Danilo Fadul Muhana

Unexpected visit to

22 Kalliope

1st edition

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Pedro Cunha

Revision

Danielle Sales

Illustrations (cover and internal illustrations)

Hugo Elias (Ninjah)

Graphic Project

Márcia Matos

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This book is dedicated to those who can dream under a starry sky.

Preface

Maybe the biggest deed in my life is having participated in a team that landed a robotic probe in a comet for the first time in the History of Humankind. I joined the Rosetta Mission, which was an initiative of the European Space Agency that sent two connected probes to the 67p Churyumov-Gerasimenko comet, and that successfully landed one of them, Philae, on the surface of this celestial body in November 2014.

Besides Rosetta, missions from different agencies all around the world have already visited other celestial bodies in the outer space. The Japanese, for instance, have already placed robotic probes in asteroids and returned with samples to Earth. The missions I am mentioning are Hayabusa-I and Hayabusa-II (still ongoing while I write this preface).

Currently, these activities of visitation to distant celestial bodies have a scientific character, but we know that very soon they will become routine activities for exploiting resources in our Solar System. This is why this topic is so important! We, as Brazilians, need to decide if we want to be part of a vigorous and lasting economy opening up in front of us for the next decades.

Recently, on account of my work, I was asked if I am able to entertain myself by reading science fiction. Since I am a space scientist, people believe I am not capable of abstracting myself from the technique of my profession and find fun in good tales that try and foresee the future.

On the contrary, fiction fascinates me. A great part of the scientists found their vocations through the fantasy created by the science fiction, and I am not an exception to that. Born in the 1980s, I had the chance to come into contact with an entire set of pop culture about the space and, nowadays, when I think of science fiction works, I see them as an opportunity to dream beyond what my daily life delivers me, as a

futurology exercise full of new discoveries and technologies that many times end up becoming real things after a while.

The discovery of life in space is one of the doubts that motivates humankind to keep on sending new expeditions, both robotic ones and crew ones, to farther and farther destinations. The Kalliope 22 asteroid, situated in the big belt of asteroids between Mars and Jupiter, is intimidating because of its size and for having its own moon, Linus. All of these elements open space for a dynamic story rich with references of both pop and scientific cultures, which tells what the effects would be of a possible encounter of the terrestrial race with an intelligent civilization inhabiting our Solar System.

In a year when humankind is celebrating the 50 years of the arrival of the men on the moon, *Unexpected visit to Kalliope 22* comes out as a work that celebrates the relation between the human being and the space. Danilo's idea of creating Rachid Abdul, a Brazilian scientist with Arab origins, as part of a multicultural crew that goes in search of knowledge in space ends up becoming a portrait of the need for Brazil to take part in future space explorations. I, as a Brazilian and leader of the Garatea Mission, an initiative that intends to place a Brazilian probe on Moon for the next years, feel represented in a story in which we look for leadership amongst the space activities. Rachid Abdul becomes a reference, even if fictional, of a character that our society claims to exist in order to achieve big deeds.

I invite the readers to go on board of this adventure and let their imagination fly away to Kalliope 22, so that they may get a glimpse of a possible future that will happen in the beginning of the next century. I can guarantee, as a scientist, that several elements described in the book will indeed happen in this meanwhile, such as the exploration of our Solar System in a collaborative fashion amongst the countries and the visitation to several asteroids, moons and planets.

And here is the question that has been forever pursuing the humankind: are we alone in our universe or will we find life in these travels?

Lucas Fonseca, space engineer and director of the Garatea Mission

Introduction

When I was a child, I was in love with the science fiction of that time. I used to read many books and watched all of the movies and TV series, most of which were still in black and white.

The books *The Bermuda Triangle* (1974) and *The Mystery of Atlantis* (1976), by Charles Berlitz, *Chariots of the Gods?* (1968), by Erich von Däniken, *The Lost City of Mars* (1975), by Ray Bradbury, and *The Hollow Earth* (1969), by Raymond Bernard, amongst many others, had a deep impact on me, as well as the TV series *Lost in Space* (1965-1968), *Voyage to the Bottom of the Sea* (1966-1967) and *The Jetsons* (1962-1987), and also movies such as *The Andromeda Strain* (1971), *2001: a Space Odyssey* (1968) and *Planet of the Apes* (1968). These literary and audiovisual productions delighted me and made me travel through unimaginable worlds. Worlds of the Martians and Kryptonite.

The years have elapsed and, even though my curiosity has not diminished, the belief I had in flying sources has died completely.

In October 2017, when the A/2017 U1 asteroid was discovered, then renamed *Oumuamua*, I read, as I do every week, the article of the Brazilian astronomer Cássio Barbosa (10/27/2017) and it reminded me of the book *Rendezvous with Rama* (1973), by Arthur Clark, which was on my shelf. I reread this specific book and its sequels, almost forty years after the first reading, and, to my surprise, I started to believe once again in the possibility and even existence of flying saucers, as well as our coexistence with extraterrestrial beings.

This idea was becoming mature and, in December 2017, my friend and brother-in-law Luiz Ribeiro Soares visited me, he who, besides being a doctor, is a passionate amateur astronomer. It was in his house in New Jersey, in 1986, that I saw Saturn and its exuberant rings “live” for the first time through a potent telescope made of PVC tubes, lenses and lunettes that he himself had built. One word leads to another and I explained to Luiz that the visitation from extraterrestrial beings was totally feasible, and that probably, many of the apparitions registered since the visions of Ezequiel, present in the Old Testament, and even reports from the middle of the 20th century could and probably be true.

The story of this book is precisely an explanation on this possibility and is also hope for all those passionate about astronomy and science fiction.

[PART 1]

ILLUSTRATION OF THE OUTERPLANETS I AS SEEN FROM INSIDE

The mission

This is the best and the biggest manned spaceship already made by humankind in order to research the external planets. It was strategically named Outerplanets I, paying an homage to a series of movies from the second half of the 20th century. Its mission is to look for a planet or satellite that possesses geothermal activity on its surface for the installation of an advanced scientific base therein.

Since the end of the 20th century, it was already known that, in Enceladus, one of Saturn's moons, there were geothermal activities that provided a show, with the release of vaporized water into the atmosphere. The geysers of the frozen oceans of this moon are the ones that release gases on account of the pressure caused by the underground heating of their deep waters. The volume expelled is so significant that the *E* ring of Saturn, where Enceladus orbits, is majorly formed by crystals of this ice.

The problem is that Enceladus does not assure a safe landing for the implementation of this base. The probable seismic activity in the solid ocean would cause a big risk for any mission. Besides, the mission would need to find not only water, but also rocks and heat available in the surface for the implementation of said base. Therefore, the executives of the International Agency for the Implementation of a Self-sufficient and Permanent Space Base (Aibe), who were gathered in the Center for the Control of the Missions to the External Planets (Cecoshi), in Shillong, India, in October 2087, decided to scan the soil of all of the external non-gaseous planets and satellites in search of a most proper location.

Resources from the 15 richer countries were used, and the time for the preparation of the spaceship and the capacitation of the team took about 11 years. Now, close to the entry into the 22nd century, we are going into this mission that is considered the most important one in which men has already joined.

My name is Rachid Abdul and at this moment I feel as though I were a sailor in Columbus' squad.

The crew

It is unnecessary to have a formal hierarchy in our mission. The Cecoshi provides us with instructions and orders and, whenever necessary, our commander will let the team be aware of them. All members know their partners in detail, and they are also aware of their obligations.

Before I describe the other crew members, let me introduce myself.

I am Rachid Abdul, a Brazilian mathematician and, even though my name has Arab origins, my parents were born in Brazil. My grandparents from both my father and my mother sides were respectively Syrian and Lebanese. My DNA sequencing, which has been mandatorily taken at birth since the decade of 2050, has identified that my genes are composed of 46% from the Middle East, 23% from the South of Europe, 29% from the Northeast of Africa, and the remaining 2% are unidentified, from some other homo species, such as the Neandertals.

My function in this mission is to refute data and results found by the main system of the ship. Therefore, I am the only member of the crew that has some freedom to operate in all of the sectors. Of course that I have computers to run my tasks, but they are isolated machines, precisely in order to avoid data contamination and influence in the results. I will better explain how my research is carried out later on.

The selection of the people who would take part in this mission was carried out in 2098, and only some of the members of the crew knew each other before that. Our first meeting happened in May 2099 at the Brazilian Antarctic base named *Comandante Ferraz*, which was not randomly chosen. The place was already being used for training some members of the crews that would spend longer time in space.

During that month, the base had sunlight for about five hours a day only, and all of the activities took place inside the inhabitable modules. The facilities reminded me of a spaceship, both on account of the reduced space and the computer, the lighting, the waste disposal systems and all the rest.

At my arrival, I was received by the commander Khristeen Bochev, a Ukrainian space architect. She joined the Agency after she won second place in a contest for innovative projects for a new space transshipment station. She has worked for the past nine years in each detail of this spaceship of ours, and her strong points are the logic reasoning behind her decisions and her ability of transmitting them to both her peers and subordinates.

After showing my bunk bed, Khristeen informed me that the presentation of the entire team would happen at night. Within a short while, I had already unpacked my stuff, changed clothes and gone to sleep. After all, I had been flying for over 24 hours from Japan, where I had gone to make a presentation at the University of Tokyo.

When I woke up with the unpleasant and insistent sound of the alarm clock, I became lost for a few seconds, without knowing where I was, which happens from time to time when I go on very long trips. Eleonor Duncan, Sebastian Martinez, Beatriz Natula and also Khristeen Bochev were already in the container reserved for our team. There were capsules on the table with different types of organic coffee. I tasted a little of each, all of them delicious.

Little by little, we started a very easygoing chitchat, while the remaining members of the team were arriving.

When all of us were in the room, Khristeen said:

"So that no self-effacement limits the information I want to provide you with, I myself will read the characteristics and the data of the curriculum of each one of you, for you to get to know each other better. I know that some of you have already worked together in other projects; however, the majority only knows one or two members of the team."

One by one, the commander asked us to stand up and then she started to read the file on each of the members of the crew, which she had meticulously prepared:

[BEGINNING OF CHART – LAYOUT AS SEPARATE CARDS]

> ***Engineer in charge of the power generators****: Eleonor Duncan, Swiss, worked in an experimental project that made use of huge mirrors in the Alps and that directed the sunlight to the photo-generating stations. Winner of the Nobel Prize of Renewable Power Sources in 2078.*

Flight engineer: *Leonard Kabir, Canadian, pilot graduated in Romania. He has commanded spaceships between the Earth and the space stations dozens of times. He is prepared to occupy the position of flight programmer and commander, if that becomes necessary.*

Communication engineer: *Sebastian Martinez, a Spanish man from Galicia, son of fishers, born in the Village of Caión. Besides mastering the best techniques of radio and photo-communication, Sebastian is probably the last human being that naturally understands and comprehends the extinct Morse Code.*

Doctor, nutritionist and technician in organic compounds: *Margareth Mendonza. She is Philippian, daughter of Mexican immigrants. She was working at the Town Hall of Manila when she developed a new process of waste decomposition that generated millionaire savings for all of the waste disposal treatment centers in the world. Even though she came to work with the recycling of the ship's waste, she might also act as an onboard physician.*

Electronic engineer and flight programmer*: Beatriz Natula, from Kenya. Hers was the idea and the operability of making a transshipment station between the Earth and the Moon for all of the planetary missions. Using simple arguments, Natula proved that the assembly of the nuclear reactors used in the spaceships could be carried out by robots in the space stations and that the sending of fuel could be done by small unmanned spaceships. The advantages and risks minimization of this operation were priceless.*

Physician specialized in gravity simulation*: Moana Ngabe is Angolan, the son of an important Soba of the region of Benguela. He got a PhD from the University of New York and worked for some years at NASA, in the team of the PhD Jeremy Kent. He participated in the development of dozens of works with gravity simulation, the most important amongst which were the following: rotation control of the spaceship, clothes and electromagnetic floors and control of the atmospheric pressure in confined spaces. He was nominated by Jeremy Kent, PhD, himself in order to replace him when he was eighty years old, because at this age, pursuant to the norms of the Cecoshi, he would then not be able to go on space trips that lasted more than sixty days.*

Biologist specialized in the decomposition of human waste: *Mikaela Ophaug is Norwegian. She worked with Margareth Mendonza in Manila and, before being invited to join our project, she lived in Honiara, in the Salomon Islands, making experiences with the enrichment of human waste through feeding.*

***Electronic engineer specialized in microcomputing**: George Sellers is American and professor of Nanotechnology of the Palestine University of Tel Aviv, where he obtained his PhD with a thesis on the use of veins and arteries for prospection in the human body. He invented and implemented a nano-submarine equipped with microchips that navigates through the blood stream in order to detect and eliminate malformed cells. Like he is used to saying, he "gave a little help to the immune system."*

***Specialist in comets**: Shisoro Yamasaki is from Kyoto, Japan. Before completing 30 years of age, she had the opportunity to take part in the mission that intercepted the Halley comet in 2061. At that time, a manned ship was sent in order to install a module in said comet. From the three crew members, Shisoro was the one responsible for choosing the location and land the module that keeps on sending data from there to Earth until today. The images shown live at that time managed to achieve the record of audience, so far never supplanted. From the global population, 93% watched the landing. We can say that the Earth "stopped."*

***Specialist in nuclear fuels**: Eduard Zanetti is the son of Italian diplomats, but he was born in Alaska. He was still very young when his parents retired and chose to keep on living where he was born. He earned a scholarship to study radiation shields at the Russian Base of Egvekinot, Chukotka. In 2084, he was the one responsible for the development and launching of the first experimental micro-spaceship with her interior lining 100% protected from the space radiation.*

[END OF CHART]

After reading these cards, the commander thanked everyone and wished us luck.

The departure

The date of the trip was set to November 17, 2099, and the location of the launching was the airport of Baker Island, in the Central Pacific.

Even though this mission possesses unique characteristics as compared to the routine ones that the several space agencies regularly sent to space, our departure did not attract the curiosity of the press, and the families' goodbyes took place one month before, when we left our homes in order to get together in the small city of Injinoo, in the north of Australia.

Despite all the tests and relationship experiences, this amount of crew members generates a potential expectation of conflicts, since this trip will last long. Therefore, a small hotel on the seaside was chosen for this final moment of wait before the travel.

On November 15, 2099, we left in a jet of the Australian Air Force towards the base in the Baker Island and entered the space module on the following day, soon after lunch. On the 17th, as foreseen, a small cargo plane took our module towards the outside of the Earth's atmosphere and from there we followed towards the launching base RATMA, which is located on the orbit of the Moon.

Our ship was ready and waiting for us to follow with the trip that, we believe, is a milestone in the colonization of the Solar System. A good reception with the engineers that had completed the tests of the spaceship and a big farewell party yesterday, November 23, 2099, have definitively set out our entrance into the Outerplanets I.

Now it's time to leave!

The **Outerplanets I**

Our mission is programmed to last four years, with only 12 crew members, despite the Outerplanets I having been conceived to accommodate up to twenty people for five years. Many novelties were already operating in one or other spaceship; however, never all of them at the same time, like with the Outerplanets I.

First of all, we must consider its size. Since it was completely assembled in space, several extra compartments have been aggregated to it in the past four years, granting a surprisingly proportion to the spaceship. Obviously, this is the most evident novelty. However, it is inside it that we find the main innovations.

Inside it, there is an efficient gravity control system, which system identifies the crew member and activates electromagnets that attract the body towards the soil. So that it works, it is necessary that we wear overalls made of a very thin metallic mesh. In the beginning, it is a weird sensation, since it seems that we are in a movie in slow motion. But soon we get used to it.

Another big novelty is the big room that we use for our team meetings: for the first time, this environment was equipped with a circular screen that goes from the ceiling to the floor, showing precisely the external view of the ship, as if it were a big transparent window. Since it is a screen, several functions activate sub-screens showing information and details of the several celestial bodies that will appear.

The control of the internal radiation in the ship is also very efficient, and our private habitats are totally exempt from radiation. Sleeping with these overalls have become commonplace. Unfortunately, our basic needs, such as urinating and defecating, continue to be done as it used to be in the 20th century.

From the external side of the ship, practically involving the entirety of the Outerplanets I, are located two big tanks of water, each with a reservoir of 30 million liters of water, which in itself would be enough to sustain the ship for fifty years, considering an average consumption of 150 liters of water a day per crew member. If we consider that almost everything is recycled, this volume of water would allow us to live more than our expected lifespan.

By the way, we are able to extract clean, filtered water with the natural mineral salts only and correctly balanced from everything that is disposed of, including our waste. What is left is a fine sterilized powder that is very rich in nutrients. A colony of bacteria is fed with this residue and, after the correct balance of nitrogen, several types of vegetable seeds and mushroom spores are implemented, generating, within a few days, food with excellent flavor and a high nutritional power. This organic module is connected to the Outerplanets I through a narrow corridor and is 300 meters long, 5 meters wide, with three floors that are 3 meters high each. On the first two floors, we have the corridor of small cultivated plots that use the treated residues. On the third floor, there is a hydroponic system for the production of some vegetables that adapt better to this technique and have a longer life cycle, such as the mini-tomatoes, some peppers with and without piquancy, and some leaves, such as spinach.

At last, the big novelty are our computers.

The main traditional system works directly with the Cecoshi and can be accessed by any university or other space center of Earth. All of the pieces of information are free and are available. Only the introduction of commands needs to be made through the Cecoshi. For instance: if a team from a university in Japan wants the picture of an object with a specific filter and details of infrared light and the ultraviolet light, one must send the command to the Cecoshi, which quickly analyses it and transmits it to the computer of the Outerplanets I. The images can be rendered available for the general public or only to the university that has requested them. It depends on some factors of contracts, but nothing is strictly “classified.”

The significant improvements of this system as compared to the previous ones were already implemented in the ships of the latest missions to Mars. The main difference is above all in the new materials and in the auto-regeneration power. I mean: the computer can recover itself from programming errors and parts with no need for human intervention.

When this computer system was developed, the several teams of Earth started to call it “Sponge”, precisely on account of this power to regenerate. We do not like this name and, in one of our meetings for integrating the team and getting acquainted

to the ship, we held a contest in order to give another name to this computer. Our engineer, Eleonor Duncan, was the winner, giving it the simple name of GØK.

After a while, I asked her why this name, and she explained to me that she saw it as the great master, the professor of the computer HAL, responsible for the control of the spaceship Discovery in the movie *2001: An Odyssey in Space.*

The second computer system is almost entirely isolated from this first one and was name Diana because, as the name suggests, it synthetizes a female voice. It is funny how we have this habit of giving names to the computers that reproduce the human voice.

Diana is the system with which I work. Even though they are very similar computers, almost identical, using the same accessories of the main computer, may "work partner" does not possesses the "memory" of the objects, spaceships, stars, natural or artificial satellites that we will find.

So, Diana knows what a celestial body, a planet, a satellite, a spaceship are, but she does not know any of them, then, when instructed to analyze the Sun, she will conclude that it is a huge sphere of incandescent gas with a mass of 1.989×10^{30} kg and a radius of 695,500 km, amongst other pieces of information that might refer to any star, disregarding the relevance of this one specifically to the humankind.

