

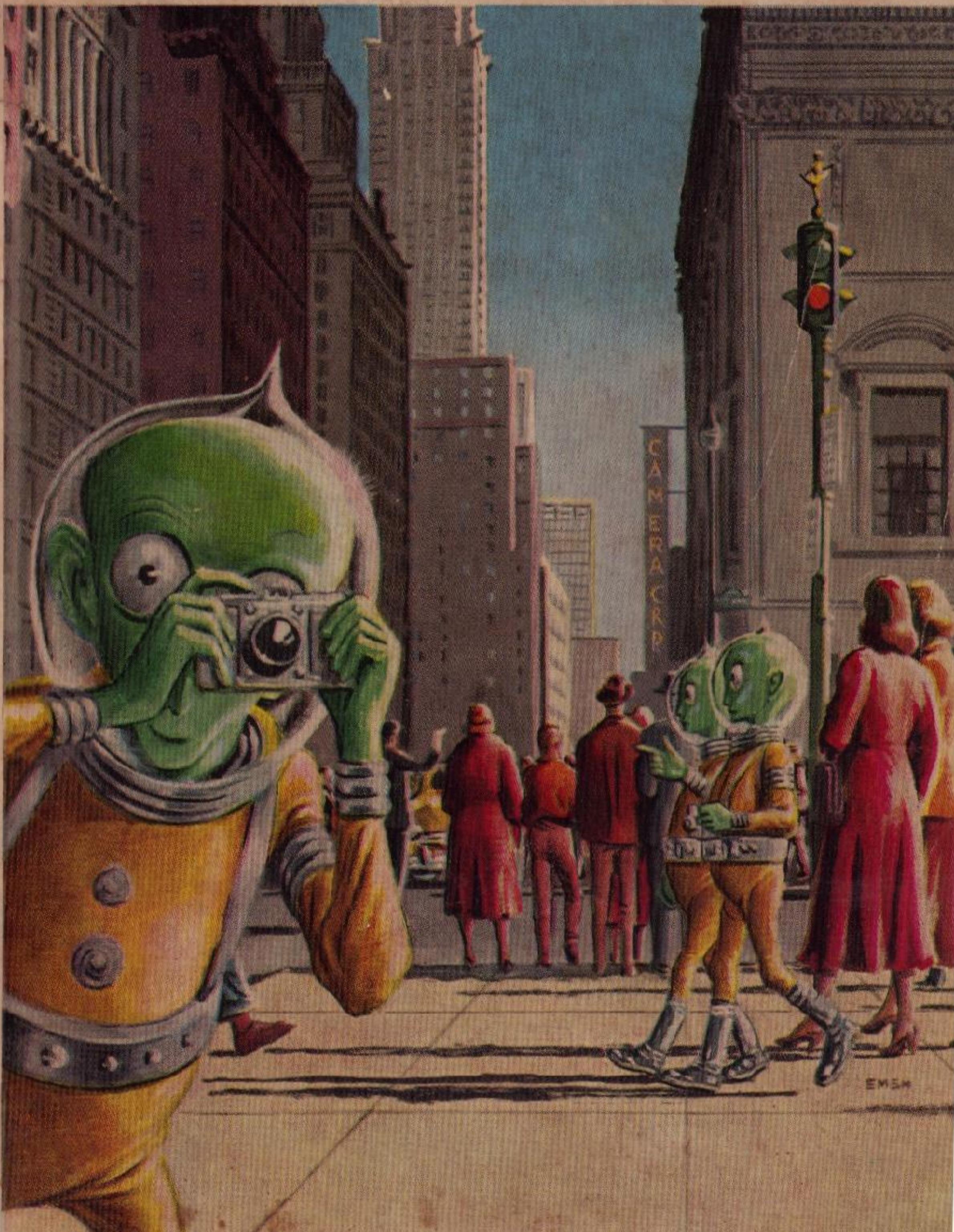
Galaxy

SCIENCE FICTION

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GALAXY

Science Fiction

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SCIENCE FICTION

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CONTENTS

NOVELETS

- SURFACE TENSION by James Blish 4
YESTERDAY HOUSE by Fritz Leiber 60

SHORT STORIES

- PROOF OF THE PUDDING by Robert Sheckley 41
EDUCATION OF A MARTIAN by Joseph Shallit 87

BOOK-LENGTH SERIAL—Conclusion

- GRAVY PLANET by Frederik Pohl & C. M. Kornbluth 104

SCIENCE DEPARTMENT

- FOR YOUR INFORMATION by Willy Ley 49

FEATURES

- EDITOR'S PAGE by H. L. Gold 2
GALAXY'S FIVE STAR SHELF by Groff Conklin 99

SURFACE TENSION

DR. CHATVIEUX took a long time over the microscope, leaving la Ventura with nothing to do but look out at the dead landscape of Hydrot. Waterscape, he thought, would be a better word. The new world had shown only one small, triangular continent, set amid end-

less ocean; and even the continent was mostly swamp.

The wreck of the seed-ship lay broken squarely across the one real spur of rock Hydrot seemed to possess, which reared a magnificent twenty-one feet above sea-level. From this eminence, la Ventura could see forty miles to



By JAMES BLISH

Only an aquatic animal could exist on that world and so Man became just that—nor did reduction in size cause a loss of stature!

the horizon across a flat bed of mud. The red light of the star Tau Ceti, glinting upon thousands of small lakes, pools, ponds, and puddles, made the watery plain look like a mosaic of onyx and ruby.

"If I were a religious man," the pilot said suddenly, "I'd call this

a plain case of divine vengeance."

Chatvieux said: "Hmn?"

"It's as if we've been struck down for—is it *hubris*, arrogant pride?"

"Well, is it?" Chatvieux said, looking up at last. "I don't feel exactly swollen with pride at the moment. Do you?"

Illustrated by WILLER



"I'm not exactly proud of my piloting," la Ventura admitted. "But that isn't quite what I meant. I was thinking about why we came here in the first place. It takes arrogant pride to think that you can scatter men, or at least things like men, all over the face of the Galaxy. It takes even more pride to do the job—to pack up all the equipment and move from planet to planet and actually make men suitable for every place you touch."

"I suppose it does," Chatvieux said. "But we're only one of several hundred seed-ships in this limb of the Galaxy, so I doubt that the gods picked us out as special sinners." He smiled drily. "If they had, maybe they'd have left us our ultraphone, so the Colonization Council could hear about our cropper. Besides, Paul, we try to produce men adapted to Earthlike planets, nothing more. We've sense enough—humility enough, if you like—to know that we can't adapt men to Jupiter or to Tau Ceti."

"Anyhow, we're here," la Ventura said grimly. "And we aren't going to get off. Phil tells me that we don't even have our germ-cell bank any more, so we can't seed this place in the usual way. We've been thrown onto a dead world and dared to adapt to it. What are the panatropes going to do—provide built-in waterwings?"

"No," Chatvieux said calmly. "You and I and the rest of us are going to die, Paul. Panatropic techniques don't work on the body, only on the inheritance-carrying factors. We can't give you built-in water-wings, any more than we can give you a new set of brains. I think we'll be able to populate this world with men, but we won't live to see it."

The pilot thought about it, a lump of cold collecting gradually in his stomach. "How long do you give us?" he said at last.

"Who knows? A month, perhaps."

THE bulkhead leading to the wrecked section of the ship was pushed back, admitting salty, muggy air, heavy with carbon dioxide. Philip Strasvogel, the communications officer, came in, tracking mud. Like la Ventura, he was now a man without a function, but it did not appear to bother him. He unbuckled from around his waist a canvas belt into which plastic vials were stuffed like cartridges.

"More samples, Doc," he said. "All alike—water, very wet. I have some quicksand in one boot, too. Find anything?"

"A good deal, Phil. Thanks. Are the others around?"

Strasvogel poked his head out and hallooed. Other voices rang out over the mudflats. Minutes

later, the rest of the survivors were crowding into the panatrophe deck: Saltonstall, Chatvieux's senior assistant; Eunice Wagner, the only remaining ecologist; El-eftherios Venezuelos, the delegate from the Colonization Council; and Joan Heath, a midshipman whose duties, like la Ventura's and Strasvogel's, were now without meaning.

Five men and two women—to colonize a planet on which standing room meant treading water.

They came in quietly and found seats or resting places on the deck, on the edges of tables, in corners.

Venezuelos said: "What's the verdict, Dr. Chatvieux?"

"This place isn't dead," Chatvieux said. "There's life in the sea and in the fresh water, both. On the animal side of the ledger, evolution seems to have stopped with the crustacea; the most advanced form I've found is a tiny crayfish, from one of the local rivulets. The ponds and puddles are well-stocked with protozoa and small metazoans, right up to a wonderfully variegated rotifer population — including a castle-building rotifer like Earth's *Floscularidae*. The plants run from simple algae to the thalluslike species."

"The sea is about the same," Eunice said, "I've found some of the larger simple metazoans —

jellyfish and so on—and some crayfish almost as big as lobsters. But it's normal to find salt-water species running larger than fresh-water."

"In short," Chatvieux said, "We'll survive here—if we fight."

"Wait a minute," la Ventura said. "You've just finished telling me that we wouldn't survive. And you were talking about us, not about the species, because we don't have our germ-cell banks any more. What's—"

"I'll get to that again in a moment," Chatvieux said. "Saltonstall, what would you think of taking to the sea? We came out of it once; maybe we could come out of it again."

"No good," Saltonstall said immediately. "I like the idea, but I don't think this planet ever heard of Swinburne, or Homer, either. Looking at it as a colonization problem, as if we weren't involved ourselves, I wouldn't give you a credit for *epi oinopa ponton*. The evolutionary pressure there is too high, the competition from other species is prohibitive; seeding the sea should be the last thing we attempt. The colonists wouldn't have a chance to learn a thing before they were destroyed."

