

THE LIVING GALAXY

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How long the human race will exist on the surface of the planet is the subject of frequent discussion by geologists, physicists, psychologists, philosophers—and military men. Perhaps, some of them think, the time may come when our descendants will spread out among the stars of the universe, and this planet itself will be but a cold pinhead endlessly rolling around an equally cold orange which will be all that is left of the sun. Laurence Manning takes us, in this charming and highly imaginative tale, out beyond the years and the light-years, to give us a glimpse of possibilities so far beyond tomorrow that the human mind can hardly conceive of the distance and the day. The very memory of the home planet has completely disappeared, but the human ideal continues, untarnished and unweakened by time. That is the message of the story, if message it must have: mankind is more than it knows or dreams.

FOREWORD

It is impossible for me, as author, to write this story so that it is complete in itself; I must ask you, as reader, to lend a hand to the work. This is what must be done: Close your eyes and picture to yourself a classroom of children about six years of age. You are one of these children. You have a book open in front of you and, as you read it, a lecturer says the words of it out loud, so that the subject matter is impressed through ear as well as eye. The date is very far in the future—more than 500,000,000 years, and the sun, Earth, Mars, Venus, and other ancient things have long since died and become as forgotten and legendary as the Garden of Eden. You, at the age of six, have played with strange toys—toys that would puzzle a skilled engineer today. You look forward to a whole century of study, research, sport, amusement, and philosophy. This first century is your childhood and it will end when you go to the great hospital to be operated upon and made bodily young once more. After that you are grown up and set about doing your work in the world—in whatever world you please, as a matter of fact, for there are billions of planets to choose from. You expect to live in this way forever, except for the risk of accidents. There is no hurry about learning or doing anything—but at six you are curious and ill-informed and this is the very first time you have been given any insight into the history of the human race, its habitations and its physical limits.

So you look around the room, with its bare green tinted walls, and gaze at the young face of the lecturer with awe, for his eyes are the most astonishingly intelligent things you have ever seen and they stare out from the youthful head with all the contrast and force of a scream coming out of the dark night. His name is History Zeta Nine and you have been told by one of your playmates that he is more than 100,000,000 years old. You did not believe it until he entered the room. Now you rather wonder if he can be as young as that! All through the reading, your eyes wander from the page every few minutes to steal a glance at this ancient man—just a glance, for you dread lest those burning eyes might meet yours.

Now, if you are ready, we will commence the history lesson:

As human beings, history must start for us upon a planet circling a small sun that has long since died. This sun was not located in our present universe, but very far away from here in a large cluster of stars known by courtesy as the "First Universe." In the Chart of Space it is known as Nebula X23G79 and is medium sized, slightly smaller than the one in which our sun and planets happen to be located. It will be the object of this first introduction to history to paint a brief picture of the progress of the race through space and to give some hints as to its final limits and their possible nature. When you have understood this general picture, we shall be in a position to go into more detail, but this is reserved for future lessons.

The planet on which the race first developed was called "Earth" and it possessed by nature a climate and an atmosphere suitable to human existence without any artificial aids. In all of Space, counting millions upon millions of Universes, such a condition has been noted only seventy-two times, so that it may be considered extraordinary. Eight other planets circled the same sun and two of these called "Mars" and "Venus" (all ancient heavenly bodies were named instead of numbered) were colonized with great

difficulty. This would have been the total distribution of humanity but for three prehistoric inventions that occurred among the ancients who inhabited the "Earth" planet. Let us examine these.

First came the release of atomic power, the first freeing of humanity from the necessity of using its manpower. The early engines and motors were, presumably, crude and dangerous but the result of the invention was, nevertheless, to enable power to be used to the limit of the raw material available in the planets. It rendered trips from one planet to another possible on a practical scale, instead of being gigantic adventures that could be afforded only once a century.

Second, arising out of the first, was atomic synthesis. This was observed as a phenomenon in the exhaust tubes of atomic rocket motors and it was found that the product could be controlled if the exhausts were surrounded by heavy induction magnets turned on and off with very high frequency. The "Earth" was now freed of its last need for labor. Food, metals, fabrics could be produced at will by atomic power using any handy raw material—rock and water being, of course, most common.

Now the "Earth" was deserted by thousands of explorers who settled down on the five remaining planets of the original solar system. These were not habitable without artificial air and heat, but the two great inventions mentioned above had solved all difficulties. One planet called "Mercury" was so near the sun of that system that it called for cooling and not until millions of years later was this perfected. The ability to reduce the heat of a body in isolated space is nowadays a mere technical commonplace—yet it involves transforming heat into energy and energy into matter.