It is also true for the planets and other celestial bodies that can and must be researched. This care is taken in order to ally our creative capacity with the uncontaminated logic deductions of the computers.

In order to aid in the understanding of this, I will give you two examples.

Imagine questioning the main computer, "GØK," on the characteristics of the Moon. The answer will be extremely rich and will gather more than a hundred years of research and information. Now imagine questioning Diana on the same celestial body. She will have to study the star, the planet system, and, at last, conclude that this is a natural satellite. Then she should direct her instruments and identify soil, temperature, gravity, composition of the atmosphere, volume, mass and everything else that is questioned. With that, she might be able to reach a conclusion that is unrelated to the previous studies.

Another possibility is to induce her to error. Let's see, imagine that, when passing through the Moon, GØK detects the existence of ice at the bottom of a crater.

The density of the material and its reflex under the light of the Sun will assure that these are water-ice crystals, already detected and confirmed in dozens of other missions and analyses. My work will be precisely to simulate other hypotheses, forcing Diana to consider unfounded the conclusion reached by GØK. Replacing, for instance, “water-ice crystals” with “salty water saturated with microdiamonds.” The idea is that induction to error allows Diana to find out novelties or identify historic errors in the main systems.

This was a technique very used in the history of the humankind and we will now make use of it by confronting our computers.

The trip

It had been six months already since we left. We orbited Venus in order to gain speed and then followed towards Mars. This was a very monotonous stage of the trip because of the almost total lack of scientific activities. It was like a confined vacation. At least we are very well adapted to the gravity simulation, at about 87% of the attraction force of the Earth, which allows us to perform a great variety of exercises and physical activities, isolated and together, inclusively those with a ball.

It took us 146 days to reach Mars and we practically did not spend any fuel. The entire mission will use the force of the gravity of the planets and satellites, even though a little fuel is always used so that we can reduce the speed of the ship or detour from asteroids, meteoroids or even in order to better study some satellites or planets.

Since Mars has been exhaustively studied, with an experimental base having been implemented in 2065 and soon abandoned, we do not worry too much to examine it, even though my team and I have used the time we orbited Mars to contest all of the pieces of information and analyses previously catalogued. Unfortunately, we did not find any discrepant data whatsoever, we only located a mineral residue that will probably be identified as a 10-centimeter fossil of some marine animal. However, since we orbited Mars at a height of 480 km, the data was not strictly precise, and we have already forwarded the results to the next mission that will go to its soil, and they should collect this material for analysis.

Our trip plan to the moons of Jupiter must allow our immersion into the Asteroids Belt, and several researches are scheduled in different of these celestial bodies. Altogether, more than 600 thousand of them have already been catalogued, even though our study will be focused on the twenty biggest ones, with an average diameter of 326 km.

[BEGINNING OF THE CHART]

> *The Asteroids Belt is a zone of the Solar System between the orbits of Mars and Jupiter, which accommodates thousands and even millions of celestial bodies referred to as asteroids. These asteroids are classified into three main types: Type-C (carbonaceous), Type-S (silicates) and Type-M (metallics). They are celestial bodies generated with the*

residues of the formation of the Solar System. The biggest of them, currently classified as being a dwarf-planet, is 1 Ceres, which has a diameter at the Ecuador of 974 km. Other thirty or forty have diameters higher than 100 km, but the majority of them is very small. It is speculated that they are billions of small celestial bodies.

[END OF CHART]

From Mars to the Asteroids Belt

At this stage of the trip, we are already very well adapted to our routine. Each member of the crew knows their tasks, obligations and schedules. We perform many activities together, both individual ones and activities in pairs or teams. One time we managed to improvise a volleyball game with 5 against 5, but the physical space is very limited.

In our routine, we included chess championships, several card games and many of them associated to the physical activities. One of what I like the most is a kind of squash in pairs, but I take part into all of the available games.

At work, I have been dedicating myself to study the interference of Jupiter's gravitational force into the internal part of the Solar System, mainly in relation to the Earth: the balance between the attraction of this planet and that of the Sun, and the model of protective shield that these forces represent.

It is marvelous to simulate a meteoroid dislocating from the cloud of Oort towards the Sun in order to see what happens when it is getting closer to the orbit of this magnificent planet that we call Jupiter. Of course these simulations could be carried out on Earth, and they are! However, here we have the opportunity to make simulations by using thousands of real pieces of data.

The rest of the team, on the other hand, is focusing on the possibility of placing a junostationary station at the North pole of Jupiter. If it works, this project will serve as a basis for the study on the ripple of the universe.

Internally, the duo Mikaela and Margareth is achieving miracles with regards to our food. In addition to the huge variety of mushroom spores that we have brought, they managed to enrich their flavors, modifying only the substrate where they are grown. Every night before dinner, we have to taste the food and give an opinion on the samples that they give us. When we return to Earth, they will be able to open a magnificent French restaurant, to which I have even given a name: *Le petit champignon*.

[PART 2]

ILLUSTRATION OF THE SHIP CUTTING THE ASTEROID BELT - REPEAT COVER]

The Belt

On February 15, 2101, we finally entered the Belt. Fuel had been our main concern until then. Because of this, the computers aligned the Outerplanets I to "navigate" between them at a speed slightly below the translation speed of the Belt, which would allow us to be "reached" by the asteroids we intended to study. However, this strategy would eventually force the Outerplanets I to “get out of the way” of some of these tiny stars not yet cataloged by the computers. Such maneuvers, if occurred, would be programmed days before by both Diana and GØK, and performed automatically by GØK, without our intervention.

[BEGINNING OF CHART]

The Belt is spread between 2.05 and 3.65 AU. Since Mars is at 1.4 AU and Jupiter is at 4.9 AU, it can be seen that it fills this space well. An AU is equivalent to an astronomical unit and is the measure equivalent to the distance between the Earth and the Sun.

[END OF CHART]

After the 18th terrestrial day of navigation through the Belt, on March 5, 2101, we were passing along the asteroid 22 Kalliope, at a distance of approximately 25,000 km, when a microasteroid was detected by both GØK and Diana, in a completely discrepant route with the natural and normal flow of the Belt. The observation time was of 0.4 seconds only, but enough for GØK to deduce that it was a small piece of a metallic asteroid that was probably fragmented by an impact with another asteroid and left its route. It was as if a runaway racing car were crossing the track!

Before I slept, I made a simulation that such piece of asteroid was a stray ice ball from the comet C/2074 Y1, which would have disappeared when its orbit crossed with that of the Belt. Diana quickly noticed an error (impossibility of being ice and also of being a piece of any comet) and recalculated the object's route. She also confirmed that it was a metallic and probably hollow object.

The problem was created.

For the object to disappear, it should have hit another asteroid. However, none of the asteroids that could have absorbed the impact showed any change in their trajectory, or even a small shake in their direction. The engineers Beatriz and George, who were with me at the time, were astonished. It was as though the object were made of gas to disappear into space.

We spent three days recalculating the asteroid's course, its chemical composition and its spectrum, without reaching any coherent conclusion. It was then that we asked our commander Khristeen to proceed to the point of detection. The fuel expense would not be too much, and we intended to examine the likely point of the collision with the 22 Kalliope.

[BEGINNING OF CHART]

> ***Kalliope*** *is a shiny "M"-type asteroid, which suggests that it has metallic structures, although it is not an entirely metallic body. It is oval, it is about 230 km long and has a(n) (average) diameter of 160 km. It has a natural satellite called 22 Kalliope 1 Linus, or simply* ***Linus****, which orbits at about 1,100 km from the 22 Kalliope. This satellite has a diameter of approximately 28 km.*

[END OF CHART]

It took us about 37 hours to reach the desired point. In the meantime, the entire crew was already working with us. Nobody wanted to speculate. After all, we were all scientists, and guessing wasn't quite our style.

When we arrived at Kalliope, our flight engineer Leonard, who was then in charge, exclaimed:

"Nothing, nothing, nothing! No mark, no sign of impact. Just an asteroid like any other this size."

We did a few laps, performed all the analysis and didn’t get a single lead. It was as though the small object had entered one of the asteroid's cracks and disintegrated without shaking Kalliope. Therefore, we started to research and simulate this possibility. We started to analyze the bottom of each crack, looking for something that could absorb the impact of the small object without leaving any marks on Kalliope.

Finally, Moana identified large hollow parts within the asteroid. It was not an isolated fact, nor even rare, for an asteroid to have hollow parts. However, the size and volume of these spaces were incompatible with Kalliope's structure.

Knowing this, we started looking for a crack or crater that would function as a snooker pocket.

From this moment on, our focus had completely changed!

The first sign

We took several turns around the asteroid and chose to fix a stationary orbit in the rear of it, over a strong natural depression, like a canyon. Everyone agreed that we should study Kalliope for a few days, at least until we clarified what the hollow spaces were, as well as the fate of the metallic meteoroid.

On the second night of studies, we were woken up by Diana and GØK giving us a simultaneous alarm. Both accused an attempted communication and awaited orders. It was a singular radio signal, one generated by some intelligence at least compatible with ours. Sebastian took over the radio and repeated the signal, including a zero at the end. From the bottom of the depression, another sign returned, adding a positive sign in the end. In seconds, we concluded that we were communicating with someone or with a machine that understood us.

Now fully awake, the crew of the Outerplanets I was elated. Meetings, opinions, consultations, more data for computers. Our mission did not foresee this situation and, although we had all been prepared for the most unlikely occurrences, at that moment we were delighted and could not believe what was happening. After all, we were living out the dream of millions of human beings when communicating with a hypothetically extraterrestrial intelligence. Only Eduard insisted that they were not extraterrestrials. According to him, they must have been Korean or Argentinian tiny artificial satellites, launched to photograph the stars of the Belt and, as far as we were concerned, they had lost communication with Earth.

From there, we had a magnificent view of the asteroid. Our stationary rotation was stabilized at just 1,500 m above the depression, which was about 1,200 m deep. It was as though we were standing over the Grand Canyon. We started to assess the situation, discussing and inserting data into the computers so as to try and clarify what was happening. At the same time, we were sending all those pieces of data to Earth.

[BEGINNING OF CHART]

> *At this distance, the time required for sending and confirming receipt is 80 minutes - 40 minutes being the time for the message to reach the Earth and 40 minutes for the standard reply to be returned. Something like: "We acknowledge receipt of a message".*

[END OF CHART]

After more than two hours without any response from Earth, it became clear that the Cecoshi had not received our information or had been unable to respond. We were isolated.

Meanwhile, Sebastian was sending sets of binary numbers and received their conversions into hexadecimal numbers. He tried a binary sum, and the answer came immediately. He did the same thing with decimals and hexadecimals. And the answer was always immediate and perfect. Then, curious, he tried in Italian:

"Can you talk to me?"

The answer returned in Morse code, "AR", which means "End of message".

Sebastian was exhilarated, and he exclaimed:

"They understood Italian and knew that I would understand the answer in Morse code. Who are they?"

This time, everyone wanted to speculate, but Khristeen seemed to have understood the objective of the message.

"They are buying time to let us know that Earth has not received our message," concluded our commander.

After three hours without any other sign, neither from Earth nor from Kalliope, we received a message back, in English:

"Commander Khristeen Bochev, do you prefer to communicate with us in English or in your mother tongue?"

The message was replicated to the entire Outerplanets I, and Khristeen explained the situation to us:

"We have the radio signal open outside the ship and, whoever they are, they want to talk to us. We will probably start the first dialogue with intelligent beings from another civilization. My private channel is open, so you can interrupt or question me at any time."

Soon after we heard Khristeen reply:

"I prefer to talk in English, so that my entire team can understand our communication."

"Technically, we can land your ship inside the asteroid, known to you by the name of Kalliope, but is not up to us to make this decision. We know your behavior pattern, the protection systems to avoid contamination risks, your expectations and curiosities. We are prepared to clarify everything. We will wait for an answer. We have time."

It was clearly a message of peace and trust. There was no warlike sense or fear towards us. From the language dialogue, it was clear that they knew everything about us. Then, our commander replied:

"Before any decision is taken, we need to know if you are from Earth and from which country you are."

Finally came the answer that in the end we all already knew:

"We are not from Earth. We just know your planet well."

She thought: "Landing the ship on an 'intelligent' asteroid, without even consulting Earth, would be a decision, if not hasty, irresponsible".

"I need to decide with my crew. We will answer you soon. Thank you."

Inside the Outerplanets I, we were living a dream. Through the internal sound system, Khristeen summoned us to the command room and said:

"We are all scientists; how can we escape this responsibility? But how to decide without discussing it with the Cecoshi? What if we get stuck inside the asteroid? What if a tragedy should happen? How could we risk not spreading this discovery? It is a difficult decision that we will have to make it together!"

George Sellers, the one responsible for the maintenance of communication and computer equipment, suggested:

"Ask if our lack of communication with Earth has anything to do with them."

We all nodded, as if agreeing with the question.

Then the commander opened the radio and asked the question.

The answer came soon enough.

“Yes. We have blocked the radio signal between you and Earth. We will open it again as soon as you get to know us, understand us or choose to leave. Please do not

take this as an attitude of hostility. We know that you are able to handle such an encounter."

Khristeen stared at the eyes of each one of us and said, without hesitating:

"Are you able to pick up three people from our crew and take them to you? We would not like to land the ship."

Once again, the response was immediate.

"Yes, three or as many more want to come."

"We'll get back to you," said Khristeen, ending the transmission. Then she continued talking to us:

"Before we define the crew, I want Margareth and Leonard with me to study everything that GØK has found out. In the meantime, Rachid and Moana see if Diana has anything to add. Sebastian, you go see if you can send a light signal to some spaceship or base."

After about two hours, we were summoned back to the command room. Khristeen already seemed a little more used to the situation.

"GØK has not given us any news," she said, and then, turning to Sebastian, he added:

"Any contact? Does anyone hear or see us?"

The answer was immediate:

"Not at all. To Earth, it is as though we had disappeared. At this time, they must be deciding which spaceship is going to check what is going on or, worse, what occurred."

Addressing me, the commander asked:

"So, Rachid? You have no news either?"

I knew that my response would be fundamental to our actions from that moment on, and although I very much wanted to enter the asteroid, I could not demonstrate a false security that I definitely did not possess.

"Everything indicates that they really are extraterrestrials and that they have no warlike intentions. Both we, Diana and GØK came to these conclusions. Now, ensuring that we are not at risk of contamination, or that nothing else would happen to us, is an affirmation that we can only prove if we take a risk. And taking risks is everything that our mission is not prepared for."

Khristeen meditated on what I told her and said:

"Let's put it to a vote. Rachid and I will only vote if necessary. There are only ten of you and you must make a decision."

"One minute," I said. "I need to tell you one more detail: before coming here, I asked Diana about this visit and the answer was: 'Yes. A team must go to Kalliope.' Why?" I questioned her. 'Because science needs this information,' said Diana. I went ahead and asked her if anyone could be hurt, contaminated or even die. 'It would be a great pity for our team and for this space project, but for humanity, it would be an invaluable achievement', concluded Diana. I didn't tell my colleagues about this, but Diana ended that conversation with a curious remark: 'Rachid, sometimes you seem to forget that I'm a computer!'"

Khristeen watched me for a moment and said, jokingly:

"Diana's vote doesn't count."

And, in the order of the table, each vote was heard, one by one:

"Eleonor Ducan?"

"I vote for the science."

"Eduard Zanetti?"

"I would demand that they reestablish our contact with Earth before we make that decision. I think this is an outrage. My vote is no."

"Leonard Kabir?"

"My vote is with Eleonor and Diana."

"And you, Margareth Mendonza?"

"I think we should go on."

"Beatriz Natula?"

"My friend Eduard, if they really know us as it seems they do, they also know that the Cecoshi's response will be political and, from a political response, anything can happen. What it seems to me is that they want answers from scientists. My vote is yes. Let's go on."

"Shisoro Yamasaki?"

"Yes. Kalliope is waiting for us."

"Moana Ngabe?"

"My answer is the one of all scholars, scientists and dreamers on Earth. Yes!"

At that moment, Eduard interrupted them and said:

"You are right. My military training led me to give the hierarchical answer, but by listening to you, I thought better, and I understand that this is the right decision to make."

"Moving on," said Khristeen. "What do you have to say, Mikaela Ophaug?"

"The asteroid awaits us."

"My friend, George Sellers, what is your opinion?"

"I agree with everyone. Onward!!

"Sebastian Martinez?"

"I couldn't be left out of the party. Yes!"

"If something happens to us, I want it to be known in the history of the Outerplanets I that my vote would also be yes," said Khristeen.

"And mine, too," I added.

The transfer of the crew

After the unanimity, everyone volunteered for “the visit." Men and women accustomed with discipline were now in an uproar. We were like children invited to make the first tour away from their families. Khristeen said:

“Okay. I understand that everyone wants to go. But I cannot risk having more than one person of each team there. Altogether, there will be three of us. Mikaela, take the opportunity and see if you can get any information about their food. Shisoro, try and understand how they managed to occupy these spaces inside the asteroid. And you, Rachid, go on representing us."

I slightly smiled to myself, not because I was representing our planet or our ship, but because I was one of the first in Humankind to set foot on an alien soil.

After making her choices and selecting the team, Khristeen explained it to the extraterrestrials:

"Three of us will go. How will this transfer be carried out? What do we need to take with us?"

And repeated:

"Will there be any risk for them?"

“There will be no risk to your crew. You don't need to bring any equipment. Our pattern of oxygen dissolved into the atmosphere is similar to yours, and the gravity is slightly lower than that of the Earth, but higher than that of your ship. Just let us know when you're ready."

Each dialogue and each sentence gave us more confidence. It was as though we were receiving instructions. Apparently, they knew everything, and their answers gave us, if not the certainty, the feeling that they were even listening to our internal conversations.

With everyone gathered, Khristeen asked us:

"Any comments? Can we consent then?"

Margareth suggested taking a streamer from the Outerplanets I, the design of which made reference to the Enterprise of the old movies. Suggestion accepted, streamer in the commander's hand, ok. On the monitor, we saw in amazement a small spaceship, compatible with the object detected days before, with a circular, almost oval shape, a true flying saucer, emerging from a crack at the bottom of the canyon.

Delight, suspense, emotion. As much as we were prepared to be cold and objective, the novelties were immense.

Without seeming to have engines, the ship or, if we can say, the flying saucer, approached the Outerplanets I and, without any instructions from us, fixed itself on the passage door, with a smooth and perfect fit like that of a finger adapting to an airplane.

On the radio, a voice explained:

"The ship we sent has a capacity for up to seven people. It is unmanned and we have adapted seats for your physical structure. Upon disembarking here, you will be guided by, let us say, a robot, and proceed to an auditorium. There we will talk again. You can open the hatch whenever you want."

Mikaela Ophaug, Shisoro Yamasaki and I were in complete ecstasy. At first, I felt the weight of Antônio Pigafetta's responsibility. Then I figured we were the new Armstrong, Aldrin and Collins.

Khristeen looked at us and asked:

"Ready to go?"

And we all nodded.

We opened the access and entered the ship. Just a circular floor, with seven swivel seats, good gravity, good oxygen, a transparent material covering its entire interior and, at the center, a large round table with something that resembled our old digital screens.

