

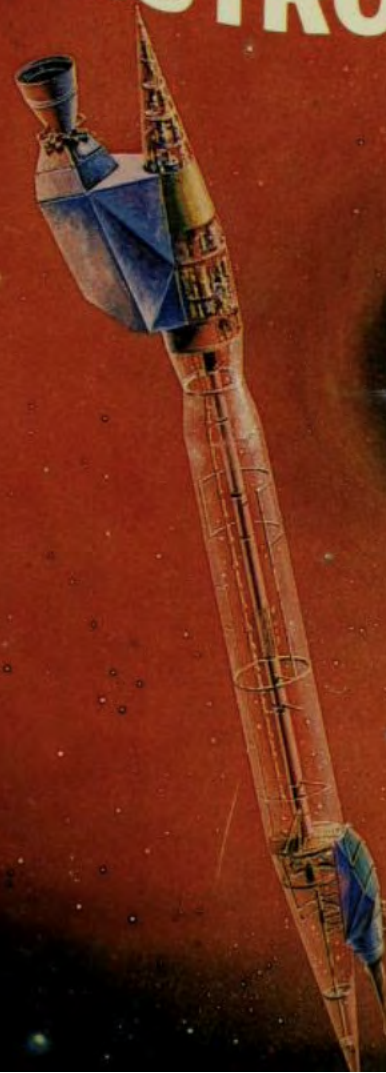
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# NEUTRON STAR

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Larry Niven



A Del Rey Book

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**TO DAD & HOPE**

Who early suspected that I might  
know what I was doing.

## NEUTRON STAR

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THE *Skydiver* DROPPED out of hyperspace an even million miles above the neutron star. I needed a minute to place myself against the stellar background, and another to find the distortion Sonya Laskin had mentioned before she died. It was to my left, an area the apparent size of the Earth's moon. I swung the ship around to face it.

Curdled stars, muddled stars, stars that had been stirred with a spoon.

The neutron star was in the center, of course, though I couldn't see it and hadn't expected to. It was only eleven miles across, and cool. A billion years had passed since BVS-1 burned by fusion fire. Millions of years, at least, since the cataclysmic two weeks during which BVS-1 was an X-ray star, burning at a temperature of five billion degrees Kelvin. Now it showed only by its mass.

The ship began to turn by itself. I felt the pressure of the fusion drive. Without help from me my faithful metal watchdog was putting me in a hyperbolic orbit that would take me within one mile of the neutron star's surface. Twenty-four hours to fall, twenty-four hours to rise . . . and during that time something would try to kill me. As something had killed the Laskins.

The same type of autopilot, with the same program, had chosen the Laskins' orbit. It had not caused their ship to collide with the star. I could trust the autopilot. I could even change its program.

I really ought to.

How did I get myself into this hole?

The drive went off after ten minutes of maneuvering. My orbit was established, in more ways than one. I knew what would happen if I tried to back out now.

All I'd done was walk into a drugstore to get a new battery for my lighter!

Right in the middle of the store, surrounded by three floors of sales counters, was the new 2603 Sinclair intrasystem yacht. I'd come for a battery, but I stayed to admire. It was a beautiful job, small and sleek and streamlined and blatantly different from anything that'd ever been built. I wouldn't have flown it for anything but I had to admit it was pretty. I ducked my head through the door to look at the control panel. You never saw so many dials. When I pulled my head out, all the customers were looking in the same direction. The place had gone startlingly quiet.

I can't blame them for staring. A number of aliens were in the store, mainly shopping for souvenirs, but they were staring too. A puppeteer is unique. Imagine a headless, three-legged centaur wearing two Cecil the Seaside Sea Serpent puppets on its arms, and you'll have something like the right picture. But the arms are weaving necks, and the puppets are real heads, flat and brainless, with wide flexible lips. The brain is under a bony hump set between the bases of the necks. This puppeteer wore only its own coat of brown hair, with a mane that extended all the way up its spine to form a thick mat over the brain. I'm told that the way they wear the mane indicates their status in society, but to me it could have been anything from a dock worker to a jeweler to the president of General Products.

I watched with the rest as it came across the floor, not because I'd never seen a puppeteer but because there is something beautiful about the dainty way they move on those slender legs and tiny hooves. I watched it come straight toward me, closer and closer. It stopped a foot away, looked me over, and said, "You are Beowulf Shaeffer, former chief pilot for Nakamura Lines."

