JOURNEY TO THE SUN

Chapter I
An Old Friend

I had gone to my window in order to listen to the melancholy song of a nightingale that had built its nest in a neighboring garden. The night was superb and the vault of heaven was sparkling with a thousand twinkling fires. With both elbows on my window-sill and my chin in my hands, I was listening to the nightingale…but a harmony far more sublime gradually took possession of my soul; I fell into the delightful meditation with which you will be familiar, if you have ever traveled on a beautiful starry night. I ceased to hear the melodious bird that alone troubled the silence of my solitude, and my mind launched itself forth into the immensity of the skies. Sometimes, like Micromégas, I passed from one planet to another with a single stride; sometimes, like the romantic genii, I sat down on the radiant head of a comet, and even if I could not guide the stars like the sorcerer Melmoth, at least I could admire their celestial harmony.

Soon, my reverie became so profound that my soul, abandoning the Earth entirely, believed that it had found a mysterious guide who led it through the labyrinth of the infinite and explained to it the hundred thousand marvels that the heavens contained. That guide was the lame devil who had already shown me "Paris Before Humankind." What I heard him say—or, if you wish, what I thought I heard him say—was sometimes so extraordinary and bizarre that I would not dare repeat it as coming from me. Thus, in order to tell you what I have seen, it is absolutely necessary that I leave him the role for which he had taken responsibility, and, whether you take it as a fiction invented expressly to put me at ease, or you regard it as the brainchild of a slightly delirious imagination, it is necessary that you accept it, as I accepted it myself. In any case, although I guarantee the truth of everything that emerges from my mouth, it would be stretching a point to make the same engagement for what emerges from his, for everyone knows that demons, like all children of the imagination, are naturally inclined to utopias.

This is how our voyage commenced.

"What a marvelous spectacle!" I exclaimed. "How admirably that immense blue vault limits the horizon of our vast universe.

"Hee hee hee!" he said, laughing sardonically. "It seems that you've scarcely profited from the little lessons in logic that I've occasionally given you, for you've only made one remark to me and you've already uttered five stupidities. Firstly, what you see isn't a vault, but the immensity; secondly, that immensity isn't blue, but black, like everything that has no color, and it wouldn't appear like that to you if it weren't constantly inundated by the light of the sun; thirdly, your vault doesn't limit anything at all because space, like time, is infinite and boundless; fourthly, the horizon is on the earth, not in the sky, where there is none; and finally, the universe, comprising the imperceptible Earth that you inhabit, its little planets and its rather paltry sun is just a dot in infinity—less than a grain of sand in the ocean. Your statement is poetic, or at least you think so, but it's by arranging sonorous words like that, whose meaning is incomprehensible, or, what's worse, false, that one puts spokes in the wheel of science."

"I'll remember the lesson. As for the vault, I admit that if I make use of that expression, it's purely figurative, for I know perfectly well that the..."

"Say the segment of the sky; above all, be didactic."

"All right. I know very well that the firmament isn't a sold arch and that the stars aren't lanterns nailed to it; I know that space is infinite, but Monseigneur, to put your lesson to use immediately, I'll ask you what infinity is."

“Imagine that you have a bow in your hand, and that you shoot an arrow into the air, that that arrow has the ability to travel through space in a straight line without any deviation, and that it has been launched with sufficient force to travel a million leagues a minute.”

“Well?”

“Well, after a billion years, that arrow would doubtless have covered a lot of ground, but it wouldn’t be any closer to its target than when it left your bow, because infinity is boundless.”

“I don’t understand, even though I’m making my head ache following your arrow through space.”

“Imitate the geometers: calculate; put figures one after another and penetrate yourself, like the stupid, with the idea that the figures prove something. And then, when you have a total formed by a row of numbers as long as the road from Paris to Rome, that total will still be nothing by comparison with the number of leagues your arrow will still have to travel in order to have spanned a tiny part of infinity.”[1]

“Pardon me, Monseigneur, but I don’t understand.”

“I can well believe it, as I’m speaking in academic terms. Well, my dear chap, infinity is…nothing at all; now rack your brains to imagine what that nothing is, and where its beginning and end can be found.”

“Now I understand. Infinite space, eternal time, etc., etc., are all just abstractions to which we’ve fitted a name, a word, and it’s that word that we utter in error, which makes us mistake the nothing for something, because we have the habit of representing things by words.