Our hatch was closed, and the ship detached itself from our the Outerplanets I. The journey took only a few seconds, and we did not experience acceleration or deceleration. We also didn't hear any noise or any sound that resembled an engine.

We were probably the first human beings to be on an extraterrestrial spacecraft.

The canyon was becoming narrower as we went. At one point, already with no exit, a crack appeared, and the ship entered there.

At first, it was dark. However, as the ship went on, the path was lighting up. We passed through several tunnels, bifurcations and gigantic corridors. Our ship was tiny inside those structures. Between the gaps, several hatches opened, while those behind were closed. Suddenly, a hollow space, like an immense football stadium, more than 10 km in diameter, appeared in front of us, and our flying saucer stopped on one of the platforms.

[PART 3]

ILLUSTRATION OF THE SPACE-PORT

First visit: the reception

It looked more like a port with hundreds of ships at anchor than an airport. We were in a real spaceport. We stopped at a dock that had several flying saucers about the size of ours. However, we could see different spaceships at other mooring points, above and below where we were, some huge and others, tiny. There were several floors with spaceships leaning against each other, and there were still others floating as parked, as though anchored in a bay waiting for the moment to dock.

The door of our spaceship opened and, outside, there was a small robot, barely more than a meter tall, in a position of a military salute, ready to receive us.

With a slight smile on her lips, Mikaela looked at me and Shisoro, saying:

"It reminds me of that robot called ‘Sardine Can’ from the television series *Lost in Space*, from the middle of the 20th century."

“Yes! If it were a little taller, it might be Sardine Can's brother," replied Shisoro, joining the game.

We got off the spaceship and admired that show. Everything was polished: when the floors and walls were metal, they resembled stainless steel, silvery or golden; when made of rock, they were polished like granite or marble. There were bit metal beams between some structures, joining the metal parts to the blocks of rocks. The temperature must have been very close to that of our own spaceship, around 22 °C.

"Where is everybody? This place looks abandoned" I said.

The little robot then answered me in English:

"They were instructed to stay working only inside the ships. They will be introduced to you in the auditorium." Can we go?"

I wanted more answers. I was very anxious, and I approached the polished structures when Shisoro said, all of a sudden:

"Yes, let's go to the auditorium," and with her eyes, she seemed to tell me that we needed to be patient.

On the way, she told me that when she had landed the module on Halley, that it was her dream to have put her feet on that comet. However, she had to restrain herself until the right moment for this feat, which had earned her a safe trip. Likewise, here she was getting ready for another feat. She never imagined that she would be one of the first human beings not only to step on, but to enter, an extraterrestrial world. And she knew that she should remain rational in order to return home and tell everyone about what had happened.

We entered a long corridor, with a curved rolling floor and mirrored walls, probably aiming at preventing views. After just over a minute, we arrived at an auditorium very similar to the ones we have on Earth, which resembled the old movie theaters, with a big screen in the background. I estimate that there would have been between five and seven thousand people inside it.

The benches were small, as though they were made for children. However, close to the screen were exactly twelve comfortable seats, suitable for our sizes, and each one contained the name of an Outerplanets I crew member.

While showing us to our seats, the robot said:

"Despite the names, you can sit anywhere. Everyone here already knows you."

He spoke in a classic, leisurely English, as if he were a native of the pure English aristocracy. And he went on saying:

"On your ship, it's exactly 8 p.m. now. Would you like to eat something?"

It was amazing how well they showed full knowledge of our spaceship and our habits.

Mikaela thanked him and said that she preferred to talk to the person who had been in contact with us via radio. She also said that we were looking forward to that encounter.

Then the voice that kept the first contacts used the general sound of the auditorium and said:

"We welcome you all. It is an honor to have you here in our home. We will make a presentation about our culture, our origins, and you will have all the time in the world to ask the questions you need. Everything that is happening here is being filmed and sent to the Outerplanets I. Any questions you ask will be accompanied by

the rest of your crew. We know how you value teamwork and how curious you are. After each presentation, a copy of the material will be also sent to your ship."

And he went on saying:

"At the moment, we are finishing the presentation. Note that, for us, it is also a very important encounter, although it is not as surprising as it will be for you. Now, please enjoy the snack that we are going to serve you."

At the Outerplanets I, everyone was able to participate in that moment. The equipment that filmed and recorded our presence faithfully reproduced the entire sound of the auditorium and displayed a complete image, as though the camera were behind and over our heads.

In front of us, under the big screen, a kind of metallic bulkhead was lifted, and a large, long table slid towards us. On the opposite side of the table, small articulated arms with three pinces appeared. These arms put glasses of a yellow liquid on the table, as well as very white round breads, a green cream that resembled the texture of mayonnaise and small red things, which looked delicious, in the shape of pyramids.

In my land, there is a saying: if you cannot take the heat, get out of the kitchen. So, I wasted no time and immediately chugged the yellow liquid. When I finished, I said:

"Delicious! It tastes like fresh orange."

The little arm that was near me quickly put another glass in front of me and removed the empty one.

We ate everything. The bread was made from tapioca, the cream, from fresh leaves, perhaps kale, spinach, watercress, parsley or even all of these leaves together. Fantastic! And the pyramids were red fruit candies, probably strawberries, mulberries and raspberries.

It was funny to see the immediate replacement after eating each of the delicatessen. After some bread and pyramids, Mikaela tried mimics to show that she was satisfied, and the result was magnificent. The little arms in front of her understood her as though those arms were trained waiters. We will never know if there was someone controlling everything from a distance or if they had any kind of artificial intelligence. I forgot to ask it at that time.

The presentation

After the snack, the lighting dimmed and, when we were almost in the dark, two beings with an apparent human shape, appeared on the stage. They carried two chairs and sat right in front of our group. They must have had the height of children, perhaps 1.40 m, but the clothes, gloves, hat and glasses were clearly used to make it difficult for us to discern their features.

Shisoro stood up, made a traditional Japanese-style bow and offered them the streamer, and they gave her a very shiny golden plaque with a design of various stars and planets.

The first being said:

"You can call me Mary."

And the second said:

"And as for me, you can call me John. We have dimmed the light and are wearing these clothes to avoid a natural embarrassment regarding the difference in our physical aspects. We believe that gradually we will interact normally.

Continuing, Mary explained:

"Now, we have prepared a film about our asteroid. Watch it and then we will respond to whatever you want to know."

The film was a documentary. A voice explained the structure of 22 Kalliope, while images of the exterior of the asteroid were displayed, revealing every detail of its elongated shape, 235 km long and with an approximate diameter of 166 km. The voice continued from the outside up to a crack that gave access to the spaceport. It was as though the footage was happening online, captured by a drone.

What we saw next was unbelievable. A true interior world with many buildings, some over 100 km high. Among these skyscrapers, we saw some beings float, as well as some small spaceships for two, three or four people. They were flying cars or, better, small flying saucers, which seemed to take the inhabitants from one place to another. Everything was being shown very slowly, as in slow motion.

At the same time, the voice was explaining that, outside the buildings, they kept the temperature and oxygen stabilized, but gravity existed only inside them. The

fuel cost would not compensate to maintain a gravitational pull inside the entire asteroid.

Flying between the corridors of buildings, resembling a gigantic 5th Avenue, the drone, or whatever was filming that, headed for a passage as though it were a window about 50 km from Kalliope's floor. Towards the “sky” or the “ceiling” there were still some 100 km of floors to go.

There was a tropical forest inside the building. Many plants, from huge trees to delicate flowers. We were able to identify lemon, apple, orange and tangerine trees, several vegetable gardens with lettuce and tomatoes, floors with thousands of known and perhaps many unknown species.

We were dazzled by the vegetal beauty carved in that asteroid.

The camera stopped showing that floor and, new images, started to present one of the internal extremities, probably produced by another drone. There, in a building approximately 40 km high, thousands, perhaps millions of cylinders, resembling the oxygen tanks divers use, were stored on floors and organized by sizes and metallic tones, ranging from graphite to golden.

At that point, the video was stopped. It was the most they wanted us to learn that day.

Mary and John turned to us. Mary said:

"It's late, tomorrow you can come back, and we'll show you more. Don't worry, we have already sent a copy of this presentation to the Outerplanets I."

"Can we ask you a few quick questions?" I wanted to know.

"Sure," said John. "We are not in a hurry."

"What are those cylinders?"

"The cylinders are our sources of energy."

Bluntly, Mary put an end to the questions:

"You already have a lot to talk about today. Communications with Earth have been restored and tomorrow we will speak again."

The return to the Outerplanets I

Our curiosity about everything we had seen was immense. We were thirsty for information and data. We wanted to understand who they were, how they knew about the Earth, whether they were really extraterrestrials or earthlings from another dimension or time. The questions were abundant, and the answers came to us in homeopathic doses.

Back at the Outerplanets I, we met with the other crew members who did not take part in this first foray, and our attention turned to Leonard Kabir, our chief engineer, who by definition can never leave the Outerplanets I, as neither can Khristeen.

Like all of the other crew members, they had seen the presentation and also did not know what to do. There were many ideas and questions, but nothing concrete.

Khristeen ordered a testing message to be sent to our repeating base on Mars, just to test the communication, while gaining a few minutes to prepare the message we were supposed to send to Earth. Like us, she was convinced that our communications had already been restored.

Leonard then went to the monitor and showed us what he had managed to detect, combining the information captured by GØK and the film we had seen.

"The asteroid Kalliope is a new world. It has a wall at least 1 km thick, mostly made of nickel-iron, and its interior, as you have seen, has thousands of worked structures, which might be buildings. If so, millions of extraterrestrial beings can live here. There is no turbine, engine or the like. More than 70% of its interior is just a hollow asteroid, but we detected something unusual in its several cracks. It seems that they all have an access door, or at least something that allows you to seal the inside from the outside. Since everything is thick and metallic, we are still unable to identify whether it is an access to the inner spaceport, escape routes or geological faults. Since it was just an "M" asteroid, previous missions never came close to analyzing these features in detail neither even notice them.

"Or maybe the Kalliopssians have the ability to camouflage themselves," I added.

The name came out so naturally that it soon spread amongst the group, and so we would start to refer to the inhabitants of Kalliope as Kalliopssians.

While we discussed other possibilities for our complete ignorance of these beings until that moment, our commander wrote a message to Earth. The repeater had already answered our message and the Earth had already sent us another one, questioning our silence.

Khristeen prepared two messages. The first was a simple radio message:

"We were incommunicado, no problems with the Outerplanets I or with our crew. We will send you a video message."

The second was the presentation we received from the inhabitants of 22 Kalliope and, since the transmission would take more than two hours to complete, she placed us in front of a monitor, placed herself in front of everyone and recorded the following introductions:

"We have located intelligent beings, perhaps human, on the 22 Kalliope asteroid. They are peaceful and want to interact. Here goes the presentation of the place where they live."

She turned off the monitor and said:

"Poor things. They will have more questions than we do."

It was after midnight when we decided to sleep.

Our Outerplanets I had a time and lighting system equivalent to that of the Cecoshi. Thus, we lived as though we were on Earth. Since crew members from different shifts had visited 22 Kalliope, the idea was to retrieve the schedules of the entire crew. Khristeen's order was clear:

"Our routine is coming back to normal, so rest and show up only on your next shifts. Tomorrow I will define how we will act."

In the bedroom, I asked Diana what that asteroid was. The following was her reply:

"A small planet inhabited by beings who have mastered some unknown techniques."

So I asked:

"What are the techniques that you fail to understand how they work?"

And Diana replied:

"Blocking radiation for such a big area, generating oxygen for the entire interior of the planet, controlling temperature without using atomic energy and, mainly, controlling gravity in big pre-selected environments."

"Well, Diana. There is a lot of work ahead of us. I will try and return to Kalliope tomorrow. Prepare a list of questions. I will take it to them, and I will do my best to get answers."

[BEGINNING OF CHART]

Radiation in space: radiation can affect the DNA of Earth beings, causing indisposition, diseases and even death. In space, we find several types of radiation. Below I highlight four of them: The one generated by the Sun, which can be blocked by the structures of the spaceships, the cosmic background radiation, known as CMB (Cosmic Microwave Background), which originated right after the Big Bang and because of to the extremely low temperature it does not affect the human beings, the cosmic rays, which, yes, have very high energy and are very harmful to the human health, which originate in supernovae, galaxies with active nuclei, stars like the Sun, and, finally, there are pulses of gamma rays that also do a lot of harm to those who are to them exposed. Some of these radiations pose a big challenge for the science to protect the interior of the spaceships and the clothes of the astronauts.

[END OF CHART]

During what would be our early morning hours, a message came from the Earth to the commander: "Data received. Wait for instructions."

At six in the morning, on the dot, Khristeen left her dormitory and, like she used to do every day, she went to the command room. There, she relayed the message on the spaceship's internal sound system and, without showing any feelings, proceeded to the cafeteria, where most of the team was already prepared.

While drinking her strong dark coffee, a habit acquired in early childhood in Siberia, Khristeen made a retrospective of the previous day.

In fact, we were all looking at her and waiting for instructions, information and news.

Kalliope's new invitation came from the Command Room:

"Let us know when you are ready for another visit."

"Well," said Khristeen. "Since we can watch all the presentations and films from here, I suggest that only three more people from our team go to Kalliope at a time. We will try to have each one of you visit the asteroid at least once. Then, we will always hold meetings with the data obtained."

I asked for the floor and addressed Khristeen:

"I am going to make a request to you and, indirectly, to the entire crew: since I am writing the book on our trip, I ask you to allow me to participate in all or at least most of the visits to Kalliope."

She looked at the rest of the team for signs of approval or objection and, since no one objected, she agreed:

"Therefore, today Rachid, Leonard and Sebastian should go there."

After letting our hosts know we were ready, we went to the transfer platform in order to admire the ships entering and leaving the asteroid, which reminded me of my childhood, when we went to the beach by car and had to pass through an air club. The other children inside the vehicle and I always asked to stop, so that we could admire those single-engine aircrafts, going up and down, taking off and landing.

Second visit: humans?

This time, the ship that came to fetch us was tiny. It had capacity for only four people, but externally it was almost identical to the previous one.

In the spaceport, we were once again welcomed by the “Sardine Can”, but now the same corridor that took us to the auditorium was completely transparent. We followed on a moving walkway that bordered the middle of a gigantic building. It felt like a horizontal panoramic elevator, the shape of which was almost cylindrical, although curved to match the shape of the building. At that time, we had about 80 km below and 80 km above us. Something completely out of proportion to the dimensions on Earth.

Although I had visited the asteroid once, and both Leonard and Sebastian had seen and reviewed the images sent by 22 Kalliope, for the three of us everything seemed too magnificent. “Agape” would be the best adjective to describe us. If we could, we would have stopped that treadmill and would have been admired that science-fiction world for hours.

Still amazed, we arrived in front of the auditorium. It was almost ten in the morning by our time.

The little arms brought coconut water, orange juice and fresh water for each of us, and, at the same time, John and Mary entered, under no dimmed lights. Actually, they looked like children, but their faces were those of adults, which gave the impression that they were but short humans.

Mary came close to us to inform that, on this day, a little more would be explained about their daily lives on the asteroid.

Leonard asked if the presentation was still being sent directly to our ship, and both said yes.

The first images that appeared on the screen were from a library. We could see, by the grandeur of the structure, how much they valued knowledge and everything we refer to as “culture."

The narrator said:

"Here we have a group of experts for the main languages and dialects spoken on Earth. We have a copy and a translation into our language of everything or almost everything that has already been published on your planet. What you are seeing here is kind of a museum, because everything has already been digitized. In fact, we have several manuscripts and even printed ones that no longer exist on Earth."

"How did you get so many documents?" I asked.

"We kept a team working on Earth for many years. We made regular trips and collected manuscripts, pamphlets, inserts, books, magazines... Everything that could document the knowledge of the different regions of the Earth. At the beginning of the 20th century, according to your time, we reduced our presence and, currently, we only go to your planet under very special and punctual conditions. With the current artificial satellite systems that you have, it would be very risky to approach you on a regular basis. We would certainly be detected. Everything we need, we already have or found in the transmissions. We can quickly download books, movies, music and documents."

"Are you some kind of hominid that left Earth?" asked Sebastian.

"No. But we would be a very close species if had we been originated from Earth. Our evolution was similar to yours; the difference is that we started to dominate some of your current technologies some hundred thousand years before. Considering that our species, like yours, appeared on our planet about 2.5 million years ago, a hundred thousand years is no big deal. Imagine for the 13.5 billion years of our galaxy!"

"Physically speaking, besides the size, what are the most unique differences between us?" I replied.

"Too much or too little, depending on how you analyze it," explained John. Our feet and hands have four fingers, but you can see that our thumb is longer and more robust than yours. Our ears are smaller. We have practically no hair on our bodies and we only have 16 teeth, which are changed a few times during our existence, as though they were milk teeth. The most important differences are the internal ones. Our body temperature is lower than yours, since it is around 33.8 °C. Male gonads are internal. We have a heartbeat around 35 beats per minute, at rest. Our bodies have functions very similar to yours and, like you, we have two of most of them. The only significant difference is a small pre-stomach, or rumen, which allows us to digest some of the

cellulose contained in vegetables. We are also mammals, and our reproduction is sexual. Maturity begins at age 35 and gestation lasts 14 months. Later we will detail this stage of life, if you are interested."

"It is clear that you did not evolve within Kalliope. You came from another planet! What planet is that?" Leonard pointed out.

"This explanation will take longer. Be patient and the answer will come within the next few days."

John took the floor and asked us to check our commander's availability to visit Kalliope. I explained that, on our planet, many rules must be followed for such an act, and that bureaucracy would take time. At that moment, I noticed a slight smile on everyone's face.

"Anyway," I went on, "I'm going to try and convince her to visit Kalliope."

The questions Diana prepared were answered, including the suspicion that they could be time-traveling earthlings, which was discarded.

That night, back at the Outerplanets I, we used all the films and resources for Diana and GØK to explain to us what the world was like inside the asteroid.

At 5:14 a.m., with a difference of only 8 seconds, all crew members received an alert in their personal communicators that Diana and GØK had news about Kalliope.

Khristeen opened the radio signal and explained:

"It is important, but it is not urgent. I would rather deal with everyone at the same time. We will have breakfast in the command room at 6 a.m."

I had to control my curiosity so as not to ask Diana what she had discovered.

After we were all seated, Khristeen asked:

"GØK, what did you find out?"

"So far, everything they have presented and shown to you is totally consistent. I did not find any manipulation in the images. I also analyzed the bodies of John and Mary, and they are fully compatible with the descriptions they made. They are really not human, nor are they androids."

"Good job, GØK. Today, focus your research on the flying saucers they send to get us," concluded Khristeen. And she went on saying:

"And you, Diana, what's new?"

"I studied the composition and structure of Kalliope, and the result is that the buildings, besides having the basic function of buildings, present another much more important one. They serve as a link between the different parts of this asteroid. I mean: Kalliope is not a compact asteroid, all made of rock or nickel-iron. Like many other asteroids, it is a cluster of asteroid remnants, metallic and rocky, that remain together due to the effect of gravity. However, these remnants are not joined, that is, “glued”. Apparently, they had to build these structures to unite the different parts of Kalliope so that it would not fragment. They gradually turned connecting beams into buildings."