Its voice was a beautiful contralto with not a trace of accent. A puppeteer's mouths are not only the most flexible speech organs around, but also the most sensitive hands. The tongues are forked and pointed; the wide,

thick lips have little fingerlike knobs along the rims. Imagine a watchmaker with a sense of taste in his fingertips . . .

I cleared my throat. "That's right."

It considered me from two directions. "You would be interested in a high-paying job?"

"I'd be fascinated by a high-paying job."

"I am our equivalent of the regional president of General Products. Please come with me, and we will discuss this elsewhere."

I followed it into a displacement booth. Eyes followed me all the way. It was embarrassing, being accosted in a public drugstore by a two-headed monster. Maybe the puppeteer knew it. Maybe it was testing me to see how badly I needed money.

My need was great. Eight months had passed since Nakamura Lines folded. For some time before that I had been living very high on the hog, knowing that my back pay would cover my debts. I never saw that back pay. It was quite a crash, Nakamura Lines. Respectable middle-aged businessmen took to leaving their hotel windows without their lift belts. Me, I kept spending. If I'd started living frugally, my creditors would have done some checking . . . and I'd have ended in debtor's prison.

The puppeteer dialed thirteen fast digits with its tongue. A moment later we were elsewhere. Air puffed out when I opened the booth door, and I swallowed to pop my ears.

"We are on the roof of the General Products building." The rich contralto voice thrilled along my nerves, and I had to remind myself that it was an alien speaking, not a lovely woman. "You must examine this spacecraft while we discuss your assignment."

I stepped outside a little cautiously, but it wasn't the windy season. The roof was at ground level. That's the way we build on We Made It. Maybe it has something to do with the fifteen-hundred-mile-an-hour winds we get in summer and winter, when the planet's axis of rotation runs through its primary, Procyon. The winds are our planet's only tourist attraction, and it would be a shame to slow them down by planting skyscrapers in their path. The

bare, square concrete roof was surrounded by endless square miles of desert, not like the deserts of other inhabited worlds, but an utterly lifeless expanse of fine sand just crying to be planted with ornamental cactus. We've tried that. The wind blows the plants away.

The ship lay on the sand beyond the roof. It was a No. 2 General Products hull: a cylinder three hundred feet long and twenty feet through, pointed at both ends and with a slight wasp-waist constriction near the tail. For some reason it was lying on its side, with the landing shocks still folded in at the tail.

Ever notice how all ships have begun to look the same? A good ninety-five percent of today's spacecraft are built around one of the four General Products hulls. It's easier and safer to build that way, but somehow all ships end as they began: mass-produced look-alikes.

The hulls are delivered fully transparent, and you use paint where you feel like it. Most of this particular hull had been left transparent. Only the nose had been painted, around the lifesystem. There was no major reaction drive. A series of retractable attitude jets had been mounted in the sides, and the hull was pierced with smaller holes, square and round, for observational instruments. I could see them gleaming through the hull.

The puppeteer was moving toward the nose, but something made me turn toward the stern for a closer look at the landing shocks. They were bent. Behind the curved transparent hull panels some tremendous pressure had forced the metal to flow like warm wax, back and into the pointed stern.

"What did this?" I asked.

"We do not know. We wish strenuously to find out."

"What do you mean?"

"Have you heard of the neutron star BVS-1?"

I had to think a moment. "First neutron star ever found, and so far the only. Someone located it two years ago, by stellar displacement."

"BVS-1 was found by the Institute of Knowledge on Jinx. We learned through a go-between that the Institute wished to explore the star. They needed a ship to do it.

They had not yet sufficient money. We offered to supply them with a ship's hull, with the usual guarantees, if they would turn over to us all data they acquired through using our ship."

"Sounds fair enough." I didn't ask why they hadn't done their own exploring. Like most sentient vegetarians, puppeteers find discretion to be the *only* part of valor.

"Two humans named Peter Laskin and Sonya Laskin wished to use the ship. They intended to come within one mile of the surface in a hyperbolic orbit. At some point during their trip an unknown force apparently reached through the hull to do this to the landing shocks. The unknown force also seems to have killed the pilots."

"But that's impossible. Isn't it?"

"You see the point. Come with me." The puppeteer trotted toward the bow.