We have, then, a human race existing on the planets of one star. The life of a man lasted little more than one century. For this reason, exploration of other stars came slowly, for a whole lifetime was used up in the mere trip. Had it not been for the third great invention, the human race might still have lived and died in one tiny corner of one universe. This invention was the rejuvenating operation which we all undergo every hundred years today. It came slowly and was not perfected without accident and many deaths. In principle, it is simple—being the familiar law of biology that hybridizing renews the youth of two aged parent races. The difficulty lay in its practice, for to hybridize the thousands of different cell types in the human body called for skill and technique then unknown. The result, historically, was to permit the long trips of exploration and colonization which in a few million years spread mankind over the planets of the "First Universe" and, subsequently, throughout all the universes and galaxies in space.

Of late, this steady, peaceful expansion has slowed down. The reason is that few new planets remain. In every direction we have spread to the very edge of matter and have come to a stop. For "space" as we know it is finite and its "curvature" that ancient men so brilliantly argued has been actually found and studied by us. As the very outermost planets grow more thickly populated and as further studies and observations are reported, we shall, perhaps, know more than now. What actually constitutes this end of matter is still a mystery. The action of light and electricity is warped and bent there and so far, the only data available is due to the work of Bzonn, the chief actor in this lesson. His trip beyond space occupied a period of fifteen million years and since one of the results was to prevent the destruction of the human race before it had spread outside of the stars of the "First Universe," he may be called the most important character in history.

Just at the time when the human race was engrossed in possibilities of new exploration in distant galaxies and universes, with thousands of huge rocket-ships under construction, astronomers reported in alarm a violent "shift to the red" in one area of the sky. As all of you have had toy spectroscopes, you know what this means. Over an area ten degrees of arc across, the star background seemed to be flying apart at terrific speed—hundreds of times faster than anything ever observed. As the centuries passed, it was seen that a void was being created where once stars had been. A great black empty area thrust its way down toward the First Universe which then contained all the human race. It was like a vast cone, point down, and in it there appeared to be nothing—absolutely nothing. Beyond it the blank space extended to infinity and not even the most powerful telescopes showed any trace of distant stars.

As the years passed, it was seen that the cone's point would at its present rate touch the First Universe in a few more millions of years. Yet what action could be taken? Most scientists were resigned to the role of mere observers. Not so Bzonn!

He gathered together a dozen scientists—twelve men and women whose names are now unknown.

They settled upon an uninhabited planetoid circling a small sun—a tiny planet not quite one hundred miles in diameter—and busied themselves in secret preparations. Atomic motors of huge size were constructed and the entire core of the planet scooped out and its stone transformed into metal. From the center, great rocket tubes flared out to the surface—fifty miles away—and the entire planet was in a few centuries made into a rocket ship. A mile below the surface they made themselves living quarters and were ready to start. The voyage they planned was, in those days, incredible. So much fuel would be needed that only a ship of planetary dimensions could have contained it and it would have been absurd to construct such a vehicle. The whole planet was set under motion by earth-shaking blasts from the great rocket chamber and the voyage commenced. Its purpose was no less than to explore the edge of space and investigate the force that was driving the stars apart. Consider this at a time when the longest flight had been less than a thousand years! After the fashion of those days of naming everything, the planet-ship was named the Humanity.

These twelve immortals and their leader, Bzonn, had wasted no time upon preparations. As soon as the blast chambers had been excavated by atomic motors in the core of the Humanity, they set off. For what remained to be done there would be ample time during the voyage. After continuous firing for thirty hours, they were traveling at the speed of 100,000 miles a second. The bulk of their ship had been reduced by one quarter, in spite of the well-known efficiency of atomic power. For two hundred years they tore through the First Universe at this speed, often averting collisions by furious application of rocket power at the last second. During this time, the tiny planet-ship had been converted into the most enormous power-plant known to mankind. Its surface was gleaming with a silver tracery of beams and girders housing every known appliance for the use of power in attack and defence. It is said that a tenth of the weight of the Humanity could be converted into energy in one second—a greater outpouring of force than possessed by many of our stars.