"This explains why the spaceport has some walls made of polished granite and others of polished metal, as if it were gold or platinum!" exclaimed Eduard.

"The golden ones are mainly copper, and the silvery, mostly nickel. They must do some special treatment on them in order to avoid oxidation," concluded Diana.

"Okay, Diana," said Khristeen. "See what you can find out with regards to Kalliope's internal atmosphere and how they managed to isolate the interior of the asteroid from the space radiations."

After breakfast, Khristeen asked me if my plan to go there in all visits was still valid and I confirmed it. I explained that Mary and John wanted her presence, but as predicted, Khristeen replied that she could not get away from the Outerplanets I yet. And then she added:

"Today, besides Rachid, Eleonor Ducan and Beatriz Natula should follow. I would like to know the contents of those colored cylinders and how they are used."

Third visit: tourism

At 9 a.m., the little flying saucer arrived. After we sat down, Beatriz and I admired Eleonor. She was the image of sheer happiness. She looked like a child. She had already watched the films of that canyon and those crevices several times and, even so, she kept on speculating about the path taken by the machine. "It will turn here... Go in there...”

Mary and the little robot were waiting for us in the spaceport.

"Today, we have scheduled a visit to some of our facilities," she said, guiding us through the moving walkway that led to the stage.

Even though I was used to it, walking on that belt was dazzling to me, and it was clear that the other crew members shared the same feeling. It was a dream came true. Beatriz arrived to make a comparison, saying that she seemed to be entering a *The Jetsons* cartoon.

After the wonderful breakfast, next to the stage, a hatch opened, and we saw a flying saucer thereto attached. An antechamber separated us from the finger and, as soon as we entered there, we noticed that there was no gravity anymore. Handrails and foot straps provided security for our walk. On the ship, automatic seatbelts fixed us to the seats as soon as we sat down. In total silence, the ship slowly slid into the air. The Kalliopssians were seen floating amongst the buildings.

John explained that when it was not necessary to use a ship, they moved with two small propellers attached to their forearms, as though they were microturbines. The only care to be taken was to prevent the fuel from running out, which would make the traveler unable to stop. However, security systems prevented this from happening, and the last accident had occurred over three hundred years ago.

"Since we have oxygen in here, the friction is significant, so the danger is very low," said John.

Mary added:

"We thought about taking you to a gym and a playground. Would you like that?"

"Could we visit the building that contains those plants that we saw in yesterday's film? Our commander also wanted to understand more about those cylinders," revealed Eleonor Ducan.

"Sure," replied John. "In fact, all of the buildings here have forests similar to those. They serve as a place of work, leisure and a source of food. Some buildings have floors interspersed with forests and residences, while others have only forests, and others, only residences."

"And how many are the inhabitants of Kalliope?" I asked.

"We are 1,234,128 Kalliopssians, in addition to 4 thousand pregnant women or newborns per year."

"How is this control carried out?" I insisted, wanting to keep the subject in our agenda.

John interrupted me gently:

"We will need a lot of time for all these explanations. Basically, women only have children when there are new buildings and places in schools. Please wait for the next few days for us to detail these processes."

The ship then slowed down and settled on a finger.

Groping, we left the ship and went to the antechamber. As soon as the door closed, gravity returned smoothly.

"What a nice feeling!" I exclaimed.

The air was delicious. Good humidity and a blueish lighting on the top of the floor, as though we were under a blue tropical sky of the Earth. Gigantic trees cast “shade” for many types of plants, while open fields sheltered hundreds of fields with foliage, cereals and legumes. A true tropical botanical garden.

On this floor we were on, the internal height was about 120 meters, and some trees almost reached its top.

John explained to us that there were trees that were almost five hundred years old, but that in other buildings there were trees that were over four thousand years old.

I noticed the absence of insects and asked about them. John replied that there was no insect or animal there. Everything that plants needed, such as pollination and

fertilization, was manually carried out or via robots. Contamination risks did not justify keeping animals in that environment.

"We developed flying micro-robots that act like bees, butterflies and birds, and look like them! In fact, we hold an annual contest in order to choose the best pollinating robot and the best fruit harvesting one."

I explained that we humans needed a variety of bacteria in our bodies to aid with digestion, and that I feared that this could cause risks to Kalliope's environment.

He said this would not happen. That they also had these bacteria, albeit a little different. All wastes were processed and sterilized, and then returned to be used as fertilizers, as we were trying to do.

Beatriz was delighted with that forest:

"Did all these plants come from Earth?" she asked.

"Not the plants themselves, but the seeds, yes," Mary replied, adding: "We had four species before we went to Earth." Now, in addition to these four, we have hundreds that came from Earth and, amongst them, there are a dozen that unfortunately no longer exist there. They became extinct before you got to know their properties."

When Beatriz was preparing for another question, John cut her:

"Well, now let's go to a playground."

During all our interactions, we felt that they never delved into matters. We didn't know if it was a strategy to retain knowledge or a way to safeguard us. It seemed that they were treating us as intellectually inferior beings, without the capacity to fully understand what they were presenting to us. Kind of like many on Earth act towards their children when they don't want them to know the whole truth.

Within a few minutes, we left the forest floor and went to an arena. There were two columns ahead, on the right, about 10 km above. It was a traditional rectangular arena and it was full of Kalliopssians. Finally, they would allow us to interact with them!

There were no seats reserved for us. In fact, there was no comfortable place to sit. The entire audience participated in the game, and the leaders of each row were in the arena, which seemed to be made of synthetic grass.

The game didn't look exciting, but they screamed a lot and were very involved with it. It consisted of taking the ball from the person in front of you and handing it to the one behind you, which happened very quickly. When the ball reached the top of the arena, it returned to the field, with the same movement. The participants had to get up, fold their arms forward or backward, depending on the direction, whether going up or down, handing the ball over to their partner and sitting down again. In the row where the ball last reached, a digital number would light up, informing the total amount of time that team had been playing, and then they would get up and be greeted throughout the stadium. The problem was that the game never ended. As soon as this team went up the stands to leave, another team took their place and the game went on. There were no winners. They exercised only for the pleasure of trying and doing some kind of gymnastics. From what I could see, for each group of buildings, there was a stadium like that. I estimated the number of Kalliopssians participating in the game at five thousand.

As though he could read my thoughts, John said all of a sudden:

"You don't seem to have enjoyed the game. It is more or less like it happens on Earth. When you are introduced to a sport, like baseball, for instance, most people don't like it, because they don't understand it. Over time, they start to love it and try to practice it."

I smiled, showing that I understood his remark and agreed with him.

When one of the teams that was leaving passed by our group, they made a body movement as if it were a greeting, like the actors do, bowing in front of an audience. We repeated the gesture and tried to speak to them, but John told me that they did not understand English. Only small groups of scholars knew the languages of the Earth, including some dead languages, but that they still analyzed with the support of dictionaries and some films with rituals and dances that preserve their meanings.

Imagine how curious we got when we learned this! However, once again, they interrupted the conversation and offered us lunch, without delving into the subject.

It was about 1 pm when we left the stadium to enter a transparent and weightless tube that was on the side of the building. We went down about 300 floors admiring those structures. Below, ahead of our entourage, followed John. We "disembarked" on a large floor, with gravity.

We went to what was a simple apartment, as compared to the exuberance and grandeur of everything we had seen so far.

The ceiling was low, about two meters high, with only one gap. Everything was well placed there. A big double bed, living room, table and kitchen. There were no electrical or electronic devices, or at least we didn't notice them. The table had that machine with little hands and there were seven chairs. Soon after, two more Kalliopssians arrived: a young woman and a man of a certain age. Like us humans, the expression and firmness of the skin on their faces gave hints to their ages.

John introduced us to young Phil, a specialist in the English language, and Mary made a point of introducing Joff, her teacher and the oldest in the English language study group.

Eleonor, in a somewhat indiscreet way for our standard of politeness, asked:

"How old are you?"

John smiled and said:

"We would give you this information within the next few days, but, in view of your curiosity, let's go! Considering the terrestrial years, Mr. Joff would be 220 years old; Phil, 54 years old; Mary, 114 years old; and I, 160 years old. Remember that our orbital period is almost five Earth years. So, by Kalliope's standards, we are only 1/5 of that age," he said and smiled, as though he wanted to give little importance to this subject.

We sat at the table and John asked what we wanted.

"Everything is vegetarian, isn't it?" Beatriz insisted.

"Yes, although our variety of flavors and textures are very reminiscent of the animal proteins on Earth. For many years, we used the food found there and we adapted ourselves to its spices and preparations. Therefore, we can make most terrestrial dishes, although, for today, we only have a few of them."

"What can you serve us?" I wanted to know.

"There is a North American-style hamburger, South European-style herbal risotto, Brazilian barbecue in the style of the Pampas, sashimi in the style of the Pacific Islands, and chop suey in the Central Asian style. For starters, we can serve a green broth or a salad of leaves and several vegetables."

We discussed the choices amongst ourselves and decided that each one of us would order a different dish. In fact, our choices were made out of curiosity, not appetite.

Eleonor ordered the chop suey, Beatriz, the risotto and I, a barbecue.

The little hands set the table with glasses, plates and cutlery. Everything was small, but adequate enough for us to have our meals. We were also served water, juice, broth and salads.

From the kitchen counter, a door opened, and four hot dishes appeared. They were prepared by some type of machine and served by those same little hands. As we were seated face to face, each human in front of a Kalliopssian, each pair would eat what their colleague across them had asked for. Only young Phil was served a small hamburger. I understood that combination and division of dishes as a sign of elegance and courtesy.

The food looked perfect, and the barbecue flavor was strangely like the real thing. There were no nerves, bones or fats, but the texture and flavor of the meat was impressive. I cannot imagine with which combination of vegetables they were able to do that with.

Later, when we were already at the Outerplanets I, we remembered lunch as one of the best experiences we had in Kalliope.

For dessert, I ordered the pyramids of red fruit, as I wanted to share that exotic flavor with Beatriz and Eleonor to share.

While the little hands poured us tea and coffee, Mr. Joff, who was sitting across from Eleonor, asked us:

"What has surprised you the most so far?"

We looked at each other, as though we were asking ourselves “Who will answer first?”. Then, Beatriz risked saying:

"Everything, but the hollow space of the asteroid is impressive. How did you build this interior? How is oxygen available throughout the environment? And what about the temperature?"

Rushing over her words, I added:

"For me, it is the gravity control. Entering and exiting spaces with and without gravity leaves me completely stunned, simply because I cannot understand how this is

possible. In our ship, more than 20% of the energy is used to generate gravity. I cannot imagine how much it takes to maintain this level here in Kalliope."

Eleonor, in her turn, asked:

"Visiting a forest like the one we visited here is the dream of anyone on Earth. Everything we would like from renewable energy is there. How much energy is needed to simulate the environment for all those plants? How do you get so much energy for lighting and heat?"

And I, almost philosophizing, replied:

"On second thought, the most surprising thing is your very existence!"

When we had finished asking for answers, we realized that these questions would not be answered. Mr. Joff was just trying to interact.

Then Phil started to speak, and I noticed for the first time a change in the expression of a Kalliopssian, in this case, a female one. With an almost professorial air, she told us that she was available to act as our guide for the next few days.

John, taking the floor, put an end to our lunch and informed us that the visit to the academy would be left for another day, but that he would like to invite up to four members of our crew to accompany him on a four-day mission, outside the Belt. It was not an ordinary mission, but essential for Kalliope's survival; they thought it would be very explanatory and also scientific for us Terrestrials. He suggested that we brought technicians in navigation and fuel technicians with us.

Nobody said anything about the cylinders, which Khristeen was so curious about.

Back at the Outerplanets I, we were surprised by the news from Earth. The instructions were clear: end visits, move away from the Outerplanets I, and position ourselves in a safer area while waiting for further instructions.

“What would be a safer area for Kalliopssian technology?”, I thought.

Although we all had an academic background marked by discipline and unconditional obedience, the atmosphere amongst us was one of revolt.

It was almost five o'clock when Khristeen called the crew together and soberly said:

"We cannot disobey orders, but neither should we show any feelings of insecurity towards the inhabitants of Kalliope. It is not justified to get so close to the

asteroid, being attracted to it, when we can get away and go on a parallel route, without spending fuel. Thus, we will fulfill the second order. And since we will have four days to get immersed with them outside the Belt, we will be complying with the first order. Meanwhile, we will try and convince the Earth of the importance of our work and the absurdity of risking the loss of such contact. For tomorrow's scientific mission, the four representatives will be: Leonard Kabir, Eduard Zanetti, Shisoro Yamasaki and you, Rachid.

Fourth visit: outside the Belt

During the night, we warned the Kalliopssians that we were moving away from Kalliope to an area with less gravitational force in order to save fuel. Khristeen and Leonard defined 554 km of distance, positioning us exactly between Kalliope and its satellite, Linus. They also programmed a stationary orbit, similar to the satellite's orbit.

The next morning, as scheduled, Leonard, Eduard, Shisoro and I were on the transfer platform. At four o'clock, a huge spaceship appeared on our screens, unlike anything we had seen in the spaceport. It had certainly not been parked there.

It was about 1 km long and 40 meters in diameter, resembling a large cigar.

It paired up slowly and joined our Outerplanets I. Inside the ship, we recognized only Phil, whom we had met the day before, who introduced us to the other two crew members and said that she would be our interpreters.

She asked what was the role of each one of us at the Outerplanets I and, together with the Kalliopssian crew, explained that the ship was self-sufficient, doing everything for what it had been previously planned. They would only act when there was a need for a subjective decision.

On the monitor, we accompanied our spacing from the trio Kalliope, Outerplanets I and Linus. Symbols were overlapping on a dial. When it stopped, I asked Phil to translate:

"We have stabilized the cruise speed at 128 WEP."

"And what does 128 WEP mean?" I wanted to know.

"This is equivalent to approximately 1,200,000 km/h."

A new surprise for our team, since the maximum speed we could achieve with the Outerplanets I was 550,000 km/h.

> *The speed of light is 299,792,458 m/s or about 300,000 km/s. This is equivalent to about 18 million kilometers per minute or just over 1 billion kilometers per hour. To help understanding, sunlight takes 8.3 minutes to reach Earth; if it were a Kalliopssian ship leaving the Sun and going to Earth, at this speed of 128 WEP, it would only take 5 days, 11 hours and 24 minutes to get there.*

After the initial curiosity, the Kalliopssians offered us coffee, and one of the crew asked who would like to play table tennis. For him, it was one of the best games on Earth that he had learned. I accepted the invitation, much more to interact than for the pleasure of the match itself. Since gravity had also been slightly reduced, the match was an exercise in juggling. The ball was vigorously thrown, but it didn't hit the table with the same intensity and so, the game was a little monotonous for our standard, although he loved it. I thanked him for the opportunity to get to know the game and after that I reread my notes, wrote a little more and updated the information for the Outerplanets I.

Leonard, Eduard and Shisoro were with Phil, and although she was very helpful and polite, they did not get any significant clarification on the issues that came up.

At 10 a.m., they offered us a simple snack and showed us the accommodations where we would rest. Since the ship was not prepared to receive us, I preferred to read on the floor, because the available beds were very small.

At 12 o'clock, we were summoned to the main room, where we were shown a strong bright spot on the monitor.

Phil translated to us what was being shown on the monitor:

"This is our destination. We call it G-976076-H. G means that it is a comet, 976076 is a reference to the sequence of the year in which it appears, and H means that it is composed of almost 100% water ice. On Earth, you don't know it, because the last time this comet visited the Solar System occurred more than 3,000 years ago."

Shisoro was sheer happiness. She was reliving the excitement that she had felt when she landed the module on Halley.

"Shall we study it?" she dared ask.

"No. We will intercept it. Let's say we are going to get a sample."

"What time will the approach happen?" insisted Shisoro.

"We are heading exactly against the comet. At 5:33 p.m., we will make a lap to pair with it. At that moment, you will be able to admire its tail, which is already 0.1 AU. Its nucleus is about 30 km in diameter. Its speed towards the Sun is 256,000 km/h and increases as it approaches that star.

Ten minutes before the predicted collision point, the speed of our ship was significantly slowed and changed direction to pair with the comet.

At the scheduled time, we were glued to the comet. Its entire surface was mapped. The fractures were displayed on the screens with images of the ideal rupture points. Several screens opened in the room and, quite amazed, we watched a set of claws come out of our ship and fix themselves at the points marked on the screen. The other two Kalliopssian crew members just watched the operation, while Phil explained each step of it to us.

In a smooth movement, we saw a block about 3 km long and between 1 km and 2 km in diameter being detached from the comet.

Slowly, we moved away to the side of that giant that was now releasing more gases, generating a new tail as though it were revolted by having part of its core amputated.

Within a short while, we were changing our course, now stapled to the piece of the comet. We wondered what astronomers on Earth would think when they saw that image of a piece of the comet changing its course. They would probably imagine a shock with some star.

Shisoro wrote data down, asked about volume, composition, fracture points, but apparently the Kalliopssian crew could say little to clarify her doubts. Making an analogy, it was as though we were on a ten-meter sailboat towing a block of ice three times as big.

The trip back to Kalliope was slower. First, we drastically reduced our speed. Then, another detailed analysis was done on our ice block. Finally, we straightened the correct course at a speed of just 200,000 km/h.

We saw Kalliope earlier that night, the fourth time since the first contact.

The processing

To our surprise, as we approached Kalliope, the ship headed for Linus. I asked Phil, and she replied:

"You will get to know our ice processing plant."

When we arrived at Linus, a floodgate was opened, much bigger than our ship. We entered that space and stopped at the only existing platform there.

It was like a spaceport for a single ship.

Almost immediately, our “iceberg” was detached from the ship and slid, so to speak, into a big shed, which probably occupied 50% of the satellite's volume.

After that, we saw the bottom of our ship open and moving walkways started to supply the interior of our spaceship with those cylinders that we saw on the first day.

They were cylinders of all shapes and sizes. Since they did not use paint, all colors were variations of metallic luster. In these, small differences in the connectors and the three shades of brightness, graphite, silvery and golden, indicated that three different substances were being transferred.

Before we asked any questions, Phil said:

"You are seeing everything we need. We use them as energy for our ships and produce all of our food. As for everything else we need, we get them with recycling processes."

"Hydrogen, oxygen and water," concluded Leonard.

"That's right, Leonard," confirmed Phil.

At that moment, Shisoro woke up:

"What about nitrogen? There was no atmosphere in Kalliope when you arrived...

"And there still is no atmosphere there," Phil replied. "Our atmosphere is internal. But, back to the nitrogen, we brought it liquefied from Earth. Nowadays we have an automated ship that picks it up on Pluto. Eventually, we also collect some minerals from one of the asteroids. We have all of them mapped, but we usually just need good quality water ice. The Solar System is rich with this ice and we know where

to find it in abundance. You saw how we do it. This comet interception operation is the most routinely one, since it is faster and cheaper to capture this ice than to land on a satellite or planet. Machines operating in Linus are capable of processing a block of up to 125 km^3. That volume is enough to keep us going for years. Considering that we have compressed stock for one Kalliope year (that is, five years on Earth), we almost never need to land on satellites or planets in order to obtain ice. We just wait for a new good comet to pass by.