"Why?" la Ventura said. The death in his stomach was becoming hard to placate.

"Eunice, do your sea-going

Coelenterates include anything like the Portuguese man-of-war?"

The ecologist nodded.

"There's your answer, Paul," Saltonstall said. "The sea is out. It's got to be fresh water, where the competing creatures are less formidable and there are more places to hide."

"We can't compete with a jellyfish?" la Ventura asked, swallowing.

"No, Paul," Chatvieux said. "The panatropes make adaptations, not gods. They take human germ-cells—in this case, our own, since our bank was wiped out in the crash — and modify them toward creatures who can live in any reasonable environment. The result will be manlike and intelligent. It usually shows the donor's personality pattern, too.

"But we can't transmit memory. The adapted man is worse than a child in his new environment. He has no history, no techniques, no precedents, not even a language. Ordinarily the seeding teams more or less take him through elementary school before they leave the planet, but we won't survive long enough for that. We'll have to design our colonists with plenty of built-in protections and locate them in the most favorable environment possible, so that at least some of them will survive the learning process."

The pilot thought about it, but nothing occurred to him which did not make the disaster seem realer and more intimate with each passing second. "One of the new creatures can have my personality pattern, but it won't be able to remember being me. Is that right?"

"That's it. There may be just the faintest of residuums—panatropy's given us some data which seem to support the old Jungian notion of ancestral memory. But we're all going to die on Hydrot, Paul. There's no avoiding that. Somewhere we'll leave behind people who behave as we would, think and feel as we would, but who won't remember la Ventura, or Chatvieux, or Joan Heath—or Earth."

The pilot said nothing more. There was a gray taste in his mouth.

"Saltonstall, what do you recommend as a form?"

The panatropist pulled reflectively at his nose. "Webbed extremities, of course, with thumbs and big toes heavy and thornlike for defense until the creature has had a chance to learn. Book-lungs, like the arachnids, working out of intercostal spiracles—they are gradually adaptable to atmosphere-breathing, if it ever decides to come out of the water. Also I'd suggest sporulation. As an aquatic animal, our colonist is

going to have an indefinite life-span, but we'll have to give it a breeding cycle of about six weeks to keep its numbers up during the learning period; so there'll have to be a definite break of some duration in its active year. Otherwise it'll hit the population problem before it's learned enough to cope with it."

"Also, it'll be better if our colonists could winter inside a good hard shell," Eunice Wagner added in agreement. "So sporaulation's the obvious answer. Most microscopic creatures have it."

"Microscopic?" Phil said incredulously.

"Certainly," Chatvieux said, amused. "We can't very well crowd a six-foot man into a two-foot puddle. But that raises a question. We'll have tough competition from the rotifers, and some of them aren't strictly microscopic. I don't think your average colonist should run under 25 microns, Saltonstall. Give them a chance to slug it out."

"I was thinking of making them twice that big."

"Then they'd be the biggest things in their environment," Eunice Wagner pointed out, "and won't ever develop any skills. Besides, if you make them about rotifer size, I'll give them an incentive for pushing out the castle-building rotifers.

"They'll be able to take over

the castles as dwellings."

Chatvieux nodded. "All right, let's get started. While the pantropes are being calibrated, the rest of us can put our heads together on leaving a record for these people. We'll micro-engrave the record on a set of corrosion-proof metal leaves, of a size our colonists can handle conveniently. Some day they may puzzle it out."

"Question," Eunice Wagner said. "Are we going to tell them they're microscopic? I'm opposed to it. It'll saddle their entire early history with a gods-and-demons mythology they'd be better off without."

"Yes, we are," Chatvieux said; and la Ventura could tell by the change in the tone of his voice that he was speaking now as their senior. "These people will be of the race of men, Eunice. We want them to win their way back to the community of men. They are not toys, to be protected from the truth forever in a fresh-water womb."

"I'll make that official," Venezuelos said, and that was that.

And then, essentially, it was all over. They went through the motions. Already they were beginning to be hungry. After la Ventura had had his personality pattern recorded, he was out of it. He sat by himself at the far end of the ledge, watching Tau Ceti

go redly down, chucking pebbles into the nearest pond, wondering morosely which nameless puddle was to be his Lethe.

He never found out, of course. None of them did.

I

OLD Shar set down the heavy metal plate at last, and gazed instead out the window of the castle, apparently resting his eyes on the glowing green-gold obscurity of the summer waters. In the soft fluorescence which played down upon him, from the Noc dozing impassively in the groined vault of the chamber, Lavon could see that he was in fact a young man. His face was so delicately formed as to suggest that it had not been many seasons since he had first emerged from his spore.

But of course there had been no real reason to expect an old man. All the Shars had been referred to traditionally as "old" Shar. The reason, like the reasons for everything else, had been forgotten, but the custom had persisted; the adjective at least gave weight and dignity to the office.

The present Shar belonged to the generation XVI, and hence would have to be at least two seasons younger than Lavon himself. If he was old, it was only in knowledge.

"Lavon, I'm going to have to be honest with you," Shar said at last, still looking out of the tall, irregular window. "You've come to me for the secrets on the metal plates, just as your predecessors did to mine. I can give some of them to you—but for the most part, I don't know what they mean."

"After so many generations?" Lavon asked, surprised. "Wasn't it Shar III who first found out how to read them? That was a long time ago."

The young man turned and looked at Lavon with eyes made dark and wide by the depths into which they had been staring. "I can read what's on the plates, but most of it seems to make no sense. Worst of all, the plates are incomplete. You didn't know that? They are. One of them was lost in a battle during the final war with the Eaters, while these castles were still in their hands."

"What am I here for, then?" Lavon said. "Isn't there anything of value on the remaining plates? Do they really contain 'the wisdom of the Creators' or is that another myth?"

"No. No, that's true," Shar said slowly, "as far as it goes."

HE paused, and both men turned and gazed at the ghostly creature which had appeared suddenly outside the win-

dow. Then Shar said gravely, "Come in, Para."

The slipper-shaped organism, nearly transparent except for the thousands of black-and-silver granules and frothy bubbles which packed its interior, glided into the chamber and hovered, with a muted whirring of cilia. For a moment it remained silent, probably speaking telepathically to the Noc floating in the vault, after the ceremonious fashion of all the protos. No human had ever intercepted one of these colloquies, but there was no doubt about their reality: humans had used them for long-range communication for generations.

Then the Para's cilia buzzed once more. Each separate hair-like process vibrated at an independent, changing rate; the resulting sound waves spread through the water, intermodulating, reinforcing or canceling each other. The aggregate wave-front, by the time it reached human ears, was recognizable human speech.

"We are arrived, Shar and Lavon, according to the custom."

"And welcome," said Shar. "Lavon, let's leave this matter of the plates for a while, until you hear what Para has to say; that's a part of the knowledge Lavons must have as they come of age, and it comes before the plates. I can give you some hints of what

we are. First Para has to tell you something about what we aren't."

LAVON NODDED, willingly enough, and watched the proto as it settled gently to the surface of the hewn table at which Shar had been sitting. There was in the entity such a perfection and economy of organization, such a grace and surety of movement, that he could hardly believe in his own new-won maturity. Para, like all the protos, made him feel not, perhaps, poorly thought-out, but at least unfinished.

"We know that in this universe there is logically no place for man," the gleaming, now immobile cylinder upon the table droned abruptly. "Our memory is the common property to all our races. It reaches back to a time when there were no such creatures as men here. It remembers also that once upon a day there were men here, suddenly, and in some numbers. Their spores littered the bottom; we found the spores only a short time after our season's Awakening, and in them we saw the forms of men slumbering.

"Then men shattered their spores and emerged. They were intelligent, active. And they were gifted with a trait, a character, possessed by no other creature in this world. Not even the savage

Eaters had it. Men organized us to exterminate the Eaters and therein lay the difference. Men had initiative. We have the word now, which you gave us, and we apply it, but we still do not know what the thing is that it labels."

"You fought beside us," Lavor said.

"Gladly. We would never have thought of that war by ourselves, but it was good and brought good. Yet we wondered. We saw that men were poor swimmers, poor walkers, poor crawlers, poor climbers. We saw that men were formed to make and use tools, a concept we still do not understand, for so wonderful a gift is largely wasted in this universe, and there is no other. What good are tool-useful members such as the hands of men? We do not know. It seems plain that so radical a thing should lead to a much greater rulership over the world than has, in fact, proven to be possible for men."

Lavor's head was spinning. "Para, I had no notion that you people were philosophers."

"The protos are old," Shar said. He had again turned to look out the window, his hands locked behind his back. "They aren't philosophers, Lavor, but they are remorseless logicians. Listen to Para."

"To this reasoning there could be but one outcome," the Para

said. "Our strange ally, Man, was like nothing else in this universe. He was and is ill-fitted for it. He does not belong here; he has been —adopted. This drives us to think that there are other universes besides this one, but where these universes might lie, and what their properties might be, it is impossible to imagine. We have no imagination, as men know."

Was the creature being ironic? Lavor could not tell. He said slowly: "Other universes? How could that be true?"

"We do not know," the Para's uninflected voice hummed. Lavor waited, but obviously the proto had nothing more to say.

SHAR had resumed sitting on the window sill, clasping his knees, watching the come and go of dim shapes in the lighted gulf. "It is quite true," he said. "What is written on the remaining plates makes it plain. Let me tell you now what they say.

"*We were made*, Lavor. *We were made by men who are not as we are, but men who were our ancestors all the same.* They were caught in some disaster, and they made us, and put us here in our universe—so that, even though they had to die, the race of men would live."

Lavor surged up from the woven spirogrya mat upon which he had been sitting. "You must

think I'm a fool!" he said sharply.