When the grey stretches of inter-galactic space were reached, a course was set to avoid all stars and the pace was speeded up to 150,000 miles a second, relative to its starting speed, in its orbit which was, of course, unknown in the absolute. Four million years were to elapse in this monotonous journey and, there being four females among the dozen scientists, a few hundred new humans were bred and educated during the first two or three centuries and the Humanity turned into a research laboratory in physics and related subjects. Several important inventions were given to the human race as a result, which you will learn about later in more technical courses. The only one I shall mention is the theory of gravitation diseases—that inexplicable effect upon stars and planets of Bzonn's "delayed" or static vortex. We now know that this effect on a minute scale is responsible for our atomic power. When applied to a sun, the result, after a delay of a century or two, is sudden expansion and deterioration until nothing remains but a vast cloud of bright gas. Since suns are rarely found outside of thickly starred systems, the net result is that several dozen suns are destroyed before the reaction is complete. The sending apparatus is extremely complicated and the power required to set up such a vortex is enormous.

It must not be thought that the opportunity for charting the galaxies was neglected. A small mountain of photographs was prepared during the four million years. Progress was made in every phase of art and science. It is regrettable that the colonization idea was not thought of until a million years had elapsed. This consisted of breeding a hundred humans and thoroughly educating them, stopping the Humanity in her course, entering a galaxy and finding a planet, and then leaving the hundred colonists on it to multiply and explore their new universe. This was done, Bzonn reports, more than one hundred and seventy times in the last three million years of the voyage. Twice during this period, the Humanity was deserted for a new planet and fresh and improved machines and equipment were set up, the name and purpose in each case being transferred to the new planet-ship, and the old one left with the current quota of colonists in the quickly deserted universe that then held them.

All dimensions, no matter how gigantic, have a definite end and the time came at last when, search as they might, no light of any sort could be seen beyond the edges of the last universe they had visited. Always before, though it might be a million years to the next star, the sky had shown dusty gray with distant pin-points. This sky now showed blankly black—dead black—the unseeable darkness where light simply does not exist in any form, color, hue, or strength. They had arrived at the end of Matter and,

by theory, also at the end of space itself. But of this latter point they were not yet certain, for though they saw this blank area, they had not yet reached it. At full speed they proceeded in its direction guided by the near stars. But before, they passed these, fresh stars swung into view from the left or the right and seemed to move into the space ahead. This, Bzonn decided, must be caused by the curvature of space which seemed to be greatly magnified at its edges. To overcome this deceptive effect was impossible by physical means, for light waves and even motion itself were all equally distorted. A thousand years were spent in study and a corrective curve drawn painstakingly from empiric tests. For its solution it was necessary to solve the problem of three forces—three impinging curves, each of three dimensions, and this tedious mathematical task had to await the breeding and educating of a thousand new humans and the construction of countless elaborate calculating machines. When at length it was finished and a course could be set, it seemed so startling and disastrous in its implications that the work must needs be gone over again painstakingly.

There was no mistake; the course was correctly laid out. But it called for driving at full speed on a course that curved more sharply as the last fringe of stars were approached until at the last the course twisted back upon itself and would return them, seemingly, into the very universe from which they sought to escape! Seven hundred years were spent in completing the manoeuvre and at the end they were apparently driving with full power straight back toward a distant star. It was days before they suspected and months before they were certain of the amazing fact that the faster they drove toward it, the farther away it became! When it finally vanished as a far pin-prick of light, they searched with the telescopes and took sufficient observations to orient themselves, afterwards attempting to correct the photographs for light curvature. For they had passed beyond the stars.

And now picture these intrepid ones, gazing on one hand out upon nothingness and on the other upon a far distant wall of dusty light that was all that remained of Creation! This wall they imagined as a floor and across it they sped for a hundred thousand years searching for anything that might project above it—that might possibly explain the great shift to the red that had been the cause of their adventure. And they found it. What they found is, of course, still debatable. Ahead of them there loomed up a wall of distant starlight at right angles to the great floor beneath their planet-ship. This they approached not too closely, but skirted it and in the course of a million years completely circled the mass of star-matter. It rose about a million light years in height and half that in diameter. Photographs of its contour were taken and by superimposing the outlines, a tiny model was created—a weird little thing that stood on their laboratory table. This sculpture you have all seen copied in the museums under the title of "The Living Galaxy." This is, of course, a misnomer, for upwards of fifty galaxies were noted in it. The title, however, clearly gives the idea of one theory of its origin, which is that the protuberance was a creature of life in some form which utilized solar systems after the fashion of atoms. This theory is much supported by the observed fact that photographic projections of its outline repeated at intervals of a hundred years showed clearly that the mass was in movement. For two million years it was studied with the most intense interest and a series of miniature statues were projected and photographed upon moving-picture film, one after the other, each in its proper attitude. It was found that when the film was viewed rapidly, the result was progressive movement.