The flying saucer

When we finished refueling, Phil told us that we were going straight to Kalliope, but that we didn't need to worry, since a small transport ship, just like the one that transported us every day, would immediately transfer us to the Outerplanets I. By the way he spoke, we understood that he knew of the instructions that we had received from Earth and that he just didn't stop halfway to leave us at the Outerplanets I for some operational reason.

As agreed, as soon as the ship landed in Kalliope, we entered the small ship. Phil accompanied us.

Right on the way out, I asked if there was a possibility of piloting the ship and, with no hesitation, the Kalliopssian ran his hand over a canvas. At the same time, the speed was reduced, and a type of panel appeared.

Leonard offered to drive, and Phil agreed, explaining:

"The panel shows the coordinates (X, Y, Z) of your target destination. All routes are predefined and follow as though they were on an autopilot. Just enter the coordinates. On that panel," he added, pointing to a three-dimensional screen, "you can wear a pair of gloves for the manual operation of the ship. Unfortunately, this system needs practice on the simulator, and few of us have mastered this technique. We only use it to prospect new stars. But you can enter the coordinates on this monitor. You will see how the ship behaves."

The insertion of coordinates was done by confirming a point on the cubic three-dimensional screen with your finger. When it reached the desired point, the ship would stop and wait for a new coordinate. After two stops, we realized that the ship was smoothly responding in any direction. It was obvious that there was not one single engine, but several of them.

We questioned Phil if this was true, and she nodded:

"For each ship, there are a number and variety of cylinders. We work with oxygen turbines. This ship, for instance, has 27 of the little ones, which allow us to turn 180° without practically any loss. The direction and the openings of the turbines are

automatically made and synchronized between them. When we make long trips, we use, like you, the gravitational force of the stars. Computers have this data and choose the most economical directions."

"And how do you land on a satellite or planet?" I teased.

"We need a stationary supporting ship orbiting the destination in order to be able to refuel on the descent and, when necessary, after the ascent. We never allow the force of gravity to dominate our ships. The entry into the atmospheres is very slow and totally controlled. The force of gravity is canceled out by the recoil force of the turbines positioned as retrorockets."

As for me, I never believed in aliens, flying saucers and the like. For me, it was impossible for spaceships from other planets to be able to visit Earth, although the reports were quite convincing. Now, not only did we know the truth, but we even knew the system used for such operations.

"How often do you visit Earth nowadays?" Eduard wanted to know.

"Currently, not quite often. Probably tomorrow we will be able to explain this to you in details."

Addressing Leonard, Phil said:

"Please, release the automatic mode on that big button, the graphite one."

And the ship automatically slowed down to execute a perfect coupling, as it always did.

The new instructions

Back to the Outerplanets I, we learned that Khristeen had managed to bend the intentions of our superiors on Earth. As far as we can tell, she imposed a decision favorable to the continuity of contacts and chose not to go into details with us.

The Cecoshi sent us a list with hundreds of questions about Kalliope and the Kalliopssians. It was as though all the scientists on Earth had come together to question the extraterrestrials, from technical questions, such as how to control the microbiota and the destination of the corpses, to details of the turbines and destination of the non-metallic core of the asteroid. They also sent almost childlike questions, such as, for instance, if there were any leisure places in the Solar System, like underground beaches.

Wisely, Khristeen pointed out that, as far as possible, she would introduce some of these questions into the conversations, but that the answers would come slowly, since the Kalliopssians were behaving like they were teachers and explaining their technologies and life styles little by little, at a pace of their own.

At night, we met to discuss the capture of the comet and the use of water as energy. Eduard quoted a phrase he had read when he was still a student in Alaska: "The bigger the problem, the simpler the solution".

And that was exactly how we were seeing the decomposition of water into hydrogen and oxygen to satisfy all the needs of that civilization.

We set up a strategy to take other different technicians to Kalliope and try to visit as many places as possible. The problem is that we did not see what we wanted to know, since everything was new!

Before our group's bedtime, Khristeen distributed the new staff list for the following day: Beatriz Natula, George Sellers and me.

Fifth visit: education and work

On the next morning, as usual, we were greeted by the little robot nicknamed "Sardine Tin". Of the three of us, only George had never come to Kalliope, and it was curious how he behaved on arrival. While we all wanted to see the interior of the asteroid from the crawler, George observed other points in that world: how the doors opened and closed, how gravity was controlled, the sensors that guided the spacecraft to stop at selected millimeter points, the type of granite cutting, the texture of polished metals, that is, the details of the details.

The little robot became static, as if it were waiting for the human to stop picking on the doors, walls and beams, until, in a moment of George's reflection, he asked:

"Can we go to the auditorium?"

There, the breakfast ritual was repeated. Only with the presence of John, Mary, Phil and Joff at the table. After we were done, John said that Phil would stay with us and that other young people would attend the visits that day. Soon after, the three of them left and Phil introduced us to Dave.

Although very young, he was quite ceremonious, perhaps shy. It used a type of "*free hand*". Phil explained:

"His name is Dave and he's going to use a translator, since he does not speak English. He has just finished his basic education and majored in early childhood education. You're 43, aren't you, Dave?"

"Yes," he replied.

"We are going to show a film about the children's first forty years. Then, we will visit one of these, if we can say so, academies."

On the screen, the image of a very traditional kind of nursery lit up. Soon after, the children appeared playing in a garden with many balls and rounded steel structures. Everything was curved, and the risk of falls or other accidents was virtually nil. Some older children, maybe teenagers, maybe adults, interacted in some games.

I realized that this introduction was carefully planned in order to create similarity between education on Earth and in Kalliope.

Dave then started the explanation:

"Forgive me for that equipment and that synthesized voice. Unfortunately, I can't speak English, I chose to learn Latin. Here, you saw the beginning of schooling. At the end of this phase, which lasts about five years, the children begin to learn a little bit of everything about Kalliope. Our times are different from those on Earth and, although they seem rigid, you will see that it is not quite like that. Children have a very regulated and, at the same time, varied routine. There are about twenty hours a day divided amongst study, leisure and collective work. They complete the day by having ten free hours.

"So your day has a duration of 30 hours?" concluded George.

"The equivalent of that," Dave agreed, going on. "What I am going to explain now to you is the course of children's lives, but you can consider it as something common to the life of all Kalliopssians. Upon waking, we clean ourselves completely, and, soon after, we have breakfast. For us, coffee is the best of all infusions. Then, integration begins, always accompanied by an adult. It can be an adult for each child, when the lesson is algebra or sculpture, for instance, or an adult for up to ten children, when the lesson is gardening or weaving. The next step is the interaction through sports, and chosen amongst those practiced on Earth, those that demand the most from our physiques. However, we avoid some of your sports that we consider violent. We are also careful with disputed sports between two people or teams: one of the teams must be of automates programmed to win; thus, sports serve to exercise the body and improve the mind, forcing us to create increasingly better robots in sports.

Throughout this presentation, the screen was broadcasting the documentary. At that moment, we could see robots playing tennis, table tennis and volleyball with eight Kalliopssians against just one machine. And the victory was of the machine in each sport, of course.

I asked if they never won against the machines, and Dave responded by saying that occasionally they did.

"That is also our goal. We go out of our ways in order to discover the flaws and improve these machines. We believe that, if there were never a chance to win, the sport would be monotonous."

Dave went on:

"After sports, we have another bath time and then we eat, in a fashion similar to your lunch. Then, we practice what a few places on Earth still enjoy, the hour of a little sleep or, as it was known in part of Europe, '*la siesta*.' In the afternoon, we have collective work, guided by young people or adults. The assembly of robots, their dismantling, the harvesting, the preparation of ingredients for cooking, sculptures, foundry, cylinders replacement, support for the elderly, mining, planting and fertilization are some of these collective works, just to name a few relevant ones.

At the end of the day, we have two more hours of mental sports. Dozens of games have been created for children to develop the speed of reasoning, learn other languages and, at the same time, learn to build and operate our machines. To make an analogy with Earth games, think about the games of chess and a flight simulator. The day ends with the equivalent of your night, with ten hours to rest. Although we don't have Saturdays, Sundays or holidays, we always do different activities, which you call extracurriculars: such as films about our planet, films from Earth, we go to museums, take trips outside Kalliope, etc. Daily, we also have choral presentations, theater plays and robot exhibitions, amongst other attractions that take place during collective work or during hours of mental exercises or sports, when the occasion is offered.

After this presentation, Dave opened a moment for us to make questions, and Beatriz asked:

"I didn't see parents participating in their children's education. How do they engage with that?"

"Good question," said Mary. "Tomorrow, we will have a special day, all dedicated to the families. We will now deal a little more with education and the beginning of community and professional tasks, which we consider to be a continuation of children's life. In reality, there is no exact separation of where one ends and the other begins. The skills of each individual allow for differentiation. For instance, it is possible that a young person is in the group of children who learn gardening and, at the same time, is an instructor in a group of sculptors. Or even an

elderly person who specializes in a language joins a children's group to start their Mandarin studies. Basically, the differences are supportive, evolution in studies and responsibility. Of course, children also do not play with adults in sports. Now, certainly, there are activities exclusively for adults, such as work outside of Kalliope and in the research labs."

George raised his hand and questioned:

"Are there no crimes or misdemeanors here? And doctors?"

“No and no. As for doctors, more or less, and I will explain the situation to you: early childhood offenses are treated and corrected in early childhood. We have professionals trained to take care of all kinds of relationship difficulties or adaptation to the routine and, when the child does not accept education, which is very rare, we scale young people and adults to live with them '30 hours a day.' For you to have an idea, today we only have one child being accompanied on a full-time basis. As far as doctors are concerned, we no longer have diseases or need surgery. We also don't have drinks or medicines that create unreal sensations. We produce different dimensions of reality, which is different. You will see this soon. In the event of an accident, we will have to use a life maintenance machine and thousands of instructional films for each damaged case or organ. Our last “traditional” doctor died more than four hundred years ago, and during his entire life, he had not performed any surgery at all. This does not mean that we have abandoned health, on the contrary, since research remains very active and we have specialists in almost everything, but we do not need formal medical practice anymore. We have also developed a process of anticipating the generation of antibodies, which always keeps us immune to diseases from Earth."

Beatriz took the floor again:

"And dating? When do you guys date?"

Phil interrupted her again:

"We date a lot, as much as you do, but that will also be seen tomorrow. Now, let's visit a copper mine."

Mining

We left the auditorium and entered another small ship. Now, George was dazzled. His observation, which was previously directed to the smallest details, gave way to a surreal enchantment. He didn't know where to look!

"Now I do understand the comparison with the Jetsons," he said.

It was really an impressive scene. Even though it wasn't new to me, I was still perplexed to see those gigantic buildings. Those almost endless avenues were literally something out of this world.

The small ship descended to about 2 km in height from what would be the base of Kalliope and accessed a path as though it were a one-way street. The ship's speed increased, and we went on as though we were in an invisible tunnel. It was possible to notice that people and vehicles passing by were automatically diverted from our route, as though it were a transparent expressway, made exclusively for ships like the one we were in.

We traveled at the maximum speed allowed inside Kalliope, the equivalent to 108 km/h on Earth. The trip took exactly 53 minutes. When we reached the end of the tunnel, it was the limit of the asteroid.

A metal wall, basically made of iron and nickel, started at the base and rose up 120 km. Later we learned that the wall was 160 km wide. It wasn't smooth; on the contrary, it was quite irregular, with many perforations and some constructions.

I mean, in fact, those were not constructions, but sculptures, sets of solid iron columns, which in the future would be converted into more buildings. We went to the top, from where Phil explained that Kalliope was already quite sculpted, that the sides had walls about 1 km made of rock and the original ferro-nickel alloy. In the 'front or bow' there was a still untreated volume, about 60 km thick, and the 'bottom or stern', where we were, still had 75 km of the original asteroid.

So, I calculated: approximately 235 km in length, minus 135 km, so there was almost 100 km in length of built area, that is, almost entirely sculpted. Considering the volume, it was impressive.

You who are reading this story and will probably never have the opportunity to visit Kalliope, imagine several parallel avenues, such as Avenida Nueve de Julio, in Buenos Aires, the 5th Avenue in New York, Avenida da Liberdade in Lisbon, Avenida Paulista in São Paulo, the Champs-Élysées in Paris, the Gran Via in Madrid, the Orchard Road in Singapore, the Aoyama Dori Street in Tokyo, La Rambla de Barcelona, and many others.

Now, imagine between them buildings that are kilometers high, some of them 'touching the sky'. Well, that was the view we had from that point, looking across Kalliope, where the spaceport and the auditorium are located at 100 km in a straight line. The main difference is that the Kalliopssians did not walk in Kalliope. They flew, sailed and floated between buildings and, therefore, pathways do not get crowded such as it happens in the Shibuya Station, for instance. Since I don't know what the best adjective is to use, I will repeat: impressive! It is out of this world.

We landed in a place the gravity of which was zero. The access corridor and the mine did not have controlled gravity. Two Kalliopssian technicians accompanied us at the mine. One of them spoke English, which made our understanding easier. His name was Carl, he was outgoing and, smiling, he soon introduced himself.

"My name is Carl, I'm 54 years old, I study philosophy and at school I specialized in polishing. It will be a pleasure to accompany you."

He explained to us that this work was much more about cutting than mining. The designers passed them the measurements and they operated manual cutting machines with a precision of 15 microns, which provided, in addition to modeling safety, an excellent appearance in the columns, without the need for another treatment. The leftovers were small, rectangular in shape, easy to be removed from the mines and stored.

I asked what they did with these leftovers, and Carl replied:

"It depends on the type of residue." If it is metallic, it is purified and stored in the form of ingots for future use; if it is rocky, it can be grinded and used as a substrate for our gardens or stored inside another asteroid."

George asked why they referred to those sculptures as mines, and it was Phil who answered:

"It turns out that the core of this asteroid is not one hundred percent regular. There are hollow spots, like caves, and there are also other metal alloys than just ferro-nickel. This tunnel will take us to a block with a lot of copper and close to two thousand kilos of gold, but many other metals and minerals have already been found."

"Come," said Carl.

We floated a little through the corridors of the mine and entered a saloon, which resembled a semisphere about five hundred meters in diameter, all golden. Half a dozen technicians were removing iron-nickel and other copper ‘bricks.’ A worker, using another type of machine, was extracting copper-gold fillets. It was both beautiful and impressive at the same time.

I remember that, when I was at college, there was a lot of talking about sending spaceships to mine the Moon or Mars, but the transport cost back to Earth would be higher than the value of these minerals.

"Can I take a small sample of this alloy?" I asked.

"Yes, you can, but you already have a good purified piece of this. Remember that plaque we gave you on your first day here? It was all carved in 24-carat gold, because we know how important this metal is for you", commented Phil.

"Thank you very much indeed! We had not understood the reason behind such a valuable treat," I replied.

"After the copper is extracted, will you fill this space?" said Beatriz right after me.

"No," replied Carl," not this one. Some need fixing and we mold the columns for that, but this one specifically will be used for the construction of a new stadium. It is already in the project phase."

So I teased:

"Well, you could build a baroque church!" And everyone laughed.

We returned to the auditorium and, since it was after 2 p.m. on our schedule, Phil took us to a children's cafeteria. It was the pre-night snack time for that group. Even so, we were very well served. At each table, there were those machines with little arms, and the dishes were ordered by means of a digital image on the table.

We returned to the Outerplanets I in the late afternoon, and the story of the gold mine took over the crew. The finely cut copper blocks gave the whole appearance that everything was made of gold. Curious, we all went over to check the plate and saw how heavy it was, and its shine, pure.

On those days, both Diana and GØK were being fed with this new information and possibilities. We instructed them to go back to studying all “M” asteroids and, at dinner, we were surprised by their responses.

"The conclusion they reached" explained Khristeen "is that some of these asteroids can have up to 5% of their volume in copper and 0.05% in gold and noble metals. Diana discovered two solid metal asteroids, with good chances of landing and mining. GØK found tungsten on the surface of another non-metallic asteroid. Everything we know to date about asteroids must be revised and many new missions must be sent to them.”

For the next day, Moana Ngabe and Margareth Mendonza should go with me. Moana asked to be one of the last to go because he wanted to use the computers in order to have an idea of how gravity control was carried out before experiencing the real sensation.

Sixth visit: leisure

For Moana and Margareth, entering the spaceport was as surprising as it would be for each of you reading this book. Moana is bulky, almost 2 meters tall, weighing 110 kilos. Very differently from the other crew members of the Outerplanets I, the first thing he did when disembarking was to lift the ‘Sardine Can’ and ask:

"Say it now: 'Danger!!! Danger!!!'

Mary and Phil, who were next to us, laughed with us.

"For him, you are not dangerous!" teased Margareth.

Back on the ground, the little robot, cold as a Sardine Can, changed direction and said:

"Follow me, please."

In the auditorium, I explained to the four of them — Mary, John, Phil and Joff — that our Cecoshi team wanted to understand all the copper processing and that they had requested a detailed and independent report from each of the crew members who had taken part in the previous day's visit.

Then Phil said:

"We have a long day ahead of us. We will try and clarify other things and then we will address this issue.”

He continued:

"From yesterday's presentation, you may have been under the impression that our schedules are rigid and that our leisure is for exercising our bodies only. In fact, things don't work out quite this way. Discipline and rigidity are just for children. As we make commitments, we also expand our free time. The most important thing is to never miss work. Be communitarian, be professional."

I interrupted Phil:

"Do you have a remuneration system?"

"There is a bonus system, which serves as a type of remuneration. As the youngsters start to become independent, they get a room to live in. They are comfortable in collective buildings for young people like them. As they provide

community services, taking care of children, teaching them, taking care of the elderly, helping in cafeterias, preparing food, sewing or doing any of the things we need, they earn points. When they reach a certain number of points, they can claim for a better house, a better menu, an apartment in the garden building, etc. Please observe that they do not exchange points. Their points are their rights and the computers identify them whenever they pass a gravity zone, that is, whenever they enter a building. The only way for a Kalliopssian to lose points is when they give up on a job without justification. There are other ways to score, by age and merit, but the system is the same."

We said goodbye to Mary, John and Joff, and took a shuttle, kind of a flying saucer, towards another building.

"We are going to enter a music and dance floor," clarified Phil.

Our first feeling was one of strangeness. All in the deepest silence, although the Kalliopssians were dancing. I thought they danced to the rhythm of the lights, but Phil explained:

"Each one chooses their music and receives them directly into their ears. You use headphones, don't you? Think of it as though they had headphones embedded in their brains. It is possible that some of them are listening to music from the Earth. When they are dancing in pair or in a group of more people, the songs can be synchronized. There is another detail, which you might have not noticed: here the gravity is a little lower than in other environments, so as to allow for a lighter and smoother dance. By doing this, they joints suffer less impact. We do this on the dance floors and in some types of game rooms."