I saw the point, all right. Nothing, but nothing, can get through a General Products hull. No kind of electromagnetic energy except visible light. No kind of matter, from the smallest subatomic particle to the fastest meteor. That's what the company's advertisements claim, and the guarantee backs them up. I've never doubted it, and I've never heard of a General Products hull being damaged by a weapon or by anything else.

On the other hand, a General Products hull is as ugly as it is functional. The puppeteer-owned company could be badly hurt if it got around that something *could* get through a company hull. But I didn't see where I came in.

We rode an escalladder into the nose.

The lifesystem was in two compartments. Here the Laskins had used heat-reflective paint. In the conical control cabin the hull had been divided into windows. The relaxation room behind it was a windowless reflective silver. From the back wall of the relaxation room an access tube ran aft, opening on various instruments and the hyperdrive motors.

There were two acceleration couches in the control cabin. Both had been torn loose from their mountings and wadded into the nose like so much tissue paper, crushing the instrument panel. The backs of the crumpled couches

were splashed with rust brown. Flecks of the same color were all over everything, the walls, the windows, the viewcreens. It was as if something had hit the couches from behind: something like a dozen paint-filled toy balloons striking with tremendous force.

"That's blood," I said.

"That is correct. Human circulatory fluid."

Twenty-four hours to fall.

I spent most of the first twelve hours in the relaxation room, trying to read. Nothing significant was happening, except that a few times I saw the phenomenon Sonya Laskin had mentioned in her last report. When a star went directly behind the invisible BVS-1, a halo formed. BVS-1 was heavy enough to bend light around it, displacing most stars to the sides; but when a star went directly behind the neutron star, its light was displaced to all sides at once. Result: a tiny circle which flashed once and was gone almost before the eye could catch it.

I'd known next to nothing about neutron stars the day the puppeteer picked me up. Now I was an expert. And I still had no idea what was waiting for me when I got down there.

All the matter you're ever likely to meet will be normal matter, composed of a nucleus of protons and neutrons surrounded by electrons in quantum energy states. In the heart of any star there is a second kind of matter: for there, the tremendous pressure is enough to smash the electron shells. The result is degenerate matter: nuclei forced together by pressure and gravity, but held apart by the mutual repulsion of the more or less continuous electron "gas" around them. The right circumstances may create a third type of matter.

Given: a burnt-out white dwarf with a mass greater than 1.44 times the mass of the sun—Chandrasekhar's Limit, named for an Indian-American astronomer of the nineteen hundreds. In such a mass the electron pressure alone would not be able to hold the electrons back from the nuclei. Electrons would be forced against protons—to make neutrons. In one blazing explosion most of the star

would change from a compressed mass of degenerate matter to a closely packed lump of neutrons: neutronium, theoretically the densest matter possible in this universe. Most of the remaining normal and degenerate matter would be blown away by the liberated heat.

For two weeks the star would give off X-rays as its core temperature dropped from five billion degrees Kelvin to five hundred million. After that it would be a light-emitting body perhaps ten to twelve miles across: the next best thing to invisible. It was not strange that BVS-1 was the first neutron star ever found.

Neither is it strange that the Institute of Knowledge on Jinx would have spent a good deal of time and trouble looking. Until BVS-1 was found, neutronium and neutron stars were only theories. The examination of an actual neutron star could be of tremendous importance. Neutron stars might give us the key to true gravity control.

Mass of BVS-1: 1.3 times the mass of Sol, approx.

Diameter of BVS-1 (estimated): eleven miles of neutronium, covered by half a mile of degenerate matter, covered by maybe twelve feet of ordinary matter.

Nothing else was known of the tiny hidden star until the Laskins went in to look. Now the Institute knew one thing more: the star's spin.

"A mass that large can distort space by its rotation," said the puppeteer. "The Laskins' projected hyperbola was twisted across itself in such a way that we can deduce the star's period of rotation to be two minutes twenty-seven seconds."

The bar was somewhere in the General Products building. I don't know just where, and with the transfer booths it doesn't matter. I kept staring at the puppeteer bartender. Naturally only a puppeteer would be served by a puppeteer bartender, since any biped life form would resent knowing that his drink had been made with somebody's mouth. I had already decided to get dinner somewhere else.

"I see your problem," I said. "Your sales will suffer if it gets out that something can reach through one of your

hulls and smash a crew to bloody smears. But where do I come in?"

"We want to repeat the experiment of Sonya Laskin and Peter Laskin. We must find—"

"With me?"