"No. You're our Lavon; you have a right to know the facts. Make what you like of them." Shar swung his webbed toes back into the chamber. "What I've told you may be hard to believe, but it seems to be so; what Para says backs it up. Our unfitness to live here is self-evident. I'll give you some examples:

"The past four Shars discovered that we won't get any further in our studies until we learn how to control heat. We've produced enough heat chemically to show that even the water around us changes when the temperature gets high enough. But there we're stopped."

"Why?"

"Because heat produced in open water is carried off as rapidly as it's produced. Once we tried to enclose that heat, and we blew up a whole tube of the castle and killed everything in range; the shock was terrible. We measured the pressures that were involved in that explosion, and we discovered that no substance we know could have resisted them. Theory suggests some stronger substances — but we need heat to form them!"

"Take our chemistry. We live in water. Everything seems to dissolve in water, to some extent. How do we confine a chemical

test to the crucible we put it in? How do we maintain a solution at one dilution? I don't know. Every avenue leads me to the same stone door. We're thinking creatures, Lavon, but there's something drastically wrong in the way we think about this universe we live in. It just doesn't seem to lead to results."

Lavon pushed back his floating hair futilely. "Maybe you're thinking about the wrong results. We've had no trouble with warfare, or crops, or practical things like that. If we can't create much heat, well, most of us won't miss it; we don't need any. What's the other universe supposed to be like, the one our ancestors lived in? Is it any better than this one?"

"I don't know," Shar admitted. "It was so different that it's hard to compare the two. The metal plates tell a story about men who were traveling from one place to another in a container that moved by itself. The only analogy I can think of is the shallop of diatom shells that our youngsters use to sled along the thermocline; but evidently what's meant is something much bigger."

"I picture a huge shallop, closed on all sides, big enough to hold many people — maybe twenty or thirty. It had to travel for generations through some kind of space where there wasn't

any water to breathe, so that the people had to carry their own water and renew it constantly. There were no seasons; no yearly turnover; no ice forming on the sky, because there wasn't any sky in a closed shallop; no spore formation.

"Then the shallop was wrecked somehow. The people in it knew they were going to die. They made us, and put us here, as if we were their children. Because they had to die, they wrote their story on the plates, to tell us what had happened. I suppose we'd understand it better if we had the plate Shar III lost during the war, but we don't."

"The whole thing sounds like a parable," Lavon said, shrugging. "Or a song. I can see why you don't understand it. What I can't see is why you bother to try."

"Because of the plates," Shar said. "You've handled them yourself, so you know that we've nothing like them. We have crude, impure metals we've hammered out, metals that last for a while and then decay. But the plates shine on and on, generation after generation. They don't change; our hammers and graving tools break against them; the little heat we can generate leaves them unharmed. Those plates weren't formed in our universe—and that one fact makes every

word on them important to me. Someone went to a great deal of trouble to make those plates indestructible to give them to us. Someone to whom the word 'stars' was important enough to be worth fourteen repetitions, despite the fact that the word doesn't seem to mean anything. I'm ready to think that if our makers repeated the word even twice on a record that seems likely to last forever, it's important for us to know what it means."

"All these extra universes and huge shallops and meaningless words — I can't say that they don't exist, but I don't see what difference it makes. The Shars of a few generations ago spent their whole lives breeding better algae crops for us, and showing us how to cultivate them instead of living haphazardly off bacteria. That was work worth doing. The Lavons of those days evidently got along without the metal plates, and saw to it that the Shars did, too: Well, as far as I'm concerned, you're welcome to the plates, if you like them better than crop improvement — but I think they ought to be thrown away."

"All right," Shar said, shrugging. "If you don't want them, that ends the traditional interview. We'll go our—"

There was a rising drone from the table-top. The Para was lift-

ing itself, waves of motion passing over its cilia, like the waves which went across the fruiting stalks of the fields of delicate fungi with which the bottom was planted. It had been so silent that Lavon had forgotten it; he could tell from Shar's startlement that Shar had, too.

"This is a great decision," the waves of sound washing from the creature throbbed. "Every proto has heard it and agrees with it. We have been afraid of these metal plates for a long time, afraid that men would learn to understand them and to follow what they say to some secret place, leaving the protos behind. Now we are not afraid."

"There wasn't anything to be afraid of," Lavon said indulgently.

"No Lavon before you had said so," Para said. "We are glad. We will throw the plates away."

With that, the shining creature swooped toward the embrasure. With it, it bore away the remaining plates, which had been resting under it on the table-top, suspended delicately in the curved tips of its supple cilia. With a cry, Shar plunged through the water toward the opening.

"Stop, Para!"

But Para was already gone, so swiftly that he had not even heard the call. Shar twisted his body and brought up on one

shoulder against the tower wall. He said nothing. His face was enough. Lavon could not look at it for more than an instant.

The shadows of the two men moved slowly along the uneven cobbled floor. The Noc descended toward them from the vault, its single thick tentacle stirring the water, its internal light flaring and fading irregularly. It, too, drifted through the window after its cousin, and sank slowly away toward the bottom. Gently its living glow dimmed, flickered, winked out.

II

FOR many days, Lavon was able to avoid thinking much about the loss. There was always a great deal of work to be done. Maintenance of the castles, which had been built by the now-extinct Eaters rather than by human hands, was a never-ending task. The thousand dichotomously branching wings tended to crumble, especially at their bases where they sprouted from each other, and no Shar had yet come forward with a mortar as good as the rotifer-spittle which had once held them together. In addition, the breaking through of windows and the construction of chambers in the early days had been haphazard and often unsound. The instinctive architec-

ture of the rotifers, after all, had not been meant to meet the needs of human occupants.

And then there were the crops. Men no longer fed precariously upon passing bacteria; now there were the drifting mats of specific water-fungi, rich and nourishing, which had been bred by five generations of Shars. These had to be tended constantly to keep the strains pure, and to keep the older and less intelligent species of the protos from grazing on them. In this latter task, to be sure, the more intricate and far-seeing proto types cooperated, but men were needed to supervise.

There had been a time, after the war with the Eaters, when it had been customary to prey upon the slow-moving and stupid diatoms, whose exquisite and fragile glass shells were so easily burst, and who were unable to learn that a friendly voice did not necessarily mean a friend. There were still people who would crack open a diatom when no one else was looking, but they were regarded as barbarians, to the puzzlement of the protos. The blurred and simple-minded speech of the gorgeously engraved plants had brought them into the category of pets — a concept which the protos were utterly unable to grasp, especially since men admitted that diatoms on the half-frustrule were delicious.

Lavon had had to agree, very early, that the distinction was tiny. After all, humans did eat the desmids, which differed from the diatoms only in three particulars: their shells were flexible, they could not move, and they did not speak. Yet to Lavon, as to most men, there did seem to be some kind of distinction, whether the protos could see it or not, and that was that. Under the circumstance he felt that it was a part of his duty, as a leader of men, to protect the diatoms from the occasional poachers who browsed upon them, in defiance of custom, in the high levels of the sunlit sky.

Yet Lavon found it impossible to keep himself busy enough to forget that moment when the last clues to Man's origin and destination had been seized and borne away into dim space.

It might be possible to ask Para for the return of the plates, explain that a mistake had been made. The protos were creatures of implacable logic, but they respected Man, were used to illogic in Man, and might reverse their decision if pressed—

We are sorry. The plates were carried over the bar and released in the gulf. We will have the bottom there searched, but . . .

With a sick feeling he could not repress, Lavon knew that when the protos decided some-

thing was worthless, they did not hide it in some chamber like old women. They threw it away — efficiently.

Yet despite the tormenting of his conscience, Lavon was convinced that the plates were well lost. What had they ever done for man, except to provide Shars with useless things to think about in the late seasons of their lives? What the Shars themselves had done to benefit Man, here, in the water, in the world, in the universe, had been done by direct experimentation. No bit of useful knowledge ever had come from the plates. There had never been anything in the plates but things best left unthought. The protos were right.

LAVON shifted his position on the plant frond, where he had been sitting in order to overlook the harvesting of an experimental crop of blue-green, oil-rich algae drifting in a clotted mass close to the top of the sky, and scratched his back gently against the coarse bole. The protos were seldom wrong, after all. Their lack of creativity, their inability to think an original thought, was a gift as well as a limitation. It allowed them to see and feel things at all times as they were — not as they hoped they might be, for they had no ability to hope, either.

"La-von! Laa-vah-on!"

The long halloo came floating up from the sleepy depths. Proping one hand against the top of the frond, Lavon bent and looked down. One of the harvesters was looking up at him, holding loosely the adze with which he had been splitting free the glutinous tetrads of the algae.

"Up here. What's the matter?"

"We have the ripened quadrant cut free. Shall we tow it away?"

"Tow it away," Lavon said, with a lazy gesture. He leaned back again. At the same instant, a brilliant reddish glory burst into being above him, and cast itself down toward the depths like mesh after mesh of the finest-drawn gold. The great light which lived above the sky during the day, brightening or dimming according to some pattern no Shar ever had fathomed, was blooming again.

Few men, caught in the warm glow of that light, could resist looking up at it—especially when the top of the sky itself wrinkled and smiled just a moment's climb or swim away. Yet, as always, Lavon's bemused upward look gave him back nothing but his own distorted, bobbling reflection, and a reflection of the plant on which he rested.

Here was the upper limit, the third of the three surfaces of the universe.

The first surface was the bottom, where the water ended.

The second surface was the thermocline, the invisible division between the colder waters of the bottom and the warm, light waters of the sky. During the height of the warm weather, the thermocline was so definite a division as to make for good sledding and for chilly passage. A real interface formed between the cold, denser bottom waters and the warm reaches above, and maintained itself almost for the whole of the warm season.

The third surface was the sky. One could no more pass through that surface than one could penetrate the bottom, nor was there any better reason to try. There the universe ended. The light which played over it daily, waxing and waning as it chose, seemed to be one of its properties.