Turning to Moana, the Kalliopssian added:

"Done. We wanted to show you our specifics about dance. We can now deal with the force of gravity with Dr. Ngabe. Isn't that how you are known?"

We looked at each other a little surprised, since no one had said what Moana's or Margareth's intentions were. I could only ask:

"Do you listen to our conversations inside the Outerplanets I?"

"Whenever you use the ship's communication systems. It can be sound, image, light, any system. Didn't you know that?"

"No, we didn't, we had just suspect it sometimes."

"Well, I'm sorry," said Phil. "I will be more careful from now on so that you know everything."

Continuing, Phil asked Moana if he wanted to go to a specific place or if she could guide the visit herself.

"I want to see how gravity is created," said Moana.

"Dear doctor, I am not the best person to explain it to you, and that is probably why I am accompanying you on this visit. To sum up, two forces act on our sense of gravity. One is the attraction of the star's center, and the other, when it exists, is the weight of the atmosphere on our bodies. Our sensors are capable of applying these forces directly to our bodies, where and when we set them forth. Everything is a matter of energy expenditure. Many Kalliopssian couples choose to disable this service when they are in the privacy of their homes. Unfortunately, to explain this in all its complexity, we would have to present you with some resources that you do not yet know, resources which, if misused, could interfere with the normal evolution of terrestrial society. Did I explain myself well?"

"Very well, but as a scientist, I would like to know much more."

"Now, Margareth, let's go for a walk in a forest." And, addressing me and Moana, she asked:

"Are you going to follow us, or do you want to do something else? I can call someone to accompany you."

"We will all be together, as usual," I replied.

We left the disco and went to a finger where there was a small flying saucer available. The one we arrived at had already been used by others. From there, we climbed a few kilometers until we stopped on another floor and disembarked into the antechamber. Phil said to Moana:

"Since you already know a little more about the subject, enjoy feeling the alternation between ‘no gravity' and 'gravity'. It happens when we close the door of the conveyor and open the doors of the building.”

This forest was much more exuberant than the previous one. As soon as we entered it, the exclamation came, almost a cry:

"Is that redwood?!" wanted to know Margareth.

"Yes," said Phil. "This is one of the oldest trees we have in Kalliope, it is more than four thousand years old. If you want, we will arrange another day with a plant specialist to tell you about it. For now, I want to show you something that might have gone unnoticed by your colleagues. Are you feeling this breeze? Do you see any leaves on the floor? Or fruit? Well, this breeze is generated to control and direct the fall of the leaves. Every leaf that falls goes to these culverts, under the sidewalk. From there, they are dehydrated, grinded and stored in order to prepare food or new inputs for plantations. This is also true for fruits. Small flying robots collect all the fruits. They select the good ones, the bad ones and direct them for consumption or dehydration. The same is true for leaves. Reprocessing plants are located at the bases of almost all buildings, which, in addition to these inputs, receive our waste. They also receive organic waste from food and packaging waste, which are always made of recyclable organic material."

"Can I get to know one of these plants?"

"You could, but I would have to identify one that is under maintenance, since the process is fully automated, and we only have access when the plant is deactivated. If it is very important, we can schedule it for tomorrow, but I can assure you that the plants on Earth, including the one in Manila, are not bad as compared to ours. What we have better are some membranes that act as filters for small molecules."

Almost in the late afternoon of Earth time, Phil pointed out:

"We still have time for a surprise. Let's go to a virtual gym. I would rather refer to it as a relaxation room, but my colleagues translated it into your language as a gym."

We navigated for about fifty kilometers. On the way, Phil explained to us that this time we would see something completely different from everything we had observed before.

"So far, everything you have known and experienced has to do with what you live and know on Earth, with the single difference being that we have a little more technology in this or that. But what you will see now will be completely different. You will understand the true meaning of the word 'virtual.' Know this: during the entire experience, you will have absolute control over your body, and, with just one touch, you can interrupt the session. No external chemical substances will be used, only your mind and senses will be controlling the game."

"I love virtual reality games," said Margareth.

When we reached the finger, Phil guided us towards a room at the end of a corridor that had a digital panel lit with a symbol on it.

"It is vacant. I asked them to prepare it for our visitation. It accommodates four people."

The room was square and had four large and comfortable armchairs, positioned crosswise, one with its back turned to the other.

She took Moana by the hand and placed him in one of the armchairs, saying:

"This one was prepared for you. Margareth, Rachid and I can use the others, but this one is special. The process you are going to see is apparently simple: the armchair will wrap you up as though it were a 'gelatinous blanket' and you will watch a movie. We all will be in this movie, and our minds will interact. There is a button here on the arm of the chair. Use it when you want to stop the movie. Whenever one of you uses this option, I'll also leave the movie so we can talk."

Then she put me into my chair and, after that, did the same for Margareth. Minutes later, she asked if we were ready.

"Yes!" we answered in unison.

The lights were dimming, and I started listening to relaxing music. Gradually, I think, I sank into the chair. In the middle of the sound of the music, Phil said:

"Close your eyes and watch the movie."

What she called a movie was a projection of images directly into my brain, like a real dream. It looked like some kind of hypnosis, I thought. I was walking barefoot, alone on a beach, and there was warm water and soft sand. The water was crystal clear and a coral reef indicated that the tide was low.

As I walked, the sensations of the sun, the wind, the sand and the smell of the sea became more and more real. Until I 'entered' the dream. Walking towards me came Margareth, Phil and Moana. Margareth was in her twenties, Phil looked like a beautiful brunette young human and Moana appeared there as a young sportsman.

Then Phil warned me:

"You are seeing what you would like to see. You can do what you want. You can play volleyball, swim, dive, ride a speedboat, play shuttlecock, in short, do everything you do on a beach. You can even relax, lie on the sand and enjoy the sun."

Margareth turned to me and suggested:

"Let's run a little, huh? I love running and, at the Outerplanets I, you can only do it on the treadmill.”

"Let's go," I said, at the same time that a footer appeared in the film, indicating Moana and Phil's departure.

For a moment I was startled, because I was already completely involved with the dream. I felt the button on my finger, to be sure of the reality, and decided to go on. I looked back at Margareth, who was marvelous, and said:

"Let's continue, shall we?"

"Sure, they will be back later."

And we ran out on the beach aimlessly. We ran for about ten minutes. With the hot sun, our foreheads dripped with sweat. All of a sudden, Phil and Moana reappeared in front of us.

As we approached each other, Moana confessed:

"It was very hard for me. I couldn't tell the dream from the reality. I want to stay here, sitting for a while, admiring this landscape and trying to get used to it."

Phil said:

"I'm staying here with Moana. Enjoy and have the feeling of a sea bath."

I looked at Margareth and ran into the water. Unbelievable! I was bathing in the sea, on a deserted beach, amongst coral reefs. My body was immersed in water and nothing suggested that was not real.

Margareth came over and, looking into my eyes, asked:

"Can I touch you?"

“Yes, you can. How do you see me now?" I wanted to know.

"As though you were a college student; your skin is smooth and very white, almost transparent, like that of someone who only studies and never sees the sun. And you? How do you see me?"

Half embarrassed, I replied:

"You look marvelous. Under twenty."

She took my hand, brought it to her face, kissed it and exclaimed:

"You also look very beautiful, and this is dangerous. I think we’d rather get out of the game or go back to the sand."

"Is there no third option?" I ventured.

However, before I finished the sentence, the footer appeared, indicating that Margareth had left the dream.

I pressed my button and, soon after, the lights in the room were restored.

The chairs rotated 180° and we were in a circle, facing each other.

Phil us a gave a quick explanation:

"Technically, I can't explain to you how this game works, but we already knew that you could work your mind at the frequency needed for this experience. The amazing thing is that we, Kalliopssians, can also float with you."

"In my dream, you were a beautiful human," I said.

"Thank you," Phil replied. "In fact, you build the reality you want. Let's see? Where did your film take place, Margareth?"

"At Central Park, on an early spring night. I watched part of a show by a very old duo, Simon and Garfunkel. They were singing a song that my grandmother used to listen to when I was a child: *The sound of silence*."

"Did any of us take part in this film of yours?" asked Phil.

"I saw you and Moana before you left, but I stayed with Rachid the whole time."

"I already know why we left your dream for a little while, but what about you, Moana? Where did you live out your experience?"

"I was in a cave adapted to function as a lab, inside a crater on the dark side of the moon. We were all working on getting an image of an eclipse when you guys called me to run. I thought that was crazy, but you insisted. You said it was a dream and that I should try it; but it was so real that I preferred to press the button to make sure I wasn't going crazy. After talking ‘out here’” with Phil, we went back to a beautiful beach and I was admiring the two of you taking a bath in the sea. It's so insane."

"Well," concluded Phil. "Here we can do anything, without the slightest risk. As compared to Earth, we can climb the Everest or participate in a car race in Monaco. We can travel in the Trieste or sail with Bernard Moitessier. Your dream partner can become a partner, a lover, a rival. You can duel or fly a hang glider. Each participant can assume the age and physiognomy they want. In groups, as we did today, you can schedule excursions to hunt wild boar or white sharks or play with penguins in

Antarctica. In a group room like this, it is possible, with practice, to enter and participate in the dreams of your partners. The only things needed are knowledge and creativity. The more you read, the more places you want to know, or better, you want to experience, live out."

As always, I was not satisfied with the explanations and asked:

"Please, Phil, answer me one more thing. How could I have sweated in the dream?"

"Because you were really running. Or almost. Your muscles, your skin, your brain, your whole body reacted to your senses and that is why you need the armchair to interact. For instance, for your skin, you took a bath in the sea. Sorry if I can't explain it better."

And she continued:

"I don't know if you will have time to come back here. However, as a suggestion, I tell you, Moana, that it would be wonderful to leave work for a few minutes and run through the moon; you, Margareth, go up on the stage and steal a kiss from Garfunkel; and you, Rachid, you should have taken delight in the sky, the sea and your beautiful companion."

Margareth looked at me curiously, and Moana teased us:

"What trip was that, Rachid?"

And Phil, realizing that I was a little embarrassed, concluded:

"It's already late. I'll take you back to the Outerplanets I. If any of you don't come back here, know that Kalliope will always be ready to receive our human 'cousins.'"

At night, at the Outerplanets I, everyone wanted to know what that gym was really like. The curiosity was tremendous, and, for us, it was difficult to explain that the dream came true.

"To really understand it, you have to experiment it," said Moana.

Later, Khristeen updated us on the news from the Cecoshi and GØK. Finally, she announced that Beatriz Natula and Mikaela Ophaug would go to Kalliope with me on the following day.

Seventh visit: family

On the following day, the routine was repeated. Phil arrived early and this time she accepted the invitation to enter.

Khristeen personally met Phil at the entrance to our spaceship, and invited her to visit our facilities, even though she assumed that she was fully aware of each one of our environments. We showed her the plantations, our accommodations, and we also explained how Diana and GØK interacted with the ship and the crew. The single moment when Phil showed any surprise was when she picked up one of the metallic overalls we wore under his clothes.

"Isn't this a nuisance?" she wanted to know.

"In the beginning it is indeed a huge nuisance, but we have spent months on Earth wearing this mesh before the trip. It's like a sock," said Kristeen, concluding. "We will miss it when we no longer need to use it."

At breakfast, everyone asked Phil to make an appointment for them at the virtual gym.

"Arrange that with Dr. Khristeen. The gym will always be there, at your disposal," replied Phil with a friendly smile.

We arrived in Kalliope around noon. The trip took longer than the usual, because Phil deviated from the route in order to show us an almost perfect ice cube, measuring about 5 kilometers, which was entering Linus to be processed. Unlike the ice from the comet, this one was crystal clear and transparent.

"It must have come from Enceladus," she told us.

In Kalliope, we went straight to the auditorium. There, we were greeted by Joff.

"Since the three of you have already toured Kalliope, we chose to do the presentation right here, in this auditorium. With each explanation, a short film will show what was said. You can ask questions between one film and another. It should take about three hours. I suggest a light meal before we start," said Joff.

After lunch, Phil gave us a brief summary of what we had already seen in Kalliope and explained that, initially, we would deal with the theme of family in Kalliope:

"In the beginning, our family system was based on marriage and raising two or three children until they left for new marriages. Something very similar to the system of some cultures on Earth today. However, with time and with the knowledge from your different cultures, we had been adapting our family structures until we reached what we have nowadays. Let's start with sex. Sexual maturity happens between 35 and 40 years in men, and between 30 and 35 years of age in women, lasting up to about 200 years in both cases. We have no rituals of union and we do not encourage, much less repress, unions or separations. When two Kalliopssians decide to live together, both return their rooms and receive a standard apartment for a couple: a living room with a kitchen counter, a bedroom, a room with a library, in this case, always virtual. Later you remind me of returning to this point, please. If they decide to separate, they ask for individual apartments back, which are much simpler to take care of.

"And can couples have children when they want to?" I asked.

“No. Women who wish to have children are cataloged and enter a queue. Some of their eggs are collected and then they stay on alert. Men who want to be parents also donate semen to a bank. When a woman is called to start a pregnancy, she can use the insemination of her own egg or not; you can choose semen from the bank or, if living with someone else and if they also want to, they can generate the child in the traditional way. We only take care in order to avoid the risk of inbreeding. A great advantage that you have is the diversity of physical aspects. For an egg or semen to be used, the donor must authorize it and, later, live with the offspring. This is for both men and women. The big improvement in this system as compared to our old model is that, after birth, the woman becomes the mother of a series of babies. In other words, everyone who was born in that period has several mothers, and mothers have several children, although they all know who have generated them. The same goes for the fathers.”

And she continued:

"This collective work facilitates care and frees many mothers so they can perform several other activities. Besides, there are volunteers who want to be mothers, but do not want to go through the pregnancy period. In times of low need for babies, the mother happens to live more intimately with her natural child, but the normal thing is that she, by taking care of everyone, feels like a mother to everyone."

I wondered and remembered a system similar to this in an ethnic group in Bolivia and in one of the fourteen nations that, together, represent the country Angola.

Mikaela interrupted her, asserting:

"It is a mistake to think of our variety of physical aspects as an advantage. In our history, we know the absurdities committed against the American indigenous peoples, gypsies, Jews, Kurds, Sikhs, Aborigines, Matabelians and many others."

Phil avoided talking on about this subject, since she probably understands the depth of this type of discussion.

"Even so, Mikaela, I understand that this is an advantage."

And after a brief pause, she continued:

"After the breastfeeding period, which we call nursery, children are sent to cozy homes, such as daycare centers. They are also homes for people or families who care for children for a while. Usually, they stay in this condition from 3 to 14 years of age. Then they move on to assisted rooms until they reach sexual maturity. They are individual rooms of collective families, where they spend most of the time, always accompanied in their activities, except for the first and last meal of the day, which are held in a collective cafeteria, monitored by volunteers. This is the definition period for the first profession. Times are much more divided amongst studies, sports activities, musical and artistic practices and leisure. After reaching the age of 30, sometimes 35, the family starts to give more freedom to their youngsters, until the moment when they choose to request their individual rooms. Before you ask, I have to explain something: there are non-traditional sexual behaviors in Kalliope. They are neither encouraged or censored."

"Is it possible to have families of three or more Kalliopssians?" wanted to know Beatriz.

"Yes," said Phil. "There are, but they are not common. The other side of the beginning of life is the old age, and we proceed in much the same way. Volunteers take turns to care for the elderly, first in their rooms, where they start living alone. Then, in collective buildings, until they die, which usually occurs due to heart failure soon after 250 years, with a variation of 10 or 20 years. Since there are practically no diseases and

the accident rate is almost zero, we can program births based on the vacancies we have or build.”

"What happens when a Kalliopssian dies?" I asked.

"We don't have many rituals in Kalliope nowadays, nor did we have before. But death is always a farewell. In general, the Kalliopssians have had children and students for their entire lives, and these people take care of the farewell. In fact, they live a lot with the Kalliopssian who is going to die, not least because some of the students and children are over 200 years old. Each building has a suitable place for this ceremony, and the body is placed in a kind of drawer where it will be processed and transformed into compost. After 10 days, the people who took part in the farewell ceremony receive a paper bag with the image of the deceased and a message that they had written or chosen. The biodegradable sachet is full of fertilizers and flower seeds. The person chooses the place and deposits this content on the land, watering it. The cycle of existence begins anew, but that life is over."

"Or returned," said Mikaela, referring to Lavoisier's saying: 'In nature nothing is lost, everything is transformed'."

"Before finishing, you asked me to remind you to explain about the library in the couple's apartment, remember?" I commented.

"Sure, thank you. What I wanted to say is that the digital room can be used as a projection room, study room, library and also a relaxation gym for the residents. This novelty has been tested for just over a hundred years and serves to reward volunteers who manage to score more points in our table. The rules are very simple and always depend on collective work. It's been a success. I think this novelty will be turned into a definite thing, thanks for reminding me of that. Tomorrow, you will know our planet and a little of our history" concluded Phil.

The folly (first part)

When we got back to the Outerplanets I, it was already dark inside. However, I didn't even have time to stop by my cabin. As soon as we entered, we received the news that we should go to the command room, where everyone was gathered.

Khristeen had a worried expression on her face and, in her cold and objective way, exposed the situation:

"The Cecoshi has changed the schedule of the Juno-34 spaceship for it to come towards Kalliope. The idea is to map Kalliope both internally and externally. The problem is that Juno-34 is unmanned and has small missiles that would be used to study impact waves when fired at Jupiter's ground. What should we do?"

"Well, I can talk to the Kalliopssians, explain what is going on and get them involved in the solution," I said.

"We will explain the risks to the Cecoshi and ask them to give up on this idea," was Eleonor's opinion.

"How long will it take for Juno-34 to get here?" asked Sebastian.

Khristeen spoke again and clarified:

"Juno-34 should arrive in four days and I would only like to involve Kalliope as a last resort. As for the Cecoshi, I have already tried to dissuade them from the idea and failed. We have to manage this situation by ourselves."

"We already have confirmation that Kalliope can access our communications. So maybe they don't know what to do either," I added, suggesting that we wait 24 hours. "Tomorrow will be an important day and we could think better then. Besides, many professionals there at the Cecoshi must share our concerns and could help us reverse this situation."

"I like that idea," said Khristeen. "I will make a brief statement, declaring that any attitude of ours that can be interpreted as an act of hostility or a threat will put not only the Outerplanets I at risk, which has no chance of defense at all, but will also render the continuity of our visits and research impossible. It would be an irreparable loss for our future history."

Having postponed the decision regarding this dilemma, Khristeen listed the people who were to go to Kalliope on the following day.

I questioned Diana about our activities on a daily basis. Over time, these exchanges became so commonplace and, at the same time, so complex, that I felt like I was talking to a co-worker. That night, in the cabin, it was no different:

"Hi, Diana! With my daily trips to Kalliope, our research has been a little abandoned. We will resume it shortly, but now, what do you expect from Juno-34?"

"Let's punctuate that," said Diana. "The Kalliopssians know that we have no weapons or defense systems; they also know that the crew of the Outerplanets I disagrees with the Juno-34 mission; besides, they have spaceships much faster than ours and can send one to intercept Juno-34 or just collide with it. In view of these facts, the only damage would be the interruption of our visits to Kalliope."