"Yes. We must find out what it is that our hulls cannot stop. Naturally you may—"

"But I won't."

"We are prepared to offer one million stars."

I was tempted, but only for a moment. "Forget it."

"Naturally you will be allowed to build your own ship, starting with a No. 2 General Products hull."

"Thanks, but I'd like to go on living."

"You would dislike being confined. I find that We Made It has re-established the debtor's prison. If General Products made public your accounts—"

"Now, *just* a—"

"You owe money on the close order of five hundred thousand stars. We will pay your creditors before you leave. If you return—" I had to admire the creature's honesty in not saying "When"—"we will pay you the residue. You may be asked to speak to news commentators concerning the voyage, in which case there will be more stars."

"You say I can build my own ship?"

"Naturally. This is not a voyage of exploration. We want you to return safely."

"It's a deal," I said.

After all, the puppeteer had tried to blackmail me. What happened next would be its own fault.

They built my ship in two weeks flat. They started with a No. 2 General Products hull, just like the one around the Institute of Knowledge ship, and the lifesystem was practically a duplicate of the Laskins', but there the resemblance ended. There were no instruments to observe neutron stars. Instead, there was a fusion motor big enough for a Jinx warliner. In my ship, which I now called *Skydiver*, the drive would produce thirty gees at the safety limit. There was a laser cannon big enough to

punch a hole through We Made It's moon. The puppeteer wanted me to feel safe, and now I did, for I could fight and I could run. Especially I could run.

I heard the Laskins' last broadcast through half a dozen times. Their unnamed ship had dropped out of hyperspace a million miles above BVS-1. Gravity warp would have prevented their getting closer in hyperspace. While her husband was crawling through the access tube for an instrument check, Sonya Laskin had called the Institute of Knowledge. "... We can't see it yet, not by naked eye. But we can see where it is. Every time some star or other goes behind it, there's a little ring of light. Just a minute, Peter's ready to use the telescope. . . ."

Then the star's mass had cut the hyperspacial link. It was expected, and nobody had worried—then. Later, the same effect must have stopped them from escaping whatever attacked them into hyperspace.

When would-be rescuers found the ship, only the radar and the cameras were still running. They didn't tell us much. There had been no camera in the cabin. But the forward camera gave us, for one instant, a speed-blurred view of the neutron star. It was a featureless disk the orange color of perfect barbecue coals, if you know someone who can afford to burn wood. This object had been a neutron star a long time.

"There'll be no need to paint the ship," I told the president.

"You should not make such a trip with the walls transparent. You would go insane."

"I'm no flatlander. The mind-wrenching sight of naked space fills me with mild but waning interest. I want to know nothing's sneaking up behind me."

The day before I left, I sat alone in the General Products bar letting the puppeteer bartender make me drinks with his mouth. He did it well. Puppeteers were scattered around the bar in twos and threes, with a couple of men for variety, but the drinking hour had not yet arrived. The place felt empty.

I was pleased with myself. My debts were all paid, not

that that would matter where I was going. I would leave with not a minicredit to my name, with nothing but the ship . . .

All told, I was well out of a sticky situation. I hoped I'd like being a rich exile.

I jumped when the newcomer sat down across from me. He was a foreigner, a middle-aged man wearing an expensive night-black business suit and a snow-white asymmetric beard. I let my face freeze and started to get up.

"Sit down, Mr. Shaeffer."

"Why?"

He told me by showing me a blue disk. An Earth government ident. I looked it over to show I was alert, not because I'd know an ersatz from the real thing.

"My name is Sigmund Ausfaller," said the government man. "I wish to say a few words concerning your assignment on behalf of General Products."

I nodded, not saying anything.

"A record of your verbal contract was sent to us as a matter of course. I noticed some peculiar things about it. Mr. Shaeffer, will you really take such a risk for only five hundred thousand stars?"

"I'm getting twice that."

"But you only keep half of it. The rest goes to pay debts. Then there are taxes . . . But never mind. What occurred to me was that a spaceship is a spaceship, and yours is very well armed and has powerful legs. An admirable fighting ship, if you were moved to sell it."

"But it isn't mine."

"There are those who would not ask. On Canyon, for example, or the Isolationist party of Wunderland."

I said nothing.

"Or, you might be planning a career of piracy. A risky business, piracy, and I don't take the notion seriously."

I hadn't even thought about piracy. But I'd have to give up on Wunderland.