Toward the end of the season, the water gradually grew colder and more difficult to breathe, while at the same time the light became duller and stayed for shorter periods between darknesses. Slow currents started to move. The high waters turned chill and began to fall. The bottom mud stirred and smoked away, carrying with it the spores of the fields of fungi. The thermocline tossed, became choppy, and melted away. The sky began to fog with particles of soft silt carried up

from the bottom, the walls, the corners of the universe. Before very long, the whole world was cold, inhospitable, flocculent with yellowing, dying creatures.

Then the protos encysted; the bacteria, even most of the plants and, not long afterward, men, too, curled up in their oil-filled amber shells. The world died until the first tentative current of warm water broke the winter silence.

"La-von!"

JUST after the long call, a shining bubble rose past Lavon. He reached out and poked it, but it bounded away from his sharp thumb. The gas-bubbles which rose from the bottom in late summer were almost invulnerable—and when some especially hard blow or edge did penetrate them, they broke into smaller bubbles which nothing could touch, and fled toward the sky, leaving behind a remarkably bad smell.

Gas. There was no water inside a bubble. A man who got inside a bubble would have nothing to breathe.

But, of course, it was impossible to penetrate a bubble. The surface tension was too strong. As strong as Shar's metal plates. As strong as the top of the sky.

As strong as the top of the sky. And above that — once the bubble was broken — a world of gas instead of water? Were all worlds

bubbles of water drifting in gas?

If it were so, travel between them would be out of the question, since it would be impossible to pierce the sky to begin with. Nor did the infant cosmology include any provisions for bottoms for the worlds.

And yet some of the local creatures did burrow *into* the bottom, quite deeply, seeking something in those depths which was beyond the reach of Man. Even the surface of the ooze, in high summer, crawled with tiny creatures for which mud was a natural medium. Man, too, passed freely between the two countries of water which were divided by the thermocline, though many of the creatures with which he lived could not pass that line at all, once it had established itself.

And if the new universe of which Shar had spoken existed at all, it had to exist beyond the sky, where the light was. Why could not the sky be passed, after all? The fact that bubbles could be broken showed that the surface skin that formed between water and gas wasn't completely invulnerable. Had it ever been tried?

Lavon did not suppose that one man could butt his way through the top of the sky, any more than he could burrow into the bottom, but there might be ways around the difficulty. Here

at his back, for instance, was a plant which gave every appearance of continuing beyond the sky: its uppermost fronds broke off and were bent back only by a trick of reflection.

It had always been assumed that the plants died where they touched the sky. For the most part, they did, for frequently the dead extension could be seen, leached and yellow, the boxes of its component cells empty, floating imbedded in the perfect mirror. But some were simply chopped off, like the one which sheltered him now. Perhaps that was only an illusion, and instead it soared indefinitely into some other place — some place where men might once have been born, and might still live . . .

The plates were gone. There was only one other way to find out.

DETERMINEDLY, Lavon began to climb toward the wavering mirror of the sky. His thorn-thumbed feet trampled obliviously upon the clustered sheaves of fragile stippled diatoms. The tulip-heads of Vortae, placid and murmurous cousins of Para, retracted startled out of his way upon coiling stalks, to make silly gossip behind him.

Lavon did not hear them. He continued to climb doggedly toward the light, his fingers and

toes gripping the plant-bole.

"Lavon! Where are you going?
Lavon!"

He leaned out and looked down. The man with the adze, a doll-like figure, was beckoning to him from a patch of blue-green retreating over a violet abyss. Dizzily he looked away, clinging to the bole; he had never been so high before. Then he began to climb again.

After a while, he touched the sky with one hand. He stopped to breathe. Curious bacteria gathered about the base of his thumb where blood from a small cut was fogging away, scattered at his gesture, and wriggled mindlessly back toward the dull red lure.

He waited until he no longer felt winded, and resumed climbing. The sky pressed down against the top of his head, against the back of his neck, against his shoulders. It seemed to give slightly, with a tough, frictionless elasticity. The water here was intensely bright, and quite colorless. He climbed another step, driving his shoulders against that enormous weight.

It was fruitless. He might as well have tried to penetrate a cliff.

Again he had to rest. While he panted, he made a curious discovery. All around the bole of the water plant, the steel surface



of the sky curved upward, making a kind of sheath. He found that he could insert his hand into it — there was almost enough space to admit his head as well. Clinging closely to the bole, he looked up into the inside of the sheath, probing with his injured hand. The glare was blinding.

There was a kind of soundless explosion. His whole wrist was suddenly encircled in an intense, impersonal grip, as if it were being cut in two. In blind astonishment, he lunged upward.

The ring of pain traveled smoothly down his upflung arm as he rose, was suddenly around his shoulders and chest. Another lunge and his knees were being squeezed in the circular vise. Another—

Something was horribly wrong. He clung to the bole and tried to gasp, but there was — nothing to breathe.

The water came streaming out of his body, from his mouth, his nostrils, the spiracles in his sides, spurting in tangible jets. An intense and fiery itching crawled over the entire surface of his body. At each spasm, long knives ran into him, and from a great distance he heard more water being expelled from his book-lungs in an obscene, frothy sputtering.

Lavon was drowning.

With a final convulsion, he kicked himself away from the

splintery bole, and fell. A hard impact shook him; and then the water, which had clung to him so tightly when he had first attempted to leave it, took him back with cold violence.

Sprawling and tumbling grotesquely, he drifted, down and down and down, toward the bottom.

III

FOR many days, Lavon lay curled insensibly in his spore, as if in the winter sleep. The shock of cold which he had felt on re-entering his native universe had been taken by his body as a sign of coming winter, as it had taken the oxygen-starvation of his brief sojourn above the sky. The spore-forming glands had at once begun to function.

Had it not been for this, Lavon would surely have died. The danger of drowning disappeared even as he fell, as the air bubbled out of his lungs and readmitted the life-giving water. But for acute dessication and third degree sunburn, the sunken universe knew no remedy. The healing amnionic fluid generated by the spore-forming glands, after the transparent amber sphere had enclosed him, offered Lavon his only chance.

The brown sphere was spotted after some days by a prowling

ameba, quiescent in the eternal winter of the bottom. Down there the temperature was always an even 4°, no matter what the season, but it was unheard of that a spore should be found there while the high epilimnion was still warm and rich in oxygen.

Within an hour, the spore was surrounded by scores of astonished protos, jostling each other to bump their blunt eyeless prows against the shell. Another hour later, a squad of worried men came plunging from the castles far above to press their own noses against the transparent wall. Then swift orders were given.

Four Para grouped themselves about the amber sphere, and there was a subdued explosion as the trichocysts which lay embedded at the bases of their cilia, just under the pellicle, burst and cast fine lines of a quickly solidifying liquid into the water. The four Paras thrummed and lifted, tugging.

Lavon's spore swayed gently in the mud and then rose slowly, entangled in the web. Nearby, a Noc cast a cold pulsating glow over the operation — not for the Paras, who did not need the light, but for the baffled knot of men. The sleeping figure of Lavon, head bowed, knees drawn up to its chest, revolved with an absurd solemnity inside the shell as it was moved.

"Take him to Shar, Para."

THE young Shar justified, by minding his own business, the traditional wisdom with which his hereditary office had invested him. He observed at once that there was nothing he could do for the encysted Lavon which would not be classifiable as simple meddling.

He had the sphere deposited in a high tower room of his castle, where there was plenty of light and the water was warm, which should suggest to the hibernating form that spring was again on the way. Beyond that, he simply sat and watched, and kept his speculations to himself.

Inside the spore, Lavon's body seemed rapidly to be shedding its skin, in long strips and patches. Gradually, his curious shrunkenness disappeared. His withered arms and legs and sunken abdomen filled out again.

The days went by while Shar watched. Finally he could discern no more changes, and, on a hunch, had the spore taken up to the topmost battlements of the tower, into the direct daylight.

An hour later, Lavon moved in his amber prison.

He uncurled and stretched, turned blank eyes up toward the light. His expression was that of a man who had not yet awakened from a ferocious nightmare. His

whole body shone with a strange pink newness.

Shar knocked gently on the wall of the spore. Lavon turned his blind face toward the sound, life coming into his eyes. He smiled tentatively and braced his hands and feet against the inner wall of the shell.

The whole sphere fell abruptly to pieces with a sharp crackling. The amnionic fluid dissipated around him and Shar, carrying away with it the suggestive odor of a bitter struggle against death.

Lavon stood among the bits of shell and looked at Shar silently. At last he said:

"Shar—I've been beyond the sky."

"I know," Shar said gently.

Again Lavon was silent. Shar said, "Don't be humble, Lavon. You've done an epoch-making thing. It nearly cost you your life. You must tell me the rest—all of it."

"The rest?"

"You taught me a lot while you slept. Or are you still opposed to useless knowledge?"

Lavon could say nothing. He no longer could tell what he knew from what he wanted to know. He had only one question left, but he could not utter it. He could only look dumbly into Shar's delicate face.

"You have answered me," Shar said, even more gently. "Come,

my friend; join me at my table. We will plan our journey to the stars."

IT was two winter sleeps after Lavon's disastrous climb beyond the sky that all work on the spaceship stopped. By then, Lavon knew that he had hardened and weathered into that temporarily ageless state a man enters after he has just reached his prime; and he knew also that there were wrinkles engraved upon his brow, to stay and to deepen.

"Old" Shar, too, had changed, his features losing some of their delicacy as he came into his maturity. Though the wedge-shaped bony structure of his face would give him a withdrawn and poetic look for as long as he lived, participation in the plan had given his expression a kind of executive overlay, which at best gave it a masklike rigidity, and at worst coarsened it somehow.

Yet despite the bleeding away of the years, the spaceship was still only a hulk. It lay upon a platform built above the tumbled boulders of the sandbar which stretched out from one wall of the world. It was an immense hull of pegged wood, broken by regularly spaced gaps through which the raw beams of the skeleton could be seen.