Let us be as explicit as we may: The shape of this mass was that of a rounded cylinder, bulged out roughly above the center line. From this projected a streamer which tapered almost to nothingness. The motion observed was, briefly, a wriggling of the streamer (possibly a tentacle?) and a slow bending forward of the main body.

The next action of Bzonn upon establishing these facts was characteristic of the fearless and coldly scientific mind which drove him continuously throughout this extraordinary voyage. Straight down toward the wriggling tip of the tentacle of star-matter he sped his ship Humanity. The voyage lasted half a million years and as the last stars in the streamer came into view, it was noted that at its point commenced the enormous vacancy in the universes—that conical emptiness formerly occupied by countless stars that had first started them on their quest!

Here was (and still is) matter for the gravest minds to consider! Those who take the opposite view from Bzonn point out that it is inconceivable that this moving cluster of star groups could have held life.

They argue by analogy that even if stars and planets could be substituted for atoms to make a scale of existence similar to our own, yet the number of stars involved was too few (relatively) to have created anything more than a very primitive microscopic creature—much too small to have fixed body parts such as tentacles. They also, by mathematics, seek to establish that there is so slight a resemblance between atoms and solar systems as to preclude the very possibility. Such reasons and arguments cannot be considered in an elementary treatise, but it must always be said that this occurred upon the edge of space—that light rays travel only a short distance outside of space (as was learned later and almost to their destruction) and that the rules and properties of such an existence cannot be yet established. On the other hand, Bzonn undoubtedly leaped to conclusions. His next action can hardly be condoned upon a scientific basis—for even if it averted destruction from a few billion or trillion humans, what is that? Humans can always be bred. And the phenomena he destroyed was one that, to date, has not since been observed and may conceivably never again occur.

Ours is not to judge. Here to Bzonn seemed a clear issue. He had found a gigantic creature rooting dangerously with a tentacle among the stars that housed the human race. This he determined to stop if it lay in his power. It must be borne in mind that Bzonn felt no doubt that the star-mass composed a living intelligent creature. At the top of the rounded body must, he thought, lie some sort of brain and toward this he drove his mobile planetoid. Right up to the "head" of the creature he came and into it, observing no difference between the stars which formed it and those back in the more orderly portions of space. Possibly, he reported, the stars were more closely placed than might have been expected—no more than that. They were still more than two light years apart at the closest and often as much as ten.

The task of destruction which he now set himself was simple—all that was necessary was to infect every tenth star he passed with his newly invented "delayed" vortex disease. There were by this time several thousand humans upon the Humanity of the moment. These were now divided into ten groups and each group established upon a suitable small planet as they passed among the suns. Each new planet was excavated for blast chambers of gigantic size and covered with huge engines for creating and releasing power. A hundred thousand years was spent in making these preparations, and upon an agreed day, the ten Humanities set off through the star-strewn space a hundred light-years apart, and as each selected star was passed, it was subjected to the terrific thrust of the disease-producing vortex. The violence and fury of this operation must be seen to be believed. Photographic reproductions are available at all museums and you are requested to view them before the next term. The ten planets shrank almost a tenth of their weight at each blast—shrank in one second! You may well believe what terrific earthquakes and storms racked them at that moment! The crew could not have lived upon them and did not attempt to. They set automatic controls an hour in advance and took themselves to small space-ships which they guided to a few thousand miles distance and there they waited until the shock had passed before returning to their wrecked living quarters. In the two or three hundred years which had then to elapse before the next selected star approached, it was necessary to rebuild the machinery over the entire surface of each of the ten Humanities.

By the time the second blast was shot, it was possible to see in the telescopes the first signs of the vortex disease in the first infected suns they had left behind. When four blasts had been delivered by each of the ten planet-ships, the distant stars were in violent disruption. On they sped, delivering in all, six blasts apiece, and came out through the other side of the "Living Galaxy" and hastened away through the blackness beyond space, anxious to be well out of the way before that galaxy vanished in fiery vapor. On they continued until, with the naked eye, they saw nothing but a distant hint of grey, and the telescopes showed only faint images of far stars. And as they proceeded to get clear of the danger zone, these faint images suddenly, inexplicably, and horrifyingly vanished!