"What I would like to say is this, Mr. Shaeffer. A single entrepreneur, if he were sufficiently dishonest, could do terrible damage to the reputation of all human beings

everywhere. Most species find it necessary to police the ethics of their own members, and we are no exception. It occurred to me that you might not take your ship to the neutron star at all; that you would take it elsewhere and sell it. The puppeteers do not make invulnerable war vessels. They are pacifists. Your *Skydiver* is unique.

"Hence I have asked General Products to allow me to install a remote-control bomb in the *Skydiver*. Since it is inside the hull, the hull cannot protect you. I had it installed this afternoon.

"Now, notice! If you have not reported within a week, I will set off the bomb. There are several worlds within a week's hyperspace flight of here, but all recognize the dominion of Earth. If you flee, you must leave your ship within a week, so I hardly think you will land on a nonhabitable world. Clear?"

"Clear."

"If I am wrong, you may take a lie-detector test and prove it. Then you may punch me in the nose, and I will apologize handsomely."

I shook my head. He stood up, bowed, and left me sitting there cold sober.

Four films had been taken from the Laskins' cameras. In the time left to me I ran through them several times, without seeing anything out of the way. If the ship had run through a gas cloud, the impact could have killed the Laskins. At perihelion they were moving at better than half the speed of light. But there would have been friction, and I saw no sign of heating in the films. If something alive had attacked them, the beast was invisible to radar and to an enormous range of light frequencies. If the attitude jets had fired accidentally—I was clutching at straws—the light showed on none of the films.

There would be savage magnetic forces near BVS-1, but that couldn't have done any damage. No such force could penetrate a General Products hull. Neither could heat, except in special bands of radiated light, bands visible to at least one of the puppeteers' alien customers. I hold adverse opinions on the General Products hull, but

they all concern the dull anonymity of the design. Or maybe I resent the fact that General Products holds a near-monopoly on spacecraft hulls, and isn't owned by human beings. But if I'd had to trust my life to, say, the Sinclair yacht I'd seen in the drugstore, I'd have chosen jail.

Jail was one of my three choices. But I'd be there for life. Ausfaller would see to that.

Or I could run for it in the *Skydiver*. But no world within reach would have me. If I could find an undiscovered Earth-like world within a week of We Made It . . .

Fat chance. I preferred BVS-1.

I thought that flashing circle of light was getting bigger, but it flashed so seldom, I couldn't be sure. BVS-1 wouldn't show even in my telescope. I gave that up and settled for just waiting.

Waiting, I remembered a long-ago summer spent on Jinx. There were days when, unable to go outside because a dearth of clouds had spread the land with raw blue-white sunlight, we amused ourselves by filling party balloons with tap water and dropping them on the sidewalk from three stories up. They made lovely splash patterns, which dried out too fast. So we put a little ink in each balloon before filling it. Then the patterns stayed.

Sonya Laskin had been in her chair when the chairs collapsed. Blood samples showed that it was Peter who had struck them from behind, like a water balloon dropped from a great height.

What could get through a General Products hull?

Ten hours to fall.

I unfastened the safety net and went for an inspection tour. The access tunnel was three feet wide, just right to push through in free fall. Below me was the length of the fusion tube; to the left, the laser cannon; to the right, a set of curved side tubes leading to inspection points for the gyros, the batteries and generator, the air plant, the hyperspace shunt motors. All was in order—except me. I was clumsy. My jumps were always too short or too long.

There was no room to turn at the stern end, so I had to back fifty feet to a side tube.

Six hours to go, and still I couldn't find the neutron star. Probably I would see it only for an instant, passing at better than half the speed of light. Already my speed must be enormous.

Were the stars turning blue?

Two hours to go—and I was sure they were turning blue. Was my speed that high? Then the stars behind should be red. Machinery blocked the view behind me, so I used the gyros. The ship turned with peculiar sluggishness. And the stars behind were blue, not red. All around me were blue-white stars.

Imagine light falling into a savagely steep gravitational well. It won't accelerate. Light can't move faster than light. But it can gain in energy, in frequency. The light was falling on me, harder and harder as I dropped.

I told the dictaphone about it. That dictaphone was probably the best-protected item on the ship. I had already decided to earn my money by using it, just as if I expected to collect. Privately I wondered just how intense the light would get.