Work upon it had progressed

fairly rapidly at first, for it was not hard to visualize what kind of vehicle would be needed to crawl through empty space without losing its water. It had been recognized that the sheer size of the machine would enforce a long period of construction, perhaps two full seasons; but neither Shar nor Lavon had anticipated any serious snag.

For that matter, part of the vehicle's apparent incompleteness was an illusion. About a third of its fittings were to consist of living creatures, which could not be expected to install themselves in the vessel much before the actual takeoff.

Yet time and time again, work on the ship had had to be halted for long periods. Several times whole sections needed to be ripped out, as it became more and more evident that hardly a single normal, understandable concept could be applied to the problem of space travel.

The lack of the history plates, which the Para steadfastly refused to deliver up, was a double handicap. Immediately upon their loss, Shar had set himself to reproduce them from memory; but unlike the more religious of his people, he had never regarded them as holy writ, and hence had never set himself to memorizing them word by word. Even before the theft, he had accumulated a

set of variant translations of passages presenting specific experimental problems, which were stored in his library, carved in wood. But most of these translations tended to contradict each other, and none of them related to spaceship construction, upon which the original had been vague in any case.

No duplicates of the cryptic characters of the original had ever been made, for the simple reason that there was nothing in the sunken universe capable of destroying the originals, nor of duplicating their apparently changeless permanence. Shar remarked too late that through simple caution they should have made a number of verbatim temporary records — but after generations of green-gold peace, simple caution no longer covers preparation against catastrophe. (Nor, for that matter, did a culture which had to dig each letter of its simple alphabet into pulpy waterlogged wood with a flake of stonewort, encourage the keeping of records in triplicate.)

As a result, Shar's imperfect memory of the contents of the history plates, plus the constant and millenial doubt as to the accuracy of the various translations, proved finally to be the worst obstacle to progress on the spaceship itself.

"Men must paddle before they

can swim," Lavon observed belatedly, and Shar was forced to agree with him.

Obviously, whatever the ancients had known about spaceship construction, very little of that knowledge was usable to a people still trying to build its first spaceship from scratch. In retrospect, it was not surprising that the great hulk still rested incomplete upon its platform above the sand boulders, exuding a musty odor of wood steadily losing its strength, two generations after its flat bottom had been laid down.

THE fat-faced young man who headed the strike delegation was Phil XX, a man two generations younger than Lavon, four younger than Shar. There were crow's-feet at the corners of his eyes, which made him look both like a querulous old man and like an infant spoiled in the spore.

"We're calling a halt to this crazy project," he said bluntly. "We've slaved our youth away on it, but now that we're our own masters, it's over, that's all. Over."

"Nobody's compelled you," Lavon said angrily.

"Society does; our parents do," a gaunt member of the delegation said. "But now we're going to start living in the real world.

Everybody these days knows that there's no other world but this one. You oldsters can hang on to your superstitions if you like. We don't intend to."

Baffled, Lavon looked over at Shar. The scientist smiled and said, "Let them go, Lavon. We have no use for the faint-hearted."

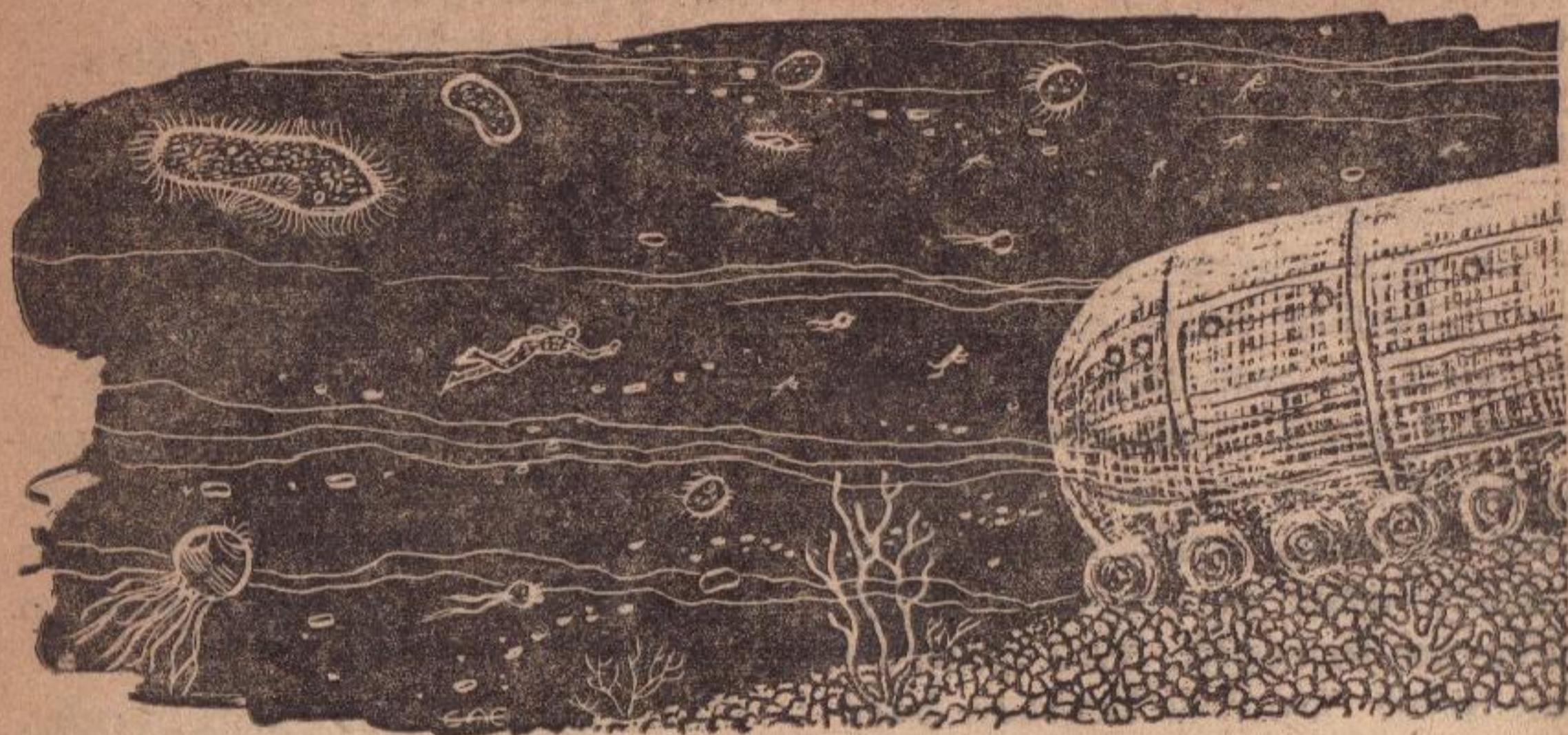
The fat-faced young man flushed. "You can't insult us into going back to work. We're through. Build your own ship to no place!"

"All right," Lavon said evenly. "Go on, beat it. Don't stand around here orating about it. You've made your decision and we're not interested in your self-justifications. Good-by."

The fat-faced young man evidently still had quite a bit of heroism to dramatize which Lavon's dismissal had short-circuited. An examination of Lavon's stony face, however, convinced him that he had to take his victory as he found it. He and the delegation trailed ingloriously out the archway.

"Now what?" Lavon asked when they had gone. "I must admit, Shar, that I would have tried to persuade them. We do need the workers, after all."

"Not as much as they need us," Shar said tranquilly. "How many volunteers have you got for the crew of the ship?"



"Hundreds. Every young man of the generation after Phil's wants to go along. Phil's wrong about that segment of the population, at least. The project catches the imagination of the very young."

"Did you give them any encouragement?"

"Sure," Lavon said. "I told them we'd call on them if they were chosen. But you can't take that seriously! We'd do badly to displace our picked group of specialists with youths who have enthusiasm and nothing else."

"That's not what I had in mind, Lavon. Didn't I see a Noc in your chambers somewhere? Oh, there he is, asleep in the dome. Noc!"

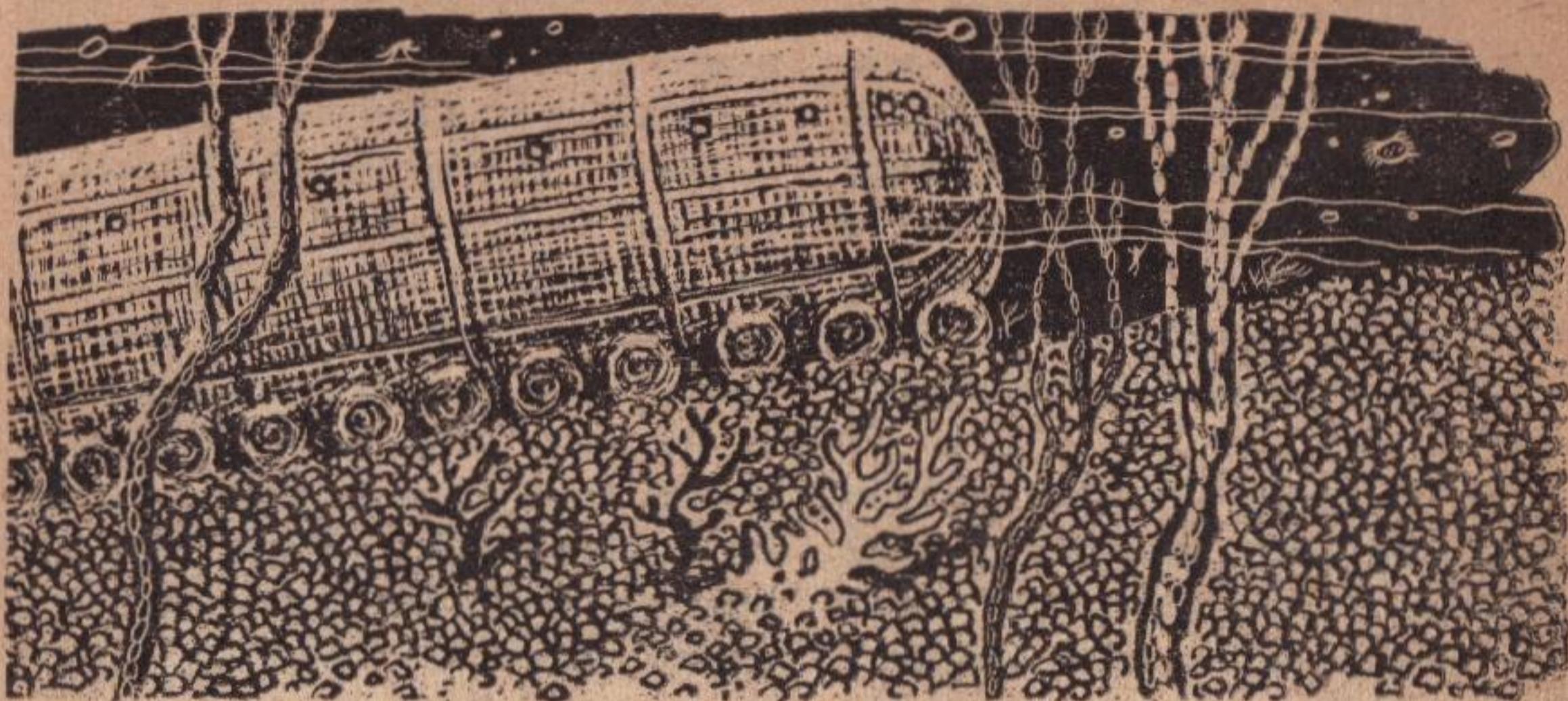
The creature stirred its tentacles lazily.

