve had collected all the samples they really needed and was saving the analyses to occupy time on the tedious trip home. His wife Marjorie, the crew doctor and psychologist, was orbiting in Interstellar B. The shuttle carried four, and the commander, physicist, biologist, and geologist had been the natural choices for the landing party. The doctor and Jan, the astronomer, were the two least needed on the ground.

The engine room was still airtight, and they had filled it with oxygen from the shuttle's reserve tank. There was plenty of working room, but little Steve could do until Buzz decided on their next move. And for that he needed to understand the theory behind the alien's plasma control, a concept still far beyond his grasp.

Elinor finished her checks and Buzz made another run, with the same negative results. Long before

the hot gas reached the plasma state it broke the weak magnetic grip and fled out the pipe he had rigged to the exterior vacuum.

"Don't you need some rest?" Elinor asked sympathetically as he let the power die.

"Maybe I do," Buzz said wearily as he turned and started suiting up. "I'll take a short nap. But first I want Jan to check a few items in our own manuals."

Buzz stepped out of the small air lock into the bright light of Centauri G2, small at this distance but otherwise similar to Sol. It had been early afternoon when they landed and they would be leaving just before dark; the planetoid had an eighty-day rotation. The K5 companion was hidden on the other side of this barren round rock, but Proxima was visible as a very bright star low on the horizon.

Instead of entering the shuttle immediately Buzz walked slowly around the tail of the wrecked ship, noting again that at less than two hundred feet in length it was far shorter than the Interstellars, though almost twice the diameter. There was a subtle alienness to the look and feel of the design that jarred on the senses, making him realize there was a remarkable resemblance between the crudest stone ax and the most modern hand tool; both were designed by and for humans. He wondered if it would be possible to meet an extraterrestrial without deep-seated revulsion, without feeling unthinking, almost instinctive, dislike.

Buzz saw nothing that would help him with his present problem, and finally entered the shuttle and called Jan Alderman. There was just time enough for her to look up the items he wanted before the interstellars passed below the horizon. The fact that the shuttle had fuel for only one more round trip, and Ed insisted on reserving it for emergencies, was a nuisance. He needed several items they had not brought down with them. But the entire expedition functioned under stringent limitations, as the space program had from its inception. The huge weight of life support supplies and regenerative equipment left little room for luxuries, or space fuel for a shuttle they might never have used.

Ed returned to the more roomy wreck while Jan was quoting the items Buzz wanted. Buzz learned nothing that could help him, and changed the radio to suit-relay operation and followed Ed. In the spare parts room, where Elinor had been working and where they slept for privacy, he shed his suit and lay down on the improvised bunk. He was immediately wide awake, though still intensely tired, and had to make a conscious effort to relax. The tall aliens had taken most of their spares with them, but several that were left bothered him. The modular components, like the spare controllers, were easy enough to understand, but the function of items such as the wrist-thick silvery rings with the hundreds of little disks attached to the inside was a mystery. There were twenty-two of those rings, eighteen almost six feet in diameter and two each of four feet and two feet. Their function, whatever it was, must belong to the wrecked front end of the ship. He had seen nothing in the engine room that remotely resembled them.

Buzz realized he had been asleep when Elinor gently shook him awake. He staggered erect, at the concentrates she had warmed for him, and returned to the baffling fusion engine he was never going to understand. It was small comfort to realize there were scientists on Earth busily working to reduce the present huge hydrogen fusion machines, and in twenty years they might have one small enough to power a ship. That vessel would be an ocean submarine tanker, not the first spaceship headed for Munich 15040.

The aliens' equivalent of a computer was located in the control room at the front of the ship, and had been smashed into scrap. There was no other source of recorded information about the power supply. Any printed sheets, or manuals, they possessed had gone back with them, leaving only the actual machinery to work with. The problem had to be solved here and now or not at all.

Elinor moved past him to her position at the master control console. Marjorie Lord was the official psychologist, but Elinor, her backup, was actually better at human relations and did more to keep harmony among the six isolated humans. Buzz knew that, if the pressures of command caused Ed to lean too heavily on the crew's physicist, Elinor would quietly speak to each man alone, in some intuitive method, uniquely her own, easing the tension. Marjorie, recognizing ability that was real rather than academic, had quickly yielded most of her mental health work to Elinor. She still performed the official psychometric tests, and functioned as doctor and general helper to the others.

Buzz had managed to interpret the marks on the strange oblong raised dials, and with a grease pen.

cil had written the English equivalent figures on the glass faces. The sophistication of the equipment was apparent in the small number of monitoring units and the simplicity of the physical control system. With the patchbox and the operational controls on the console he could manage a heat-run up to the point where a self-sustaining fusion reaction would occur—if he could contain the plasma. The key lay in the magnetic field, and there he had been unable to follow their reasoning, or understand the design. He was like a man with only a basic knowledge of radio suddenly confronted by a transistor; he could see what it did, but, with no understanding of semiconductors, not how.