*Skydiver* had drifted back to vertical, with its axis through the neutron star, but now it faced outward. I'd thought I had the ship stopped horizontally. More clumsiness. I used the gyros. Again the ship moved mushily, until it was halfway through the swing. Then it seemed to fall automatically into place. It was as if the *Skydiver* preferred to have its axis through the neutron star.

I didn't like that.

I tried the maneuver again, and again the *Skydiver* fought back. But this time there was something else. Something was pulling at me.

So I unfastened my safety net—and fell headfirst into the nose.

The pull was light, about a tenth of a gee. It felt more like sinking through honey than falling. I climbed back into my chair, tied myself in with the net, now hanging face down, and turned on the dictaphone. I told my story

in such nitpicking detail that my hypothetical listeners could not but doubt my hypothetical sanity. "I think this is what happened to the Laskins," I finished. "If the pull increases, I'll call back."

Think? I never doubted it. This strange, gentle pull was inexplicable. Something inexplicable had killed Peter and Sonya Laskin. Q.E.D.

Around the point where the neutron star must be, the stars were like smeared dots of oilpaint, smeared radially. They glared with an angry, painful light. I hung face down in the net and tried to think.

It was an hour before I was sure. The pull was increasing. And I still had an hour to fall.

Something was pulling on me, but not on the ship.

No, that was nonsense. What could reach out to me through a General Products hull? It must be the other way around. Something was pushing on the ship, pushing it off course.

If it got worse, I could use the drive to compensate. Meanwhile, the ship was being pushed away from BVS-1, which was fine by me.

But if I was wrong, if the ship was not somehow being pushed away from BVS-1, the rocket motor would send the *Skydiver* crashing into eleven miles of neutronium.

And why wasn't the rocket already firing? If the ship was being pushed off course, the autopilot should be fighting back. The accelerometer was in good order. It had looked fine when I made my inspection tour down the access tube.

Could something be pushing on the ship *and* on the accelerometer, but not on me? It came down to the same impossibility: something that could reach through a General Products hull.

To hell with theory, said I to myself, said I. I'm getting out of here. To the dictaphone I said, "The pull has increased dangerously. I'm going to try to alter my orbit."

Of course, once I turned the ship outward and used the rocket, I'd be adding my own acceleration to the X-force. It would be a strain, but I could stand it for a while. If I came within a mile of BVS-1, I'd end like Sonya Laskin.

She must have waited face down in a net like mine, waited without a drive unit, waited while the pressure rose and the net cut into her flesh, waited until the net snapped and dropped her into the nose, to lie crushed and broken until the X-force tore the very chairs loose and dropped them on her.

I hit the gyros.

The gyros weren't strong enough to turn me. I tried it three times. Each time the ship rotated about fifty degrees and hung there, motionless, while the whine of the gyros went up and up. Released, the ship immediately swung back to position. I was nose down to the neutron star, and I was going to stay that way.

Half an hour to fall, and the X-force was over a gee. My sinuses were in agony. My eyes were ripe and ready to fall out. I don't know if I could have stood a cigarette, but I didn't get the chance. My pack of Fortunados had fallen out of my pocket when I dropped into the nose. There it was, four feet beyond my fingers, proof that the X-force acted on other objects besides me. Fascinating.

I couldn't take any more. If it dropped me shrieking into the neutron star, I had to use the drive. And I did. I ran the thrust up until I was approximately in free fall. The blood which had pooled in my extremities went back where it belonged. The gee dial registered one point two gee. I cursed it for a lying robot.

The soft-pack was bobbing around in the nose, and it occurred to me that a little extra nudge on the throttle would bring it to me. I tried it. The pack drifted toward me, and I reached, and like a sentient thing it speeded up to avoid my clutching hand. I snatched at it again as it went past my ear, and again it was moving too fast. That pack was going at a hell of a clip, considering that here I was practically in free fall. It dropped through the door to the relaxation room, still picking up speed, blurred and vanished as it entered the access tube. Seconds later I heard a solid *thump*.

But that was *crazy*. Already the X-force was pulling blood into my face. I pulled my lighter out, held it at

arm's length and let go. It fell gently into the nose. But the pack of Fortunados had hit like I'd dropped it from a building.

Well.

I nudged the throttle again. The mutter of fusing hydrogen reminded me that if I tried to keep this up all the way, I might well put the General Products hull to its toughest test yet: smashing it into a neutron star at half lightspeed. I could see it now: a transparent hull containing only a few cubic inches of dwarf-star matter wedged into the tip of the nose.