"Noc, I've a message," Shar called. "The protos are to tell all men that those who wish to go to the next world with the spaceship must come to the staging area right away. Say that we can't promise to take everyone, but that only those who help us build the ship will be considered at all."

The Noc curled its tentacles again and appeared to go back to sleep. Actually, of course, it was sending its message through the water in all directions.

IV

LAVON turned from the arrangement of speaking-tube megaphones which was his control board and looked at the Para. "One last try," he said.



"Will you give us back the plates?"

"No, Lavon. We have never denied you anything before, but this we must."

"You're going with us though, Para. Unless you give us the knowledge we need, you'll lose your life if we lose ours."

"What is one Para?" the creature said. "We are all alike. This cell will die; but the protos need to know how you fare on this journey. We believe you should make it without the plates."

"Why?"

The proto was silent. Lavon stared at it a moment, then turned deliberately back to the speaking tubes. "Everyone hang on," he said. He felt shaky. "We're about to start. Tol, is the ship sealed?"

"As far as I can tell, Lavon." Lavon shifted to another megaphone. He took a deep breath. Already the water seemed stifling, though the ship hadn't moved.

"Ready with one-quarter power. One, two, three, go."

The whole ship jerked and settled back into place again. The raphe diatoms along the under hull settled into their niches, their jelly treads turning against broad endless belts of crude leather. Wooden gears creaked, stepping up the slow power of the creatures, transmitting it to the sixteen axles of the ship's wheels.

The ship rocked and began to roll slowly along the sandbar. Lavon looked tensely through the mica port. The world flowed painfully past him. The ship

canted and began to climb the slope. Behind him, he could feel the electric silence of Shar, Para, the two alternate pilots, as if their gaze were stabbing directly through his body and out the port. The world looked different, now that he was leaving it. How had he missed all this beauty before?

The slapping of the endless belts and the squeaking and groaning of the gears and axles grew louder as the slope steepened. The ship continued to climb, lurching. Around it, squadrons of men and protos dipped and wheeled, escorting it toward the sky.

Gradually the sky lowered and pressed down toward the top of the ship.

"A little more work from your diatoms, Tanol," Lavon said. "Boulder ahead." The ship swung ponderously. "All right, slow them up again. Give us a shove from your side, Than — no, that's too much — there, that's it. Back to normal; you're still turning us! Tanol, give us one burst to line us up again. Good. All right, steady drive on all sides. Won't be long now."

"How can you think in webs like that?" the Para wondered behind him.

"I just do, that's all. It's the way men think. Overseers, a little more thrust now; the grade's get-

ting steeper."

The gears groaned. The ship nosed up. The sky brightened in Lavon's face. Despite himself, he began to be frightened. His lungs seemed to burn, and in his mind he felt his long fall through nothingness toward the chill slap of water as if he were experiencing it for the first time. His skin itched and burned. Could he go up *there* again? Up there into the burning void, the great gasping agony where no life should go?

THE sandbar began to level out and the going became a little easier. Up here, the sky was so close that the lumbering motion of the huge ship disturbed it. Shadows of wavelets ran across the sand. Silently, the thick-barreled bands of blue-green algae drank in the light and converted it to oxygen, writhing in their slow mindless dance just under the long mica skylight which ran along the spine of the ship. In the hold, beneath the latticed corridor and cabin floors, whirring Vortae kept the ship's water in motion, fueling themselves upon drifting organic particles.

One by one, the figures wheeling about the ship outside waved arms or cilia and fell back, coasting down the slope of the sandbar toward the familiar world, dwindling and disappearing. There was at last only one single

Euglena, half-plant cousin of the protos, forging along beside the spaceship into the marches of the shallows. It loved the light, but finally it, too, was driven away into cooler, deeper waters, its single whiplike tentacle undulating placidly as it went. It was not very bright, but Lavon felt deserted when it left.

Where they were going, though, none could follow.

Now the sky was nothing but a thin, resistant skin of water coating the top of the ship. The vessel slowed, and when Lavon called for more power, it began to dig itself in among the sand-grains.

"That's not going to work," Shar said tensely. "I think we'd better step down the gear ratio, Lavon, so you can apply stress more slowly."

"All right," Lavon agreed. "Full stop, everybody. Shar, will you supervise gear-changing, please?"

INSANE brilliance of empty space looked Lavon full in the face just beyond his big mica bull's eye. It was maddening to be forced to stop here upon the threshold of infinity; and it was dangerous, too. Lavon could feel building in him the old fear of the outside. A few moments more of inaction, he knew with a gathering coldness at the pit of his

stomach, and he would be unable to go through with it.

Surely, he thought, there must be a better way to change gear-ratios than the traditional one, which involved dismantling almost the entire gear-box. Why couldn't a number of gears of different sizes be carried on the same shaft, not necessarily all in action all at once, but awaiting use simply by shoving the axle back and forth longitudinally in its sockets? It would still be clumsy, but it could be worked on orders from the bridge and would not involve shutting down the entire machine — and throwing the new pilot into a blue-green funk.

Shar came lunging up through the trap and swam himself a stop.

"All set," he said. "The big reduction gears aren't taking the strain too well, though."

"Splintering?"

"Yes. I'd go it slow at first."

Lavon nodded mutely. Without allowing himself to stop, even for a moment, to consider the consequences of his words, he called: "Half power."

The ship hunched itself down again and began to move, very slowly indeed, but more smoothly than before. Overhead, the sky thinned to complete transparency. The great light came blasting in. Behind Lavon there was an

were easy stir. The whiteness grew at the front ports.

Again the ship slowed, straining against the blinding barrier. Lavon swallowed and called for more power. The ship groaned like something about to die. It was now almost at a standstill.

"More power," Lavon ground out.

ONCE more, with infinite slowness, the ship began to move. Gently, it tilted upward.

Then it lunged forward and every board and beam in it began to squall.

"Lavon! Lavon!"

Lavon started sharply at the shout. The voice was coming at him from one of the megaphones, the one marked for the port at the rear of the ship.

"Lavon!"

"What is it? Stop your damn yelling."

"I can see the top of the sky! From the *other* side, from the top side! It's like a big flat sheet of metal. We're going away from it. We're above the sky, Lavon, we're above the sky!"

Another violent start swung Lavon around toward the forward port. On the outside of the mica, the water was evaporating with shocking swiftness, taking with it strange distortions and patterns made of rainbows.

Lavon saw Space.

IT was at first like a deserted and cruelly dry version of the bottom. There were enormous boulders, great cliffs, tumbled, split, riven, jagged rocks going up and away in all directions.

But it had a sky of its own—a deep blue dome so far away that he could not believe in, let alone compute, what its distance might be. And in this dome was a ball of white fire that seared his eyeballs.

The wilderness of rock was still a long way away from the ship, which now seemed to be resting upon a level, glistening plain. Beneath the surface-shine, the plain seemed to be made of sand, nothing but familiar sand, the same substance which had heaped up to form a bar in Lavon's own universe, the bar along which the ship had climbed. But the glassy, colorful skin over it—

Suddenly Lavon became conscious of another shout from the megaphone banks. He shook his head savagely and asked, "What is it now?"

"Lavon, this is Than. What have you gotten us into? The belts are locked. The diatoms can't move them. They aren't faking, either; we've rapped them hard enough to make them think we were trying to break their shells, but they still can't give us more power."

"Leave them alone," Lavon

snapped. "They can't fake; they haven't enough intelligence. If they say they can't give you more power, they can't."

"Well, then, you get us out of it," Than's voice said frightened-ly.

Shar came forward to Lavon's elbow. "We're on a space-water interface, where the surface tension is very high," he said softly. "This is why I insisted on our building the ship so that we could lift the wheels off the ground whenever necessary. For a long while I couldn't understand the reference of the history plates to 'retractable landing gear,' but it finally occurred to me that the tension along a space-water interface — or, to be more exact, a space-mud interface — would hold any large object pretty tightly. If you order the wheels pulled up now, I think we'll make better progress for a while on the belly-treads."

"Good enough," Lavon said. "Hello below — up landing gear. Evidently the ancients knew their business after all, Shar."