Buzz shook his head, as though trying to dislodge the preconceptions that were keeping him from the truth, and returned to work.

At the end of two more days, relieved only by two short naps and hurried bites of food, he was no closer to a solution than before. When he wolfed down his breakfast on the third morning and hurried to the console he knew it had to be within the next few hours, or not at all. He hadn't shaved in four days, or bathed since landing. Fatigue was a constant companion, gnawing at his strength. Today he had to succeed, or clear the way for Elinor to enter the chamber with her cameras. But he had little faith that even Earth's best physicists could learn more from a photographic record than he could from the actual machinery.

Ed and Steve were in the storeroom, selecting the few pounds of alien equipment they could carry back with them. As Buzz reached for the patchbox Elinor stopped him with a tentative touch on the forearm. "Buzz, I've been thinking. The problem here, isn't it that the coils are just so small they can't produce a magnetic bottle with sides strong enough to hold the deuterium in place while you heat it into a plasma?"

Buzz grinned, and touched her face with a quick, tender hand. "Bad terminology, but that's close enough."

"Could there be such a thing as a magnetic amplifier? I mean—you're looking for some way to increase the field strength, but does it have to be with larger magnets, or higher currents? Is there such a thing as a device that just . . . sits there and makes the field stronger?"

Buzz frowned, unable to follow her. "If you place a conductor in the field it lessens reluctance and increases magnetic strength, sure; that's one of the basic laws. But you can't have a solid in the same area as plasma."

"No, but I was just thinking . . ." She trailed off into silence as Ed walked up. The short man looked at the day's setup and turned to Buzz. "Any chance you can solve the mystery today?"

"Not one in a million," Buzz replied without hesitation.

"Then you've let us down," Ed said, his voice unusually low.

Buzz whirled around to face his commander, smoldering resentment at last bursting into open fire. He could almost feel the shock of adrenalin pouring into his blood under the stimulus of anger, realized that he had involuntarily clenched his fists, as though the confrontation would be physical. He opened his mouth and found himself stammering, as he had not done since childhood. In his mind's eye he saw a red baseline on Marjorie's overall crew stability chart, knew that Ed's condemnation had just taken them below that line, and when he got his twisted tongue under control and told the short astronaut what he thought of him it would dip far lower, past the point of possible recovery. Their real enemies were themselves and tedium, six long years of it still ahead, and it would have been easier by far to fight the tentacles, or claws, of a living alien.

They had known since the first year out that personality problems were their greatest danger. The nominal requirements for food, drink and fuel were easily established; the more complex baseline, for a crew's mental health was harder to determine. They had been living with a small safety factor since discovering Buzz and Ed were inimical types, and now even that was gone.

Ed stood waiting for the insubordination that would enable him to relieve Buzz, calmly self-controlled. Elinor said clearly and loudly, "I have an idea!"

Her voice was like a dash of cooling water on rose-red steel. Both men whirled toward her and she went on quickly, "Those large silvery rings with the hanging disks, Buzz; I noticed yesterday that they have little attaching points that match the hooks on the ends of the extensible rods in the chamber. If you

position the rods the same distance apart, both vertically and horizontally, they could hold up the whole set of rings. And I think you could move them together, or apart, with the rod controls. Of course they wouldn't do anything but sit there on the outer edge of the field, which is why I was asking you . . ."

Almost instantly a design leaped into Buzz's mind, one so obvious he realized he had overlooked it while dwelling too heavily on complexities. If the eighteen larger rings were arranged the length of the vacuum cylinder with the four-and two-foot ones at each end, they would roughly match the shape of the cylindrical magnetic field. They would be suspended just above the coils and there was no way they could contribute to flux flow by supplying a return path, but Elinor and Ed were just behind him when Buzz dashed for the spares room, in his excitement forgetting the low gravity and losing his balance as he entered. He recovered and grabbed the first ring, but then realized he had more important work to do and handed it to Elinor. He returned to the engine room, closed the exterior vent, and flooded the vacuum chamber with air. He had to stay at the console and start positioning the first set of rods while they entered and attached the rings. After the first one the work went swiftly, and in an hour they had the entire set installed. Buzz found, as Elinor had thought, that he could change the size of the space they enclosed by bringing them closer together, or spreading them. And he discovered a circuit he had not yet used, that tied the entire set into one automatic control. He hastily changed his patchbox to match the new design.