At one point four gee, according to that lying gee dial, the lighter came loose and drifted toward me. I let it go. It was clearly falling when it reached the doorway. I pulled the throttle back. The loss of power jerked me violently forward, but I kept my face turned. The lighter slowed and hesitated at the entrance to the access tube. Decided to go through. I cocked my ears for the sound, then jumped as the whole ship rang like a gong.

And the accelerometer was right at the ship's center of mass. Otherwise the ship's mass would have thrown the needle off. The puppeteers were fiends for ten-decimal-point accuracy.

I favored the dictaphone with a few fast comments, then got to work reprogramming the autopilot. Luckily what I wanted was simple. The X-force was but an X-force to me, but now I knew how it behaved. I might actually live through this.

The stars were fiercely blue, warped to streaked lines near that special point. I thought I could see it now, very small and dim and red, but it might have been imagination. In twenty minutes I'd be rounding the neutron star. The drive grumbled behind me. In effective free fall, I unfastened the safety net and pushed myself out of the chair.

A gentle push aft—and ghostly hands grasped my legs. Ten pounds of weight hung by my fingers from the back of the chair. The pressure should drop fast. I'd programmed the autopilot to reduce the thrust from two gees

to zero during the next two minutes. All I had to do was be at the center of mass, in the access tube, when the thrust went to zero.

Something gripped the ship through a General Products hull. A psychokinetic life form stranded on a sun twelve miles in diameter? But how could anything alive stand such gravity?

Something might be stranded in orbit. There is life in space: outsiders and sailseeds, and maybe others we haven't found yet. For all I knew or cared, BVS-1 itself might be alive. It didn't matter. I knew what the X-force was trying to do. It was trying to pull the ship apart.

There was no pull on my fingers. I pushed aft and landed on the back wall, on bent legs. I knelt over the door, looking aft/down. When free fall came, I pulled myself through and was in the relaxation room looking down/forward into the nose.

Gravity was changing faster than I liked. The X-force was growing as zero hour approached, while the compensating rocket thrust dropped. The X-force tended to pull the ship apart; it was two gee forward at the nose, two gee backward at the tail, and diminished to zero at the center of mass. Or so I hoped. The pack and lighter had behaved as if the force pulling them had increased for every inch they moved sternward.

The back wall was fifteen feet away. I had to jump it with gravity changing in midair. I hit on my hands, bounced away. I'd jumped too late. The region of free fall was moving through the ship like a wave as the thrust dropped. It had left me behind. Now the back wall was "up" to me, and so was the access tube.

Under something less than half a gee, I jumped for the access tube. For one long moment I stared into the three-foot tunnel, stopped in midair and already beginning to fall back, as I realized that there was nothing to hang on to. Then I stuck my hands in the tube and spread them against the sides. It was all I needed. I levered myself up and started to crawl.

The dictaphone was fifty feet below, utterly unreachable. If I had anything more to say to General Products,

I'd have to say it in person. Maybe I'd get the chance. Because I knew what force was trying to tear the ship apart.

It was the tide.

The motor was off, and I was at the ship's midpoint. My spread-eagled position was getting uncomfortable. It was four minutes to perihelion.

Something creaked in the cabin below me. I couldn't see what it was, but I could clearly see a red point glaring among blue radial lines, like a lantern at the bottom of a well. To the sides, between the fusion tube and the tanks and other equipment, the blue stars glared at me with a light that was almost violet. I was afraid to look too long. I actually thought they might blind me.

There must have been hundreds of gravities in the cabin. I could even feel the pressure change. The air was thin at this height, one hundred and fifty feet above the control room.

And now, almost suddenly, the red dot was more than a dot. My time was up. A red disk leapt up at me; the ship swung around me; I gasped and shut my eyes tight. Giants' hands gripped my arms and legs and head, gently but with great firmness, and tried to pull me in two. In that moment it came to me that Peter Laskin had died like this. He'd made the same guesses I had, and he'd tried to hide in the access tube. But he'd slipped . . . as I was slipping . . . From the control room came a multiple shriek of tearing metal. I tried to dig my feet into the hard tube walls. Somehow they held.

When I got my eyes open the red dot was shrinking into nothing.

The puppeteer president insisted I be put in a hospital for observation. I didn't fight the idea. My face and hands were flaming red, with blisters rising, and I ached as though I'd been beaten. Rest and tender loving care, that's what I wanted.