QUITE a few minutes later, for shifting power to the belly treads involved another setting of the gear box, the ship was crawling along the shore toward the tumbled rock. Anxiously, Lavon scanned the jagged, threatening wall for a break. There was a

sort of rivulet off toward the left which might offer a route, though a dubious one, to the next world. After some thought, Lavon ordered his ship turned toward it.

"Do you suppose that thing in the sky is a 'star?'" he asked. "But there were supposed to be lots of them. Only one is up there — and one's plenty for my taste."

"I don't know," Shar admitted. "But I'm beginning to get a picture of the way the universe is made, I think. Evidently our world is a sort of cup in the bottom of this huge one. This one has a sky of its own; perhaps it, too, is only a cup in the bottom of a still huger world, and so on and on without end. It's a hard concept to grasp, I'll admit. Maybe it would be more sensible to assume that all the worlds are cups in this one common surface, and that the great light shines on them all impartially."

"Then what makes it seem to go out every night, and dim even in the day during winter?" Lavon demanded.

"Perhaps it travels in circles, over first one world, then another. How could I know yet?"

"Well, if you're right, it means that all we have to do is crawl along here for a while, until we hit the top of the sky of another world," Lavon said. "Then we dive in. Somehow it seems too

simple, after all our preparations."

Shar chuckled, but the sound did not suggest that he had discovered anything funny. "Simple? Have you noticed the temperature yet?"

Lavon had noticed it, just beneath the surface of awareness, but at Shar's remark he realized that he was gradually being stifled. The oxygen content of the water, luckily, had not dropped, but the temperature suggested the shallows in the last and worst part of the autumn. It was like trying to breathe soup.

"Than, give us more action from the Vortae," Lavon called. "This is going to be unbearable unless we get more circulation."

It was all he could do now to keep his attention on the business of steering the ship.

The cut or defile in the scattered razor-edged rocks was a little closer, but there still seemed to be many miles of rough desert to cross. After a while, the ship settled into a steady, painfully slow crawling, with less pitching and jerking than before, but also with less progress. Under it, there was now a sliding, grinding sound, rasping against the hull of the ship itself, as if it were treadmilling over some coarse lubricant whose particles were each as big as a man's head.

Finally Shar said, "Lavon,

we'll have to stop again. The sand this far up is dry, and we're wasting energy using the treads."

"Are you sure we can take it?" Lavon asked, gasping for breath. "At least we are moving. If we stop to lower the wheels and change gears again, we'll boil."

"We'll boil if we don't," Shar said calmly. "Some of our algae are already dead and the rest are withering. That's a pretty good sign that we can't take much more. I don't think we'll make it into the shadows, unless we do change over and put on some speed."

There was a gulping sound from one of the mechanics. "We ought to turn back," he said raggedly. "We were never meant to be out here in the first place. We were made for the water, not this hell."

"We'll stop," Lavon said, "but we're not turning back. That's final."

The words made a brave sound, but the man had upset Lavon more than he dared to admit, even to himself. "Shar," he said, "make it fast, will you?"

The scientist nodded and dived below.

THE minutes stretched out. The great white globe in the sky blazed and blazed. It had moved down the sky, far down, so that the light was pouring into

the ship directly in Lavon's face, illuminating every floating particle, its rays like long milky streamers. The currents of water passing Lavon's cheek were almost hot.

How could they dare go directly forward into that inferno? The land directly under the "star" must be even hotter than it was here!

"Lavon! Look at Para!"

Lavon forced himself to turn and look at his proto ally. The great slipper had settled to the deck, where it was lying with only a feeble pulsation of its cilia. Inside, its vacuoles were beginning to swell, to become bloated, pear-shaped bubbles, crowding the granulated protoplasm, pressing upon the dark nuclei.

"This cell is dying," Para said, as coldly as always. "But go on—go on. There is much to learn, and you may live, even though we do not. Go on."

"You're . . . for us now?" Lavon whispered.

"We have always been for you. Push your folly to its uttermost. We will benefit in the end, and so will Man."

The whisper died away. Lavon called the creature again, but it did not respond.

There was a wooden clashing from below, and then Shar's voice came tinnily from one of

the megaphones. "Lavon, go ahead! The diatoms are dying, too, and then we'll be without power. Make it as quickly and directly as you can."

Grimly, Lavon leaned forward. "The 'star' is directly over the land we're approaching."

"It is? It may go lower still and the shadows will get longer. That's our only hope."

Lavon had not thought of that. He rasped into the banked megaphones. Once more, the ship began to move.

It got hotter.

Steadily, with a perceptible motion, the "star" sank in Lavon's face. Suddenly a new terror struck him. Suppose it should continue to go down until it was gone entirely? Blasting though it was now, it was the only source of heat. Would not space become bitter cold on the instant — and the ship an expanding, bursting block of ice?

The shadows lengthened menacingly, stretched across the desert toward the forward-rolling vessel. There was no talking in the cabin, just the sound of ragged breathing and the creaking of the machinery.

Then the jagged horizon seemed to rush upon them. Stony teeth cut into the lower rim of the ball of fire, devoured it swiftly. It was gone.

They were in the lee of the

cliffs. Lavon ordered the ship turned to parallel the rock-line; it responded heavily, sluggishly. Far above, the sky deepened steadily, from blue to indigo.

SHAR came silently up through the trap and stood beside Lavon, studying that deepening color and the lengthening of the shadows down the beach toward their world. He said nothing, but Lavon knew that the same chilling thought was in his mind.

"Lavon."

Lavon jumped. Shar's voice had iron in it. "Yes?"

"We'll have to keep moving. We must make the next world, wherever it is, very shortly."

"How can we dare move when we can't see where we're going? Why not sleep it over — if the cold will let us?"

"It will let us," Shar said. "It can't get dangerously cold up here. If it did, the sky — or what we used to think of as the sky — would have frozen over every night, even in summer. But what I'm thinking about is the water. The plants will go to sleep now. In our world that wouldn't matter; the supply of oxygen is enough to last through the night. But in this confined space, with so many creatures in it and no source of fresh water, we will probably smother."

Shar seemed hardly to be in-

volved at all, but spoke rather with the voice of implacable physical laws.

"Furthermore," he said, staring unseeingly out at the raw landscape, "the diatoms are plants, too. In other words, we must stay on the move for as long as we have oxygen and power — and pray that we make it."

"Shar, we had quite a few protos on board this ship once. And Para there isn't quite dead yet. If he were, the cabin would be intolerable. The ship is nearly sterile of bacteria, because all the protos have been eating them as a matter of course and there's no outside supply of them, any more than there is for oxygen. But still and all there would have been some decay."

Shar bent and tested the pelticle of the motionless Para with a probing finger. "You're right, he's still alive. What does that prove?"

"The Vortae are also alive; I can feel the water circulating. Which proves it wasn't the heat that hurt Para. *It was the light.* Remember how badly my skin was affected after I climbed beyond the sky? Undiluted starlight is deadly. We should add that to the information on the plates."

"I still don't see the point."

"It's this. We've got three or four Noc down below. They were shielded from the light, and so

must be alive. If we concentrate them in the diatom galleys, the dumb diatoms will think it's still daylight and will go on working. Or we can concentrate them up along the spine of the ship, and keep the algae putting out oxygen. So the question is: which do we need more, oxygen or power? Or can we split the difference?"

Shar actually grinned. "A brilliant piece of thinking. We'll make a Shar of you yet, Lavon. No, I'd say that we can't split the difference. There's something about daylight, some quality, that the light Noc emits doesn't have. You and I can't detect it, but the green plants can, and without it they don't make oxygen. So we'll have to settle for the diatoms — for power."

Lavon brought the vessel away from the rocky lee of the cliff, out onto the smoother sand. All trace of direct light was gone now, although there was still a soft, general glow on the sky.

"Now, then," Shar said thoughtfully, "I would guess that there's water over there in the canyon, if we can reach it. I'll go below and arrange —"

Lavon gasped, "What's the matter?"

Silently, Lavon pointed, his heart pounding.

The entire dome of indigo above them was spangled with tiny, incredibly brilliant lights.

There were hundreds of them, and more and more were becoming visible as the darkness deepened. And far away, over the ultimate edge of the rocks, was a dim red globe, crescented with ghostly silver. Near the zenith was another such body, much smaller, and silvered all over . . .

Under the two moons of Hydrot, and under the eternal stars, the two-inch-wooden spaceship and its microscopic cargo toiled down the slope toward the drying little rivulet.

V

THE ship rested on the bottom of the canyon for the rest of the night. The great square doors were thrown open to admit the raw, irradiated, life-giving water from outside — and the wriggling bacteria which were fresh food.

No other creatures approached them, either with curiosity or with predatory intent, while they slept, though Lavon had posted guards at the doors. Evidently, even up here on the very floor of space, highly organized creatures were quiescent at night.

But when the first flush of light filtered through the water, trouble threatened.

First of all, there was the bug-eyed monster. The thing was green and had two snapping claws, either one of which could



have broken the ship in two like a spirogyra straw. Its eyes were black and globular, on the ends of short columns, and its long feelers were as thick as a plant-stem. It passed in a kicking fury of motion, however, never noticing the ship at all.

"Is that — a sample of the kind of life we can expect in the next world?" Lavon whispered. Nobody answered, for the very good reason that nobody knew.

After a while, Lavon risked moving the ship forward against the current, which was slow but heavy. Enormous writhing worms whipped past them. One struck

the hull a heavy blow, then thrashed on obliviously.