"Thank you, I think you're right," I finished, with not much certainty, and went to take my shower and then sleep.

That night, after I went to my accommodations, Khristeen asked Margareth Mendonza and Eleonor Ducan to accompany me on the next day's visit to Kalliope.

Eighth visit: the long road

The next day started with no big news. When disembarking in Kalliope, we went straight to the auditorium.

At the table were Carl, that young man we met at the mine, and Joff.

We started the day by watching films about the planet of the Kalliopssians. They called it the Enchanted Planet, in a free translation into English.

You couldn't see the sky. All of the shots were in closed or underground places, and I had the impression that it was a peaceful environment. There were many cargo and people transporters, like our treadmills and escalators, but no free areas. In the domestic footages, since there was no sound, we suspected that they were families in very small houses and apartments and very cramped rooms. We also watched the footage of a people transshipment station, as if it were a subway or train station, where thousands of ‘enchanted ones’ followed in very tight lines, without deviating from it, as if there were an invisible trail previously defined on the floor.

Joff clarified that to us:

"This is what the ancients brought from documents from our planet. We also have some digital books and a lot of still images, but what you saw summarizes what we wanted to show."

The auditorium lighting was restored, and we boarded a conveyor, which took us to the highest building in Kalliope. We had already estimated that the building would be more than 100 km high, with its top floor being precisely the inner top of Kalliope. From there, we followed for another ten minutes under the thick layer of polished metal, until we stopped at an access, like a cave entrance. The walls were made of rough hematite and, considering that the floor and ceiling were polished, including baseboards, I understood that the walls were purposely left like this, as if it were an 'artistic touch.' The hall darkened, and young Carl opened what would be the door, inviting us in. At first it looked like a small, cramped and entirely dark little room, and you could barely see the walls. Then he explained:

These rocks that you will see are from the destruction of the planet Brontes, which gave rise to the Asteroid Belt. This planet collided with another small one called

Arges, which was slightly bigger than Vesta, but smaller than Ceres. Both were rocky, and Brontes regularly orbited between Mars and Jupiter. Arges, on the other hand, had a more elliptical orbit and orbited on the same plane as Pluto, although a little more internally. Every 214 years, this orbit allowed Arges to pass through the inner planets. In a disastrous confluence, the shock occurred. This impact was so impressive that most of the two stars were lost in space or were harvested by the gravity of the Sun and the other planets in the Solar System. Only a tiny tiny part gave rise to the Asteroid Belt. This occurred about 3.9 billion years ago.

For a long time, Vesta was considered the second biggest asteroid in the Asteroid Belt and its official name was 4 Vesta. Subsequently, it was classified as a dwarf planet. Its diameter is 530 km.

Ceres was also classified as an asteroid, in fact, the biggest one. Since it was the first of its kind to be discovered, its given name was 1 Ceres, until it became a planet. Its diameter is approximately 974 km.

Pluto has a radius of 2,300 km and could be classified as the biggest asteroid in the Kuiper Belt, but, like Ceres, it is currently classified as a dwarf planet. At any time, space agencies can reclassify it into another type of star.

Like the Asteroid Belt, the Kuiper Belt has thousands of stars. Currently, ten stars with a diameter bigger than Ceres' are already known, which will require new reclassifications. The Kuiper Belt is located between 30 AU (after Neptune) and 50 AU.

The Oort Cloud is also a zone where millions of small stars are located, probably remnants of the formation of the Solar System. It is considered the cosmographic limit of the Solar System. It is located at about 50,000 AU or 25% of the distance from the Sun to the Centauri set (Proxima Centauri, Alpha Centauri A and Alpha Centauri B).

When our eyes got used to the dimmer light, we noticed something amazing: three blocks of stones, studded with diamonds. The biggest of these diamonds was the size of a crystalline soccer ball. The others were also clear, and the smaller ones were the size of a matchbox.

Carl went on:

"We found these stones in a type "S" asteroid that was going to disintegrate in Jupiter's atmosphere. From the spectrum analysis, we deduced that it was a special meteoroid and sent a ship to capture it. As a reward, we found these three stones inlaid inside it."

"Are there many more of these stones in asteroids?" I quickly asked.

"We do not believe so. Perhaps some, but we are not looking for them either. Our synthetic diamonds are much harder than natural ones, and we don't need them for everyday use. You can admire them. On Earth, you don't have them so big."

Eleonor said:

"You have demonstrated great knowledge about the origin of the Solar System when you detailed the destruction of Brontes. I can't imagine the technology involved in this discovery. Now, I would like to know about the origin of the universe. The main theory on Earth indicates that it all started with the Big Bang. What do you think about that?"

"We also have our theorists and some more information than you about the Universe. However, with regards to its origin, our current theory does not go far beyond what researchers on Earth have already raised. You see, each Galaxy has its black hole in their center, and that hole gives the Galaxy balance. In return, the black hole continues to suck up the nearby stars. Each sucked star represents more acquired mass and more gravitational force to suck more stars. It turns out that, near the end of the Galaxy, the hole has a lot of mass, therefore, a lot of gravity, which starts to attract another entire galaxy. As a result, two black holes merge and the second galaxy is consumed. This movement does not stop. Currently, there is already a black hole engulfing a whole galaxy. On Earth, you called it J2157-3602. In our current theory, we consider that, when all of the black holes merge into just one, a new Big Bang will occur, and a new cycle will be repeated. If this theory is correct, the process is already underway and should only take another six billion terrestrial years to be complete. In short, the Big Bang allows the universe to expand for about 15 billion years. Then it contracts for another 5 billion and... Bang! It all happens again."

"Good theory," exclaimed Eleonor, "too bad we can't prove it."

"True," confirmed Carl. "The most amazing thing is that this cycle can be infinite and that twenty billion years, for another world or another civilization, can mean only a few relative seconds. Want more? What if this universe we know is just a blow ball, a bladder, for another civilization, which is getting more and more filled in until it bursts?"

We had nothing to do but smile in face of such creative philosophy. After this class of planetary geology, or better, intergalactic geology, we climbed a smooth staircase and reached the bottom of a tiny tiny crater. A dome made of some kind of transparent material allowed us to see Kalliope's exterior.

There were about twenty big reclining seats there. We sat in a circle and admired the space.

Margareth, always very observant, commented:

"See, Rachid, how big these armchairs are and there are those that adapt to both our size and theirs. They must have been recently manufactured."

I nodded. It was really amazing how they dealt with every detail at all times.

Already comfortably seated, Joff explained to us that the space around this region of the Belt was entirely monitored.

"Any piece of a star that goes astray or any residue resulting from a collision between asteroids will be intercepted. The base responsible for this monitoring is located in Linus and controls a space with a radius of 20,000 km around Kalliope. If any star is observed heading towards this imaginary sphere, ships already prepared are thereto sent, such as the one we used to capture part of comet G-976076-H, to intercept, redirect or, if necessary, destroy the intruder."

This explanation was a direct message to our Cecoshi. Since everything that happened to us in Kalliope was sent in real time to the Outerplanets I and then relayed to the Cecoshi, they took the opportunity to, in an intelligent and friendly way, warn that Juno-34 could be destroyed if it insisted on continuing on its course.

Joff nodded his thanks and opened the room for John to enter.

"Well, I guess you guys are curious to know more about us. There is, or used to be, our home," John began, pointing with his index finger to infinity.

Without looking homesick, he continued:

"We used to live in an unsustainable situation, both internally and externally. On the planet, we lived in a moment similar to that of the current Earth. The leaders did not accept birth control because of the rampant demand for consumption and the need for young labor to subsidize the maintenance of the retired ones. The direct consequence was the destruction of native flora and fauna and the unrestrained use of natural resources. Day after day, our planet waned, and our atmosphere started to

face a process of degradation with no return. The radiation from our star, which you call Alpha Centauri B, was already destroying all life on the surface. In some events, millions of 'enchanted ones' received intolerable radiation discharges. Our medical system collapsed and then we created an underground world. The surface waters were diverted underground, and our lives were reduced to these gigantic underground cities. However, even this was not enough for there to be an agreement among the different leaders in order to control birth rates, protect our resources and, mainly, slow consumption. At that time, we conquered many of the techniques that we would use then in Kalliope. We already dominated space relatively well and we had a few colonies on satellites in our star system. The problem was to find abundant water. At a certain point, it was decided that some spaceships would leave the planet to look for a safe place where a new civilization of 'enchanted ones' would be generated."

"How was the repercussion of this project?" asked Margareth, imagining the consequences of something like that on Earth.

"This entire project, from the construction of these spaceships, choosing the crew members to launches, was kept confidential. We have no documents on the process. We only have a record of the instructions that our ancestors received. Our ship left for your Solar System, and four other ships left for other nearby solar systems. Ships were sent to Sirius, Barnard's Star, Ross 128, and the last one, to Wolf 359. The ancients knew that, in all of these systems, there were rocky planets and that the available technology would allow for us to develop colonies there. To avoid panic, the five ships left on the same day from different bases. In the beginning, our ship housed 400 men and 480 women. We had two supporting ships that could capture pieces of ice in comets or asteroids and we brought a tanker with about 4.5 billion liters of water that was outside our controlled atmosphere, that is, it was still 'in tow'. The idea was to keep a closed life system inside the ship with everything being reprocessed and just using water to replace the lost energy. Twenty species of vegetables, judiciously selected, were used as a basis in the diet of our ancestors. During the voyage, we became pieces of the ship's gears. Both the lighting, when necessary, and the heating were generated by our gymnastics equipment. In fact, we didn't need this, nor did we manage to generate the minimum enough, but it was the way our ancestors found to

save water, maintain a pace of discipline and the physical health of the crew, in addition to fulfilling the excess time available. This pace of work was fundamental for the group's mental health and the success of the journey. But life was not just about operating energy-generating machines and sleeping. Everyone had what we can paradoxically call 'playful obligations.' Aware that, at some point, all the books written, and all the films produced on our home planet would become repetitive for the group, the subject of 'artistic creation' was established at school. Before completing the first cycle, children should write a book, edit a film, act in a play and compose a piece of instrumental music. We thought that creativity would be limited by the amount of information we had, but that is not what happened. Children created fantastic worlds, incredible novels and unimaginable psychological dramas. Our subjective creativity is strikingly similar to yours."

"Is this subject still part of the school curriculum in Kalliope?" I interrupted his explanation with a question.

"Currently, in addition to all this, children learn drawing and painting, participate in choirs and are trained in at least four Earth dances: classical ballet, Argentinian tango, European waltz and Brazilian capoeira," replied John.

"What about the relations amongst the members of the crew? What was established in order to guarantee the group's survival in space?" Margareth added.

"Sex, which at the beginning of the trip was an escape valve, became normal and pleasurable. Reproduction was scheduled to exist also as to replace the older ones, in order to maintain the number of crew members. However, in practice, we found that there would not be enough energy to reach your 'Sun' with so many people. Initially, a woman was allowed to become pregnant after two 'enchanted' people reached 200 years old. Then, the ratio became that of three 'enchanted ones' for one pregnancy. That period must have been very difficult. The only hope was the sight of the sun growing and becoming clearer with each generation. It was like being born and already condemned to death in that confined space, even though the books of those times do not show this feeling."

"How long did this trip last?" asked Eleonor.

"Based on your calculations, considering that the system was 4.37 light years away, and they were capable of traveling at about 1,400,000 km/h..."

We looked at each other in amazement and said, almost in unison:

“... it lasted more than three thousand years!"

"Precisely," said John, pleased. "The trip took exactly 3,371 terrestrial years. The average age of our ancestors in space had been extended to 230 terrestrial years, since on our planet it was 200 years old. And we have a record of 22 complete generations. Physically speaking, there was no significant genetic alteration in that period, but, due to the reduction in gravity and the constant and daily practice of exercises, our average height increased by 12 centimeters. When we arrived at the Solar System, there were only 80 of us, of which only 15 were women of childbearing age and 12 female children. From the original plants, only four species remained."

"I wonder how much this journey has influenced and still influences life in Kalliope," I thought aloud, receiving the approval of the attending Kalliopssians.

"Many things have allowed their survival for so long. I believe that the most important were: the determination, discipline, the reuse of everything that was consumed, the reproduction techniques and, in some rare cases, genetic selection, in order to avoid the serious consequences of consanguineous relationships.”

"Do you keep in touch with the other ships and the Enchanted planet? " wanted to know Eleonor. Shaking his head, John reported to us:

"After a thousand years, communications from our planet have been disrupted. No message was sent so we could even have an idea of what might have happened. We kept on sending them signals for over two hundred years and currently we send them a message every year when we are in the smallest target with Alpha Centauri B. With regards to the other ships, about 20 thousand years ago we received a message from the third ship stating that they had left Ross 128 and would head towards the center of the Milky Way. The crew informed us that they had also lost contact with our planet, but unlike us, the ship's internal population was balanced. The last message we received from them was about 8,000 years ago and, it seems that everything went according to the plan. With regards to the other ships, there are only records of the early years of their voyages. The one who would go to the Barnard Star decided to return to the Enchanted planet, and the last, which would go to Wolf 359, stopped contacting us without any explanation whatsoever."

Margaret, as if speaking to herself, said:

"I don't know if we on Earth could make such great crossings."

Slowly, the lighting was being restored and a big metal floodgate closed the crater on the 'glass.'

Sober and, as always, very calm, John explained:

"Tomorrow, you will get to know our history on Earth and how we came to live in Kalliope. Please inform Commander Khristeen Bochev that her presence would be most welcome and that you do not need to worry about the problems related to your Cecoshi. Everything will be solved without further disturbance."

As we had imagined, they were actually monitoring our conflicts over Juno-34.

The folly (second part)

At the Outerplanets I, Khristeen was upset. Nothing had shaken the Cecoshi's decisions and we didn't know if there was anything else to do. It was about forty hours before Juno-34 reached our space, and everyone was eager for a solution. Our summary of the day was in the background.

Since it was still late afternoon, I asked Khristeen what she thought of inviting the Kalliopssians to have dinner with our team. It would be a way to share our concerns and listen to their opinions.

I think Khristeen accepted my suggestion just because she didn't have a better option.

Invitation made; invitation accepted. John, Mary, Phil and Carl came. You could tell the latter two were having a romance.

We were careful not to insert any animal protein into our menu, nor butter and much less eggs, although almost everything available contained these ingredients in their manufacturing or conservation process.

We were only able to make a salad dish and a mixture of cereals with olive oil, salt and basil. For dessert, we invented a coffee jelly that was excellent.

I couldn't bring the subject up during dinner. There was always someone asking a question that took the attention and the time of those who answered, successively. In addition to this, the other crew members of the Outerplanets I insisted on wanting to know how the virtual fitness room worked.

I was somehow frustrated. After all, it was my suggestion to invite them to discuss the matter and nothing had happened. When bidding them farewell, at the gateway to the carrier ship, John looked at me and said exactly this:

"Focus on the problem only and the solution will come. Good night!"

I went to sleep with it pounding in my head. Around three in the morning, I woke up with the solution, at least for me. If the problem was the missiles, the way out would be to get rid of them!

I sent a light signal to Khristeen's communicator. If she were awake, she'd answer me.

"Tell me, Rachid, what is it?"

"Let's ask the Cecoshi to get Juno-34 get rid of the missiles. That way, their intentions will be evident. If they don't get rid of the missiles, Kalliope will be cleared to destroy Juno-34. I suggest we do everything on the open channel, even though they can capture the messages we send on the encrypted channel."

"Good idea, Rachid. Meet me in ten minutes in the command room."

"Let's just say I was responsible for only fifty percent of the solution. After all, as you might remember, the bigger the problem, the simpler the solution."

The last message Khristeen wrote to the Cecoshi was: "You need to show full trust to the Kalliopssians. A definitive end to the missiles is necessary. I suggest launching them perpendicularly to the Milky Way, since we are close to one of its edges!”

> *The Milky Way is a relatively small galaxy. Its center is located at about 27,000 light-years from the Solar System, and its maximum diameter is 100,000 light-years. Imagine a starfish with long, curved arms due to the rotation movement. Well then. The Milky Way is like that. There are about four big arms and some smaller, internal ones, amongst the bigger ones. The Solar System is at the end of the Arm of Orion and this is located between the Arms of Sagittarius (Internal) and Perseus (External). By way of comparison, the biggest known galaxy is more than 500,000 light years in diameter. It is called NGC 6872 and is located in the constellation of Peacock. It is located at 212 million light years from the Earth.*

After sending the message, Khristeen turned to me and assured:

"We can go rest. Now, they will not be able to sleep..."

At 9 a.m., we received the standard call to confirm the time for us to be transported. Khristeen confirmed that she would go and asked them to pick us up at 10 a.m.

Ninth visit: a quick history of the Earth

This was our last visit to Kalliope, at least on that mission. The night before, after we had determined what to do about Juno-34, Khristeen said that almost all of us should go to Kalliope. She understood that this would be a demonstration of the friendship and trust that the Kalliopssians deserved.

We informed them that seven from our crew would go there. In addition to me and Khristeen, the following would go with us: Moana Ngabe, Eduard Zanetti, Margareth Mendonza, Shisoro Yamasaki and George Sellers.

The spaceship that came to pick us up was very different from the traditional flying saucers from before. It resembled a cube, in fact, a container. Inside, there were two rows of 15 seats parallel to each other, reminding us of the old parachute landing planes.

In the spaceport, only John was waiting for us. It was the first time that the 'Sardine Tin' was not ready.

"Commander, Mr. Rachid, ladies and gentlemen, I want to inform you that Juno-34 will be late for the scheduled mission. It did a rather unexpected maneuver and got rid of an uncomfortable load. It has already returned to its course in order to meet us, now lighter."

The irony used in that statement made us feel how close we were to that distant species.

In the auditorium, with everyone we knew in Kalliope in attendance, John announced:

"Before we begin to explain our history in the Solar System, let's conclude yesterday's presentation with a *pout-pourri* of short films."

Behind us, there were many other Kalliopssians who had not attended our meetings. John explained that everyone had long waited for this day. We got up, turned around and Khristeen started introducing us one by one by our names.

A young lady stood up in the audience and spoke, in perfect English:

"I love your music. We welcome you." And, talking towards the rest of the auditorium, she said something that we understood as being the translation of what she had told us.

A confirmation buzz overtook the audience, and John went on.

"Let's continue, shall we? After the trip of more than three thousand terrestrial years, the ship was stabilized in a geostationary orbit over the Pacific Ocean, in a region where it was thought that there was no danger of aggression. In fact, we didn't know what could be found on that planet. This occurred just over forty thousand years ago."

At the same time that John explained this, a group of humans was projected into a cave. They were getting warmed up around a campfire, eating a medium-sized animal, while one of the humans, appearing to be the oldest, drew a similar animal on the cave wall, surrounded by human figures. The images were interrupted, and John said:

"That's more or less what we found at that time. We used to make frequent visits to Earth, but around the year 8,000 BC by your calendar, we decided to look for a place outside of Earth to stabilize ourselves. Kalliope's finding was casual. We were with one of our research spaceships looking for copper in order to expand and improve our equipment when we detected the presence of the metal at the bottom of a crater in this asteroid. Upon entering here, we discovered a very big hollow flaw, which is nowadays the location of our base of ships, which you refer to as the spaceport. From there, the new history of the people of the 'Enchanted Planet' began."