Bzonn vividly recalls this scene in the following words: "Astronomy Gamma first reported it to me and I did not believe him. It was not an hour before that I had used the telescope myself. He went away and returned with Astronomy Alpha himself and upon this I went to investigate and found it was even as I had been told. Through our most powerful electric telescope nothing—literally nothing—could be seen save for the other nine planets that formed our fleet. I signalled each of the nine in turn but not one reported any observation different from ours. The command to apply rocket power to bring our flight to a halt was

a dangerous one—I dare not give it. How could we tell that direction might not be lost in the manoeuvre? One thing I did know and only one—if our rockets were kept shut off, our inertia would continue us in a straight line. Possibly large gyroscopes would hold direction and set us upon a return course. I proceeded at once to try them.

"By signal, I requested Physics Beta, who commanded one of the planetoids, to make the official tests, using the other nine ships to check direction. In a tenth of a year, he had completed his apparatus and the test was made. He found that the gyroscope retained its direction in spite of all manner of manoeuvres to which he subjected his planetoid. The facts were signalled to all our consorts and each member of the crew.

I delayed the command to return on our course only long enough for Mechanics Delta to finish a gyroscope on my own planet. This delay was fatal, as you shall see.

"All this time, it must be remembered, our planet-ships were speeding outward in the blackness beyond space. Evidently, light waves cease to function entirely when space completely ends. Also, evidently we had reached about then an absolutely blank condition which, near or in space, only partially exists. Whatever the exact reason, the fact is that, of a sudden, the other planets in the fleet grew faint and dim and quite casually vanished. One of them was less than a thousand miles away! Radio signals were tried in vain. Our gyroscope was set in motion finally and I changed course at once, hoping to come close enough to the nearest planet-ship to get into communication. Possibly her commander had the same idea—I may never know—but I never saw him again.

"For a hundred thousand years, I searched through the black fog in the most complete and utter fruitlessness. Finally, despairing of ever finding them, I gave the command for setting our course back to our starting point. Of the other nine planets, eight had not set up gyroscopes when the light failed and could only by the merest chance ever hope to return to our familiar star universes. Physics Beta, of course, had a guide for his return and him I expected to find later on. As a matter of fact, he returned to human civilization half a million years before I did.

"For centuries we peered despairingly out at the desolate wastes that lie there so emptily and blackly, searching for the first distant hints that might indicate our approach to familiar space. We gave up hope a dozen times, fearing that the gyroscope compass had failed, and a dozen times we kept grimly on, for what else was there for us to do? Then came the glorious moment when, with the naked eye, we all of us could make out the far floor of light formed by all created matter and toward it we rushed until the separate light-points showed us stars in the telescopes. And where we entered space, there was a great rough lump of star-clusters projecting above the level floor of stars and this we photographed as we passed over and, laying silhouette upon silhouette, built up a tiny replica of its outline in our laboratory. It had the appearance of a long, rounded body lying on its side with a tentacle motionless on the floor beside it."

The remainder of Bzonn's narrative is an argument in favor of his theory that he had slain a super-beast—a living galaxy of stars. He warmly defended his action and insisted that a second beast doubtless exists somewhere and can be studied. He has made frequent expeditions to the edge of space in many directions but, so far, without success. At present, he has been absent twenty million years and is feared lost. But space has been conquered by many other explorers and there remains almost no star not already in our catalogs and almost no planet without its human settlement.

The next problem facing the human race is, is all this finite incurved group of star clusters we know as "space" merely one unit in infinity? Do there lie imbedded in the dark nothingness beyond "space" incalculable other such units? Can we reach these other islands in chaos steering through the lightless areas with gyroscopes? Only time can tell.

AFTERWORD

When the voice of the teacher ceases, you look up, for the end of the chapter has been reached. You have been so excited by the substance of what has been read that you have lost your awe for this ancient man. Then his eyes sweep over the class and meet yours—just for an instant—and pass on to the door as he walks out of the room. And then a low babel of conversation breaks out among your six-year-old

contemporaries and there is a general movement toward the door. You, reader, barely notice the others. Your chin is on your hands and your elbows on your desk. Your eyes stare through walls and pass through space until, in imagination, you see the warped and bulbous edge of space itself—see it as a fish sees the surface of water from beneath. How fine it would be, you think, to devote yourself forever to searching for the lost companions of Bzonn! But to do that one must wait until one knows enough and . . . there is the book before you. You are one of those who cannot wait for the next day to bring what it will—you must peer into the next chapter, driven by curiosity. For long hours you sit there over the book and I would give anything to know what you read there!