“I don’t understand, either, why you tell me that the space of the heavens is black when I can see that it’s blue; my eyes certainly aren’t deceiving me: I see the sky blue, and I assume that the ether that fills space is that color.

“As for your ether, it’s a stupidity that I advise you to renounce, for nothing proves that a particular fluid exists that fills space; its existence, if it has one, doesn’t explain anything, not even the theory of waves of light, and it’s very difficult to explain in itself—but what is very easy to demonstrate is that the ether isn’t blue.”[2]

“You believe, then, in the void of space? It’s a great question, which has agitated our astronomers a great deal.”

“If there’s a void in space it’s at a distance so remote that the eye of an astronomer, armed with the most powerful telescope, has never been able to fathom it. The sky is full of light everywhere, at least everywhere that humans know; there is, therefore, no void, for light has body, and even a decomposable body. If a corner exists in space so distant from a sun that the sun’s rays can’t reach it, that corner is an intense and opaque black, a thousand times darker than the most profound terrestrial night, for light is composed of colors, and black in the absence of all the colors.

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[1] Author’s note: “A reasonable person never allows himself to be seduced by calculations. In fact, what results from the efforts of the greatest mathematicians? Often, definite conclusions derived from uncertain suppositions. For example, if one compares the calculations that prove the movement of the Earth with calculations that determine its shape, one finds on the one hand a complete evidence, which assumes nothing, and on the other, an evidence that leaves a cloud behind in which one can suppose anything one likes, because light never penetrates it. But the public believes blindly that everything is demonstrated because it is prejudiced, with good reason, in favor of the genius of inventors.”

[2] Author’s note: “Encke, to explain how the long axis of the ellipse described by comets and their medium distance diminish progressively, found nothing better than to suppose a ether filling the regions through which those singular heavenly bodies travel, whose resistance, diminishing their velocity, also diminishes their centrifugal force and gives the sun more purchase on them to attract them. We shall show later that the etheric invention in question is at least useless, although it has been adopted without examination by the majority of astronomers.”

As Boitard admits, he was going against the prevailing scientific consensus in refusing to believe that Johann Encke’s observations of variations in the orbit of the comet named after him, whose return in 1822 he predicted in 1818, on the basis of his calculations, proved the existence of an “ether” capable of exerting friction upon it. On the other hand, his assertion that there is no void in space, on the grounds that light travels through it, look suspiciously like a endorsement of the notion of a “luminiferous ether,” with which many contemporary scientists identified Encke’s.

"If the sky appears to you to be blue, it's because you see it through a blue fluid, which tints with its color the objects that one sees through it, in the same way that green spectacle-lenses make objects appear green. That fluid is atmospheric air, and you can't doubt it when you look at a distant horizon. The mountain nearest to you appears green because there isn't enough air interposed between it and you for it to be tinted blue; one that is further away will appear bluish green, while the most distant of all, the one that limits your horizon, can seem entirely blue if it's far enough away for there to be a sufficient quantity of air between it and you."

"It would seem, according to what you say, that space is full of blue air, and it's doubtless the air in question that you'll make responsible for supporting the heavenly bodies to prevent them from falling. Make it spin and draw the heavenly bodies in its vortices, and there's Descartes resuscitated!"

"What you say there, my dear, is devoid of common sense, for I was only talking about the layer of atmospheric air. As for the heavenly bodies, why would they fall, when nothing in nature falls—not even the apple that, detaching itself from its tree, demonstrated to Newton the principle of attraction that other astronomers had previously suspected?"

"What, then, is the attraction with which our scientists so easily construct the universe?"

"It's something very simple: it's a property of matter, like extent, impenetrability, etc. All bodies are mutually attracted to one another; those that contain more matter—which is to say, the largest or the densest—naturally draw those that contain less; it's the law of the strongest or the richest. The sun, for example, attracts the Earth and all the other heavenly bodies, not just because it's larger than any of them, but larger than all of them put together. A body that seems to you to be falling is nothing but a body drawn toward another body that is heavier than itself. You humans can that falling; now, as words don't cause any difficulty when their meaning is fixed, I see no inconvenience in continuing to make use of that expression, but only to replace the words "being attracted." We can even say that the attracted objects are "heavy," and "have weight," because we now know that weight is nothing other than the effect of attraction.