Following, they exhibited what would be the construction of one of the first pyramids in Egypt. It was an enlarged aerial shot, but with excellent resolution. New images showed the construction of the Parthenon and a big fire, which I thought was the one in the city of Rome, but I was not aware of the details to be sure. These images continued to be interspersed with images of the construction of the Great Wall. There were many people crossing the seas in rudimentary boats and there were also huge buildings in every corner of the Earth. In the Andes, with the Incas; in Asia, where Laos and Thailand are; the Easter Island, Syria and the Mediterranean. And images of many wars always appeared.

John stopped the film and explained:

"All of this exuberance was interspersed by big wars that destroyed almost everything that these people built! The more you developed yourselves, the more you created weapons more powerful than the previous ones."

New images appeared on the screen. They seemed to me like sumptuous buildings in China and perhaps the image of a European, dressed in a very unusual way. He was a stranger, probably a merchant, a Marco Polo.

Reeds sailed the seas and small ships began to cross the Pacific.

We have seen the spreading of an increasing pollution, both in the air and in rivers, accompanied by the spreading of many diseases throughout Europe. It was sad to see that.

John went on:

"In this period, we were still stationed over the Pacific. A spaceship traveled around Earth, collecting and researching data, and other ships made the bridge between us and Kalliope. In your Middle Ages, we collected many handwritten books, most of them with no historical value, but some very important ones. We were always dressed up as sick old people, lepers or disabled children and, therefore, everyone made way for us. It wasn't hard."

"We transferred our ship into this place, Kalliope, and new spaceships were developed. Better and much faster ones. Our makeup and camouflage techniques would still allow us to frequent the Earth, but nowadays, we practically don't go on trips to your planet anymore. We have already gotten everything we need, and the new things you create are already done digitally. So, in order to acquire them, we just have to select what we need in the 'cloud', as you say."

The penultimate film showed children walking in uniforms, as though they were going to school, and the last one replayed the scenes of what was left hours after the atomic bomb was dropped on Hiroshima. A counterpoint of images. With a wide look at the audience, John implied that the projection had ended and clarified:

"The construction of Kalliope was slow and we only moved into here completely around 1,700 AD, as per your calendar. The first residences in Kalliope started to be built in 7,000 BC and, in the year 1,200 AD, there were already more than 300,000 Kalliopssians. We had a team dedicated to collecting seeds almost every day from all corners of the Earth. Your planet was everything for our new civilization. It was

our source of culture, inspiration, water and seeds. Our people have grown again always based on the availability of food, energy and education. If we had not found Earth, surely, none of this would have existed and our few ancestors would not have been able to fulfill their mission. However, in these forty thousand years, we understand that this planet is a paradise, but that humans still need to evolve a lot in order to be able to enjoy it. Unfortunately, technological and scientific growth did not go hand in hand with advancing social welfare."

After a brief silence, John concluded:

"I think most of the questions you had were answered in this presentation: where did we come from, why are we so similar to Earthlings, etc. But I suggest that each one of you ask at least one question. I will try to be as clear as possible. Please commander!"

"How did you do the footages?

"Basically, they were done in two ways. A film was made from the research ship, which you called a flying saucer. We stopped and documented the facts that were happening. Often without any relevance, just because we didn't understand them, but in other times we were able to document important moments in Earth's history. The other way was to do the filming on the spot, with camouflaged or hidden Kalliopssians. In these cases, we filmed everything that was interesting to learn, understand, or that was foreign to our culture, such as crops, fights, illnesses or thefts."

Khristeen continued:

"Did you have contact with us?"

"On a regular basis. We lived together with earthlings on Earth for several centuries. In the uninhabited areas, common until the 17th century, we did not need makeup or disguises. However, in urban areas, we preferred to disguise ourselves as beggars or the sick, as I said before."

"Every day you surprise me more and more," Khristeen confided.

John looked at me and I took the opportunity to question whether they could have interfered in more critical moments like the atomic explosions.

"I was a young man at that time, I was about 4 years old, and what I know I learned in books, just like you. The answer is: yes, we could, but our philosophy has

always been one of total respect and non-interference. We know that the Earth is moving towards a fast and sad end, but we understand that we are not responsible for the solution. We would be treated by humans as though we were just another enemy. Does that answer satisfy you, Rachid?"

I nodded, agreeing with him and feeling hopeless.

Moana stood up:

"Would you have any suggestions for us to improve life on Earth?"

"This question could be made to each one of the humans on Earth and the answer would be more or less the same. In any case, based on our experience, we understand that three measures are fundamental: first, that each couple only have children if the local government guarantees adequate conditions for food, health and education for the family; second, to eliminate the consumption of fossil and atomic fuels; third, completely stopping the manufacture of products that are not recycled due to lack of technology or because throwing them into nature is regarded as mistakenly more cost-efficient."

Moana thanked and Eduard stood up.

"There are books and magazines on Earth telling many stories of flying saucers. What is your relationship with these stories?"

"Until the middle of the 20th century, we were seen many times. There was no danger. We did not participate in some abduction stories of terrestrials, although a few times we have interacted and even maintained a brief contact with some of you. In those cases, with people who could never imagine that we were not beggars or sick children. With regards to the possibility of other ships coming from other dimensions, the chance is minimal, but we do not exclude said possibility. The universe is huge."

Following up on the questions, John asked Shisoro if he wanted to ask something.

"Which are the oldest books that you have? Did any of them come from the famous Library of Alexandria?"

"We have books of poetry and songs that date back to around 5,000 years BC and we got them in the region of present-day Mainland China. Almost from the same time, we also have epics from the so-called Babylon and Egyptian hymns. Before that, beautiful records in caves, which narrate parties and hunts. And yes, we do have books

from the Library of Alexandria. Many of them! We used to digitize them, since most of them had only one original. Nowadays, they are available to anyone who wants and can read them."

Before John gave the floor to another of us, Shisoro continued:

"Which of the books found in Alexandria do you think is the most important? And what about the Japanese writing, do you read it easily?"

John smiled as though he were asking the audience for permission to answer:

"For each study that is done or for each student, one book is more important than the other. For me, it is a book that tells an impossible and hypothetical encounter between Clystenes, Socrates and Aristotle. The three of them discuss government, slavery, democracy, wars, myths, culture, humanity, stars and give their opinions on the future of humanity. It's brilliant. For other scholars, it is not a book from Alexandria, but a document that was lost in the 1755 fire in Lisbon. They are manuscripts on board of a Chinese fleet, which in 1416 descended to the East coast of Africa, crossed the Cape of Storms, went up the Atlantic and went to the Caribbean. This squadron crossed with Portuguese boats at the time of present-day Senegal and provided these sketches that later gave rise to Fra Mauro's world map of 1457. And as for the Japanese ideograms, they are no more difficult for us than the hieroglyphics or the Mayan writing, which many, you have not yet deciphered, nor those of other indigenous American peoples. By the way, it was with these peoples that we had the most contact, before the Spaniards and other Europeans arrived on the Andean coast, close to where we were."

Margaret took the opportunity and asked:

"What do you have to say about our sacred books and writings?"

"Only that they are sacred books and writings. Since they are sacred, they need not be questioned."

"Do you think them true?" retorted Margareth.

"Most of the facts reported, from the historical point of view, 'are true', but there are symbolic facts that we do not understand but we do not consider then 'untrue.'"

"Sorry for the insistence, but I would like to know if you have films by our great religious leaders, as they were very important for Earth's history!"

"Dear Margareth, if we go through our files, we are likely to find footage of those that existed. There will certainly be no records on Horus, for instance. But what matters to the inhabitants of the Earth is not the truth, but the symbolism. Faith is more important than these objective proofs."

Finally, Margareth was content. John had the sensitivity to give the answer that his interlocutor wanted to hear, without having to lie.

I took the opportunity to pronounce myself again:

“One second, please. In the early days, you introduced us to an Earth library. On the other day, you showed us a disco with songs from Earth. And now, you are dealing with places, ancient maps and philosophers of the Earth. What is your real intention regarding our planet?"

"Dear Rachid. The Earth is the most beautiful and magnificent place that any being, from any planet, could imagine. It took us three thousand years to get here and we have been watching your evolution for over forty thousand years, without interfering. Nothing prevents us from waiting so many more years so that, in the near or distant future, we can share the same planet."

At last, George spoke:

"Ladies and Gentlemen, you have shown us many things. You have presented unimaginable technologies, fantastic equipment, exquisite education. What I'm going to ask is more a request. Can we take a blood sample from you?"

Immediately, Khristeen stood up and with a reproachful expression on her face and said aloud:

"That was not agreed on, George. We could have discussed it between us before!"

John interrupted her and said:

"Madam Commander, we understand Mr. George's curiosity. He developed something on Earth that we never thought possible. A 'nanosubmarine', as you call it," he said, laughing.

We looked at each other, again surprised to see how much they knew about us. And John went on:

"I can't give you a sample, at least not for this mission, but I can provide you with some clarifications. If we were from Earth, we would be between chimpanzees

and humans. Our DNA would represent that of an intermediate species. The problem would be the analysis of our RNA, which you on Earth do not yet know well enough, you just have speculations on its interaction with the genes."

> *On Earth, there are two species physiologically very similar to us: that of humans and that of chimpanzees. In fact, for many scientists, chimpanzees should belong to the Homo genus. They, chimpanzees, are much closer to humans than to other monkeys, such as gorillas and orangutans. The level of DNA similarity is around 99.38% between them and us.*

"So, why are you technically much more evolved than us?!" insisted George.

"Education is responsible for our progress. Although the logical reasoning of your brain is more developed than ours (and therefore your technical development is superior, even if it does not seem to be so), we are at an educational evolutionary level slightly ahead of you. We believe that this educational level was acquired during the three thousand years of confinement in our interplanetary adventure. As a common saying on Earth says, 'Every cloud has a silver lining.' Anyway, I will try and get a blood sample for you for the next mission that comes from Earth to visit us."

"One more thing," continued George. "How do you explain that two species, ours and yours, are so similar, born on such distant planets?"

"Mr. George, we do not consider that we were born on planets that far away. If we compare the Milky Way to a city, it is as though we were born in the next room. If we compare it to the universe, we have been born in the same bed. Sorry for the analogy, but we really think that life in this corner of the universe could only evolve as it did on our planets."

He stopped, paused for reflection and continued:

"We don't know life in the other corners of the Milky Way, much less in the other galaxies, but what we found is that there is only life, let's say, intelligent life, like ours, in this region. Only on the two planets that have stars with similar characteristics, planets with this protection from radiation, similar in the characteristics of their atmosphere and mainly with an abundance of water. This probably spawned protozoa and the rest we all know. The few differences between us are a consequence of the variety of foods. We were very reluctant regarding not introducing ourselves to Alfred

Russel Wallace and Charles Robert Darwin, but our non-interventionist stance prevailed.”

> *Alfred Russel Wallace was an English naturalist. He traveled through the Amazonia and the Malayan archipelago when he wrote an essay on the theory of evolution. This essay was sent to Charles Darwin, who, understanding it to be very similar to his own Theory of Evolution, in which he, Darwin, had been working for over twenty years, decided to complete it and present his ideas. Some historians consider Wallace the true father of the Theory of Evolution; others consider him to be a great gentleman, who gave up on glory when he learned that Darwin had a very similar theory but written before his. The only fact that we are sure of is that both had similar tools and hypotheses and that, one day, Russel Wallace sent a manuscript for Darwin to analyze and, after that, the Theory of Evolution was presented at the Linnean Society of London.*"

John thanked our team and the entire audience, informing us that lunch would be served right there.

The hidden surprises in Kalliope

In the afternoon, after lunch, as direct and objective as ever, Khristeen asked Phil, but looking at the entire team of Kalliopssians:

"And now that we are aware of your existence, what will you do?"

John promptly replied:

"This response is the reason for the invitation and your presence here with us today. Please let's go to that room where we presented you Alpha Centauri B."

Two transporters took us there. Altogether, we were seven humans and six Kalliopssians. Almost at the door, Khristeen asked to enter the 'cave' where the three meteorite stones were kept.

Moana pointed out:

"On Earth, there are many people who, to get one of these stones, would destroy Kalliope."

"Unfortunately, we know that. Unfortunately," repeated Phil.

Back in the living room, we sat and admired Kalliope's sky. Soon after, John, Mary and Joff arrived. They had passed somewhere else when we entered the 'Grotto of Diamonds.' That's what we referred to that room.

Using an invisible microphone, John signaled something to Linus and asked Khristeen to warn the Outerplanets I that the ship's control should remain on automatic and that no manual operations should be performed.

He explained to us that he would do a demonstration that would interfere with the revolution of the Outerplanets I, that is, our ship would change speed due to some change in the gravitational attraction that Kalliope exerted on it. If automatic control were maintained, there would be no problems.

All fixed, then John asked us to pay attention to the Sun. Since Kalliope's rotation time was just over four hours, we could see 'the sun walking', as we say on Earth. Within minutes, we noticed that Kalliope's speed of rotation was slowing down very gently, but it was certainly slowing down.

"What does that mean?" I asked, suspicious.

Khristeen did not wait for an answer. She took out her portable communicator and called Leonard.

“What’s going on there?”

"We don't know it yet, but the revolution of the Outerplanets I is slowing down over Kalliope. It remains stationary for now, but I don't know how long it will remain that way."

"Actually, we're the ones with the reduced speed," said Khristeen. "You will probably get to a balance with us. Monitor Linus just out of curiosity. If there is any other news, we will talk."

Leonard was not content and exclaimed, clearly concerned:

"If you stop all of a sudden, we will have to start the engines and it is likely that Linus will be catapulted".

"No doubt our hosts know this and are taking the necessary precautions," replied Khristeen.

John gently spoke again and explained it so that Leonard could also hear him:

"In fact, we are already recovering our rotation speed. This was just a small demonstration. Only now, when 22 Kalliope really became autonomous, did we allow ourselves to be detected by you. Explaining it better, 22 Kalliope was converted into a spaceship ready to follow any path. A real 'Oumuamua' ship. Only a few adjustments are needed for 1 Linus to follow us. Everything will depend on how we live together."

We were agape. Khristeen didn't seem to believe it and shot some questions:

"Is this whole wonderful world a self-sufficient ship? Can you go anywhere? What will happen to Linus when Kalliope returns to its normal rotation speed?"

"Calm down, calm down. We will answer everything in the right time," said John. "We have performed this test several times. We are too far from other stars for our movements to interfere with them. Only Linus follows our rotation and today, exceptionally, the Outerplanets I. In a few hours, the three of us will be back in sync and balanced."

And he went on:

"It would be great to be able to interact with and explain to you all about our culture and knowledge, but that will depend much more on you than on us. Many of our techniques could be misused by your leaders, as you know. Today, it takes you a

long time to get here and we will be able to easily identify who your crew are, as well as your cargo and intentions. This gives us a good deal of time to decide what attitude or direction to take. Even within this Belt, it would be very difficult for you to locate us, but we are ready to proceed to a Saturn ring or to the Kuiper Belt and, if necessary, even to the Oort Cloud. In all of them, we will have as many comets as we need. On Saturn, we will have a lot of quality water, and Pluto is a very beautiful planet, with rich valleys and abundant methane ice, and Charon has a frozen ocean of water, as well as active geysers. As a last resort, we can even go back to the Enchanted planet."

And, to put an end to the visit, John used these words:

"Now, Commander, did you understand why we wanted your presence here? For us, it was very important to transmit this information and, as you say on Earth, nothing better than doing so 'eye to eye.' Thank you for your presence here and for allowing your team to attend this meeting."

Khristeen stood up, asked us to get up and said out loud:

"On behalf of the people of Earth, we would like to thank you for your receptivity and, as a symbolic act, however very important for all of us, I ask my team for a round of applause to you."

When we started to clap, all those eight fantastic beings also got up and did the same. It was the first time that Earthlings had an interplanetary confraternization.

In the transparent corridor that would take us back to the spaceport, I was admiring that unbelievable new world. How many more things would they have to teach us?

However, I understood that it will be necessary to give it time. The population of Earth is not yet prepared for so much information. First, we need to solve the simplest of our problems. That was the message they gave us.

THE END

Afterword

If you made it this far, I assume you liked this book. So donate it, lend it, or give it to someone you know. If you are a child or teenager, give it to your cousin, your neighbor, your schoolmate as a gift.

During the entire the time I was writing this book, I thought of my nephews, cousins, children and grandchildren to come. Both the vocabulary and the quotes were carefully thought out to stimulate reading, curiosity and pleasure in astronomy and science fiction. The volume of the book was made by thinking about children and students.

All of you who have read it, probably would like to have "another" visit addressing this or that subject. Me too, but I understood that this volume would be ideal for boys and girls today.

Finally, I imagined that children my age could have fun remembering films, magazines and TV series from the 1960s and 1970s, when space conquest became a reality. Many will remember when they were between 10 and 12 years old, and the human being stepped on the Moon for the first time. It was 1969 and, in those days, many parents bought TVs to watch the big event. In the dining room, hoping that the antenna would not get out of place, in the deepest silence, my sisters, my cousins and I believed in what the adults said: that the space conquest by the human being made them demigods, ready to have encounters with extraterrestrials. There was an optimism that we would soon colonize the unknown lands of space, just as the Portuguese and Spaniards conquered the New World in the past.

I liked to accompany solar and lunar eclipses, always with welding glasses.

Every time there was a comet, I would stay awake for hours and days trying to view it. Most of the time it was frustrating, but when I could see one, coming from unknown space to Earth, it felt like a party. I remember a very big one, in 1970, when all of the children on the street and in the building got out of bed at dawn to see it.

However, the world on Earth has not change that much with the arrival of human beings on the Moon. There were neither 'lunatics' nor 'Martians' to our civilization to face, and who could have made us change, learn, reflect. This did not

prevent the advancement of technology from continuing to be an almost magical feat. We all had watched, in the previous year, the film *2001: A Space Odyssey,* and life seemed to imitate art. The computers that took the man to the Moon could take us to the unthinkable. It was enough to imagine, with the help of the robots we had invented, which were much more intelligent than we, their creators. I went to work at IBM in 1977, when I was 19 years old. IBM was the first information technology company in the world, with a history that dates back to the 19th century, and Brazil was one of the first countries to receive a subsidiary of its own. I followed all the evolution of computers, from punched cards (referred to as *Hollerith*, as an homage to their inventor) to the current pen drives, passing through floppy disks and hard drives until the arrival of the Internet. But then, a few years ago, my profession changed. The time had come for me to set foot on Earth. And I started to write.

This book can open the door for many others. In reality, it is an invitation to read. I inserted in the middle of its pages many references to scientific studies and literary texts about space.

I researched a good-sized asteroid, which had metal in its composition and at least one satellite to illustrate the story.

I used Wikipedia as one of the main sources of research, trying to verify the origin of the information therein summarized. I did so because I was looking for a language that was very accessible to the general public and, in particular, the younger readers.

My wish is for children to be empowered in order to have knowledge, travel and dream!

Danilo Fadul Muhana

Contact: dfmuhana@gmail.com