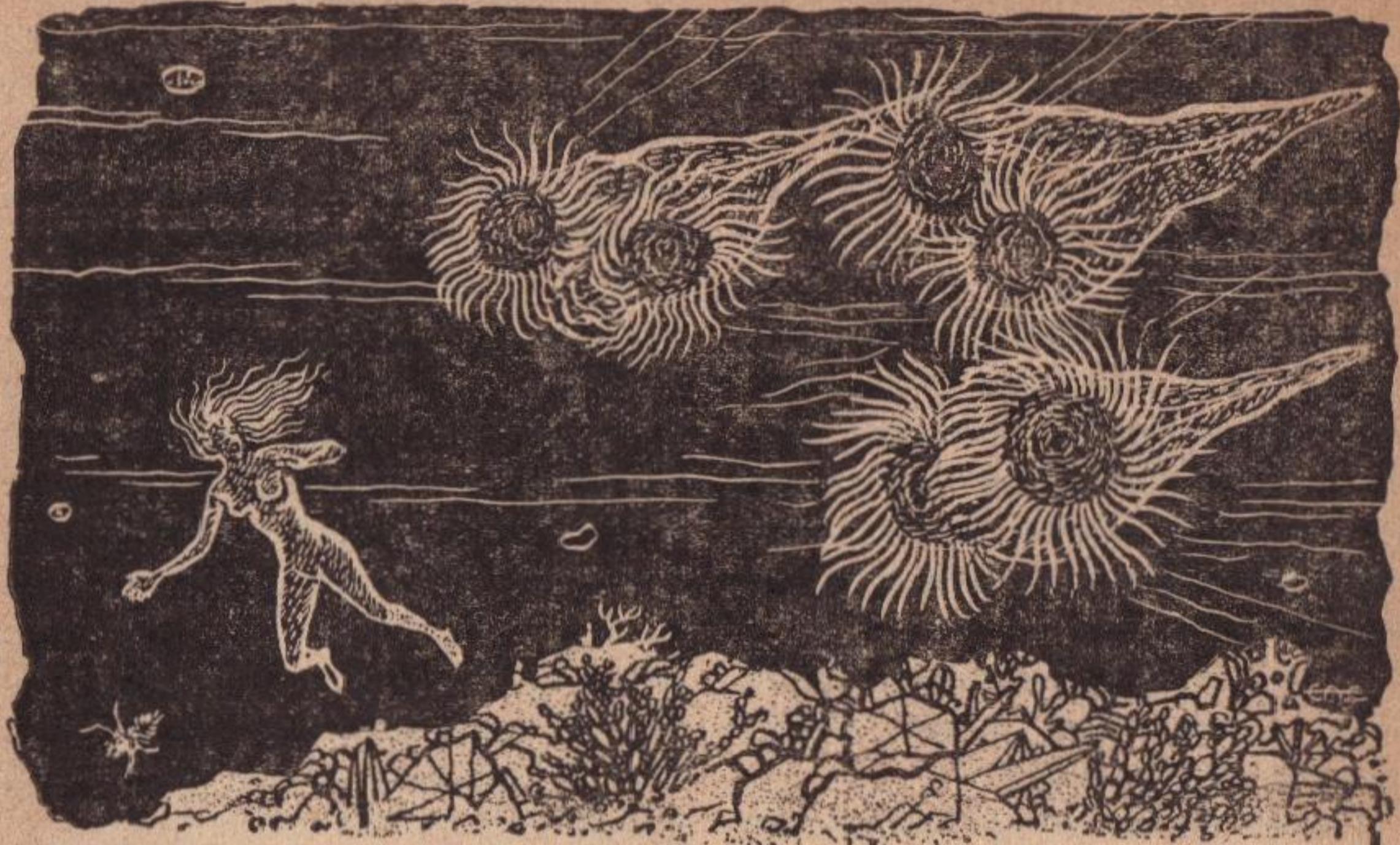
"They don't notice us," Shar said. "We're too small. Lavon, the ancients warned us of the immensity of space, but even when you see it, it's impossible to grasp. And all those stars — can they mean what I think they mean? It's beyond thought, beyond belief!"

"The bottom's sloping," Lavon said, looking ahead intently. "The walls of the canyon are retreating, and the water's becoming rather silty. Let the stars wait, Shar; we're coming toward the entrance of our new world."

Shar subsided moodily. His vision of space had disturbed him, perhaps seriously. He took little notice of the great thing that was happening, but instead huddled worriedly over his own expanding speculations. Lavon felt the old gap between their two minds widening once more.

Now the bottom was tilting upward again. Lavon had no experience with delta-formation, for no rivulets left his own world, and the phenomenon worried him. But his worries were swept away in wonder as the ship topped the rise and nosed over.

Ahead, the bottom sloped away again, indefinitely, into glimmering depths. A proper sky was over them once more, and Lavon could see small rafts of plankton



floating placidly beneath it. Almost at once, too, he saw several of the smaller kinds of protos, a few of which were already approaching the ship—

THEN the girl came darting out of the depths, her features distorted with terror. At first she did not see the ship at all. She came twisting and turning lithely through the water, obviously hoping only to throw herself over the ridge of the delta and into the savage streamlet beyond.

Lavon was stunned. Not that there were men here—he had hoped for that—but at the girl's

single-minded flight toward suicide.

"What—"

Then a dim buzzing began to grow in his ears, and he understood.

"Shar! Than! Tanol!" he bawled. "Break out crossbows and spears! Knock out all the windows!" He lifted a foot and kicked through the big port in front of him. Someone thrust a crossbow into his hand.

"Eh? What's happening?" Shar blurted.

"Rotifers!"

The cry went through the ship like a galvanic shock. The rotifers

back in Lavon's own world were virtually extinct, but everyone knew thoroughly the grim history of the long battle man and proto had waged against them.

The girl spotted the ship suddenly and paused, stricken by despair at the sight of the new monster. She drifted with her own momentum, her eyes alternately fixed hypnotically upon the ship and glancing back over her shoulder, toward where the buzzing snarled louder and louder in the dimness.

"Don't stop!" Lavon shouted. "This way, this way! We're friends! We'll help!"

Three great semi-transparent trumpets of smooth flesh bored over the rise, the many thick cilia of their coronas whirring greedily. Dicrangs—the most predacious of the entire tribe of Eaters. They were quarreling thickly among themselves as they moved, with the few blurred, pre-symbolic noises which made up their "language."

CAREFULLY, Lavon wound the crossbow, brought it to his shoulder, and fired. The bolt sang away through the water. It lost momentum rapidly, and was caught by a stray current which brought it closer to the girl than to the Eater at which Lavon had aimed.

He bit his lip, lowered the

weapon, wound it up again. It did not pay to underestimate the range; he would have to wait until he could fire with effect. Another bolt, cutting through the water from a side port, made him issue orders to cease firing.

The sudden irruption of the rotifers decided the girl. The motionless wooden monster was strange to her and had not yet menaced her—but she must have known what it would be like to have three Dicrangs over her, each trying to grab away from the other the biggest share. She threw herself toward the big port. The Eaters screamed with fury and greed and bored after her.

She probably would not have made it, had not the dull vision of the lead Dicran made out the wooden shape of the ship at the last instant. It backed off, buzzing, and the other two sheered away to avoid colliding with it. After that they had another argument, though they could hardly have formulated what it was that they were fighting about. They were incapable of saying anything much more complicated than the equivalent of "Yaah," "Drop dead," and "You're another."

While they were still snarling at each other, Lavon pierced the nearest one all the way through with an arablast bolt. It disintegrated promptly — rotifers are delicately organized creatures

despite their ferocity—and the remaining two were at once involved in a lethal battle over the remains.

"Than, take a party out and spear me those two Eaters while they're still fighting," Lavon ordered. "Don't forget to destroy their eggs, too. I can see that this world needs a little taming."

The girl shot through the port and brought up against the far wall of the cabin, flailing in terror. Lavon tried to approach her, but from somewhere she produced a flake of stonewort chipped to a nasty point. He sat down on the stool before his control board and waited while she took in the cabin, Lavon, Shar, the pilot, the senescent Para.

At last she said: "Are—you—the gods from beyond the sky?"

"We're from beyond the sky, all right," Lavon said. "But we're not gods. We're human beings, like yourself. Are there many humans here?"

The girl seemed to assess the situation very rapidly, savage though she was. Lavon had the odd and impossible impression that he should recognize her. She tucked the knife back into her matted hair—ah, Lavon thought, that's a trick I may need to remember—and shook her head.

"We are few. The Eaters are everywhere. Soon they will have the last of us."

Her fatalism was so complete that she actually did not seem to care.

"And you've never cooperated against them? Or asked the protos to help?"

"The protos?" She shrugged. "They are as helpless as we are against the Eaters. We have no weapons which kill at a distance, like yours. And it is too late now for such weapons to do any good. We are too few, the Eaters too many."

LAVON shook his head emphatically. "You've had one weapon that counts, all along. Against it, numbers mean nothing. We'll show you how we've used it. You may be able to use it even better than we did, once you've given it a try."

The girl shrugged again. "We have dreamed of such a weapon now and then, but never found it. I do not think that what you say is true. What is this weapon?"

"Brains," Lavon said. "Not just one brain, but brains. Working together. Cooperation."

"Lavon speaks the truth," a weak voice said from the deck.

The Para stirred feebly. The girl watched it with wide eyes. The sound of the Para using human speech seemed to impress her more than the ship or anything else it contained.

"The Eaters can be conquered,"

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the thin, buzzing voice said. "The protos will help, as they helped in the world from which we came. They fought this flight through space, and deprived Man of his records; but Man made the trip without the records. The protos will never oppose men again. I have already spoken to the protos of this world and have told them what Man can dream, Man can do, whether the protos wish it or not.

"SHAR, your metal records are with you. They were hidden in the ship. My brothers will lead you to them.

"This organism dies now. It dies in confidence of knowledge, as an intelligent creature dies. Man has taught us this. There is nothing that knowledge . . . cannot do. With it, men . . . have crossed . . . have crossed space . . ."

The voice whispered away. The shining slipper did not change, but something about it was gone. Lavon looked at the girl; their eyes met.

"We have crossed space," Lavon repeated softly.

Shar's voice came to him across a great distance. The young-old man was whispering: "But have we?"

"As far as I'm concerned, yes," said Lavon.

—JAMES BLISH