I was floating between a pair of sleeping plates, hide-

ously uncomfortable, when the nurse came to announce a visitor. I knew who it was from her peculiar expression.

"What can get through a General Products hull?" I asked it.

"I hoped you would tell me." The president rested on its single back leg, holding a stick that gave off green incense-smelling smoke.

"And so I will. Gravity."

"Do not play with me, Beowulf Shaeffer. This matter is vital."

"I'm not playing. Does your world have a moon?"

"That information is classified." The puppeteers are cowards. Nobody knows where they come from, and nobody is likely to find out.

"Do you know what happens when a moon gets too close to its primary?"

"It falls apart."

"Why?"

"I do not know."

"Tides."

"What is a tide?"

Oho, said I to myself, said I. "I'm going to try to tell you. The Earth's moon is almost two thousand miles in diameter and does not rotate with respect to Earth. I want you to pick two rocks on the moon, one at the point nearest the Earth, one at the point farthest away."

"Very well."

"Now, isn't it obvious that if those rocks were left to themselves, they'd fall away from each other? They're in two different orbits, mind you, concentric orbits, one almost two thousand miles outside the other. Yet those rocks are forced to move at the same orbital speed."

"The one outside is moving faster."

"Good point. So there *is* a force trying to pull the moon apart. Gravity holds it together. Bring the moon close enough to Earth, and those two rocks would simply float away."

"I see. Then this 'tide' tried to pull your ship apart. It was powerful enough in the lifiesystem of the Institute ship to pull the acceleration chairs out of their mounts."

"And to crush a human being. Picture it. The ship's nose was just seven miles from the center of BVS-1. The tail was three hundred feet farther out. Left to themselves, they'd have gone in completely different orbits. My head and feet tried to do the same thing when I got close enough."

"I see. Are you molting?"

"What?"

"I notice you are losing your outer integument in spots."

"Oh, *that*. I got a bad sunburn from exposure to starlight. It's not important."

Two heads stared at each other for an eyeblink. A shrug? The puppeteer said, "We have deposited the residue of your pay with the Bank of We Made It. One Sigmund Ausfaller, human, has frozen the account until your taxes are computed."

"Figures."

"If you will talk to reporters now, explaining what happened to the Institute ship, we will pay you ten thousand stars. We will pay cash so that you may use it immediately. It is urgent. There have been rumors."

"Bring 'em in." As an afterthought I added, "I can also tell them that your world is moonless. That should be good for a footnote somewhere."

"I do not understand." But two long necks had drawn back, and the puppeteer was watching me like a pair of pythons.

"You'd know what a tide was if you had a moon. You couldn't avoid it."

"Would you be interested in—"

"A million stars? I'd be fascinated. I'll even sign a contract if it states what we're hiding. How do *you* like being blackmailed for a change?"

## A RELIC OF THE EMPIRE

WHEN THE SHIP arrived, Dr. Richard Schultz-Mann was out among the plants, flying over and around them on a lift belt. He hovered over one, inspecting with proprietary interest an anomalous patch in its yellow foliage. This one would soon be ripe.

The nature-lover was a breadstick of a man, very tall and very thin, with an aristocratic head sporting a close-cropped growth of coppery hair and an asymmetric beard. A white streak ran above his right ear, and there was a patch of white on each side of the chin, one coinciding with the waxed spike. As his head moved in the double sunlight, the patches changed color instantly.

He took a tissue sample from the grayish patch, stored it, and started to move on. . . .

The ship came down like a daylight meteor, streaking blue-white across the vague red glare of Big Mira. It slowed and circled high overhead, weaving drunkenly across the sky, then settled toward the plain near Mann's *Explorer*. Mann watched it land, then gave up his bumblebee activities and went to welcome the newcomers. He was amazed at the coincidence. As far as he knew, his had been the first ship ever to land here. The company would be good . . . but what could anyone possibly want here?

Little Mira set while he was skimming back. A flash of white at the far edge of the sea, and the tiny blue-white dwarf was gone. The shadows changed abruptly, turning the world red. Mann took off his pink-tinged goggles. Big Mira was still high, sixty degrees above the horizon and two hours from second sunset.

The newcomer was huge, a thick blunt-nosed cylinder twenty times the size of the *Explorer*. It looked old: not damaged, not even weathered, but indefinably old. Its nose