Ed and Elinor emerged from the chamber, and Buzz closed the entrance panel and manually operated the evacuation vent. Several thousand cubic feet of their precious oxygen vanished into the exterior vacuum, and they were ready for another run.

"Exactly what is it you think we've found?" asked Ed as Buzz started setting the console controls. There was no trace of the commander in his voice; rancor had vanished in the excitement of discovery.

"I'm not certain, Ed," Buzz replied, his mind elsewhere. "Let's make another run and check the effect on the magnetic field. If these rings somehow increase it enough to hold the plasma, we have our answer."

It took only minutes to feed deuterium into the chamber and start the heating process. As he fed current into the field coils Buzz saw the small disks hanging from swivels on the inside of the rings starting to move, those on bottom and sides gradually lifting until they pointed toward the center of the chamber. At a certain point all the disks began whirling. The field strength needle Buzz was watching, till then barely off its peg, made a substantial jump. At the same time the coil temperature, which had been near its limit, started back down. And the amount of current available to feed the coils suddenly increased.

At the moment Buzz had no time to wonder about the laws of physics he was seeing broken. The cycle continued, more heat being converted into power while the coil temperature remained constant, the extra power increasing the strength of the magnetic field that held the hot gas locked in the center of the chamber. When the temperature passed the 80 million degree mark and the plasma approached the point of sustained fusion, the automatic control on the rings had brought them together almost to their limit. And then the temperature reached the critical point, and, though he knew that operating with their patchbox and jury-rigged system was incredibly dangerous, Buzz was so caught up in the sheer exhilaration of the moment that he took it on over the edge. The white-hot energy of a miniature sun lived and burned within that tiny vacuum chamber, held in check only by ephemeral lines of magnetic force.

Buzz cut off the flow of gas, turned down the heat control until the temperature fell below the critical point, and ten minutes later he was exhausting the bulk of the hydrogen and a few million atoms of helium to the outside.

"And now we can go home," said Ed, in the happiest voice Buzz had heard in years.

"Not just yet; I want to take one of the small rings back with us." Buzz began rechecking his patch-box, though he felt certain the pattern was burned on his brain in lines of fire. "We have to get it into a good magnetic lab to learn how it magnifies an extended field. What I want to know, wife-of-mine, is how you guessed that the rings were part of the chamber's operational equipment and not spare parts."

"Seeing the attaching points on the rings was just dumb luck, Buzz. But I think I know why I connected them with the chamber rods when you didn't. Even though this design is new and strange, you

managed to operate it because you knew what had to be there. I didn't, and so I saw how some extra pieces that wouldn't serve any function could be fitted in. I was too ignorant to know the rings couldn't do what they . . . they do! And in this case ignorance gave me a freedom of mind you didn't have. But do you two really think this little jump in technology will impress the World Science Council enough to get another expedition authorized? They may have made fusion breakthroughs equal to this one by the time we get back."

The two men looked at her with almost identical expressions of amusement. Buzz crossed the few steps between them and caught Elinor in a bear-hug. She yelped at the unexpected pressure and fought her way out of his arms, indignant but laughing. Steve, who had just entered the engine room from the outside, stared at his three crew-mates in mild astonishment.

"Honey, it isn't the small fusion engine we are, carrying home," Buzz finally collected himself enough to say. "Don't you realize it's theoretically impossible for those rings to function as they just did? I wasn't looking for a few circles of metal, with spinning disks that would increase the strength of a magnetic field ten thousand times, because I knew no such thing could exist. Now that we know it does we have to find out how, and why, it works and rewrite one of the basic laws of electromagnetism. They'll still be changing the textbooks and finding new applications twenty years after we reach home!"

"And we'll send the word on ahead right now," said Ed, reaching for his spacesuit. He walked into the air lock, still fastening his helmet.

As the door closed behind their commander Elinor smiled at her husband and said, "I wonder what the Munich group will bring back."

In Times to Come

Next issue features another of Katherine MacLean's stories of Ahmed and his telepathic friend George, "The Missing Man".

In this case the missing man is a computer-programmer systems-analyst who knew all about the environmental control computers that manage a city's wellbeing. And somebody's found him, and a way to make him think up fun-and-games about how half a dozen minor accidents—if carefully timed in the right sequence—are remarkably destructive.

That, of course, is the trouble with computers; they do what they're told to do—not what they're meant to do!—and always believe everything their sensors tell them. Even the complex "fail-safe," self-checking computer operating the nuclear reactor is really very naive. It'll believe anything it's told. . .

Ahmed's job, of course, is to find the missing man and his fun-and-games captors before they have another game, with another major reactor

Finding one missing man among many millions isn't the convenient shortcut to the answer they need—it's just the only way!

THE EDITOR.