"Every molecule of matter attracts other molecules of matter. A body composed of a hundred molecules will attract a body composed of ten molecules with ten times as much force as it's attracted, because the square of ten is a hundred; the body composed of ten molecules will fall on to the other because it has less strength, and the speed of its fall will similarly be proportional to the number of its molecules, taking distance into consideration—for bodies are attracted more energetically the closer together they are.[3]

"Will that attraction explain to me why falling bodies constantly tend toward the center of the Earth?"

"If you think about it a little, you'll see that the center of a globe is always the part that presents to an object the most numerous pencil of attractive rays, because the line that traverses the center of the globe is the one whose path encounters the greatest number of attractive molecules."

"I understand all that very well, and only two objections remain for me to put to you. How can attraction be proven, and why, if the heavenly bodies attract one another, don't they fall on to one another?"

"I won't tell you that attraction is proven to all evidence by the exact solution of various astronomical problems, because you're not knowledgeable enough to understand me, but I can give you more material proofs. When a ship is sailing under full sail it travels, I'll suppose, at six feet per second; now, if it takes a lead pellet a second to fall from the top of the mast to the deck, it follows that, the vessel advancing six feet during that second, the mast will draw away during the fall and the pellet will land six feet away from the mast. Well, my dear, nothing of the sort; the pellet is attracted by the mast and drawn

[3] Author's note: "Newton concluded from very thorny calculations these three consequences, which are one of the principal bases of astronomy: firstly, the force that solicits the planets is directed toward the center of the sun; secondly, that force is in inverse proportion to the square of the distance from their center to the center of the sun; and thirdly, that it is proportional to their mass."

by it; it obeys its attractive power and comes to land exactly as the foot of the mast, deviating from the vertical line.

"When a vessel in port is motionless on its anchor, take a drop of water and let it fall from the ceiling of your cabin to the floor, It is certain that in falling it will follow a straight line directed toward the center of the earth. Then mark on the ceiling the point from which it departed and on the floor the point where it fell. The anchor is raised, the sails are deployed and the vessel sails with the greatest rapidity; repeat our experiment then and let further drops of water fall from the same point on the ceiling. You might think that they wouldn't fall on the same point of the floor, because the vessel advances by a foot during the fall of each drop—well, you'd be wrong, for the vessel has become a power of attraction to which the drops of water are obedient; they deviate from the vertical line to follow its progress and fall at exactly the same point on the floor as if the vessel were immobile."[4]

"That very good, but why don't the planets fall into the sun?"

"This is the reason. When a body spins rapidly, the molecules composing it tend to draw away from the center of the body by virtue of a physical force called 'centrifugal force' by astronomers. You can verify that fact by a thousand experiments all as easy as one another. For example, place on a pivot or an axle a wheel, a round table or simply a plate. Spread water, sand or anything else on the late and rotate it with some rapidity. You'll immediately see the water or sand move to the circumference of the circle formed by the table or the plate, and then be thrown outside the circle to a greater or lesser distance, dependent on the greater or lesser velocity of rotation. That's how the performers in our public squares can place a glass full of water on a barrel hoops that they cause to turn rapidly in a vertical plane without spilling a drop, even though the glass is upside-down momentarily during each rotation of the hoop. Instead of falling, the liquid leans constantly on the bottom of the glass in order to draw away from the center of rotation, according to the law of centrifugal force. In any case, in order not to understand me, it would be necessary never to have seen a stone launched by a sling.[5]

"The planets can't, therefore, fall into the sun, because, launched in straight lines in space and not experiencing any friction in their course, their force of projection cannot be eroded. Attracted by the sun, they rotate around it, but, the force of attraction being combated, firstly by the force of projection and them by centrifugal force—which is probably the same thing—an equilibrium is established that nothing can break, and which will last eternally, like all the properties of matter."

"That's all well and good, but it seems to me that if we were placed elsewhere than on Earth, we'd see things differently, and perhaps then the entire scientific scaffolding that you're trying to establish would collapse."

"Well, my dear, you're stubborn, but I'll try to convince you. Let's go."

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[4] The correct explanation for this phenomenon, and the previous one, has to do with the lateral velocity imparted to the drop or the pellet at the moment of its release, not the attractive force of the ship or the mast. Even lame devils make silly mistakes.

[5] But to contradict him, it only requires one to be aware that the impulsion in either case comes not from a "centrifugal force" but from a tangential momentum—which, contrary to what the next paragraph alleges, is not the same thing.