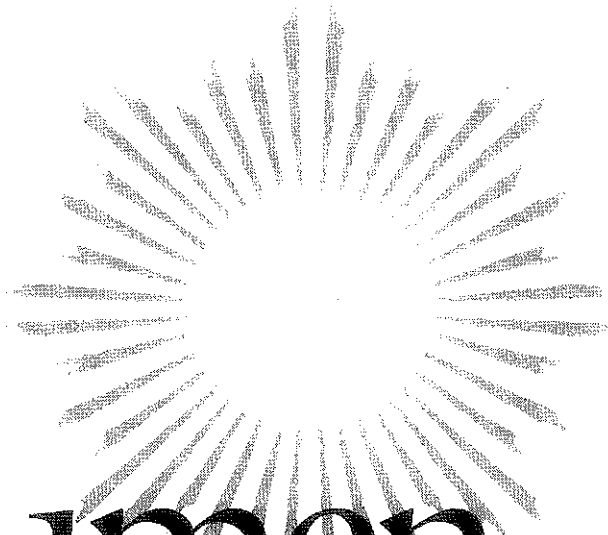


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ARTHUR B. EVANS



Lumen

Camille Flammarion

Translated and with an Introduction by

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THE FIFTH CONVERSATION

Imagination Is Bold; Nature Is Bolder

You know the splendid constellation of Orion, which reigns like a sovereign over your winter nights, and the curious multiple star Theta Orionis, which is to be found below the sword suspended from the Belt and shines in the middle of the famous nebula.¹

The system of Theta Orionis is one of the most unusual to be found in the vast treasure house that contains such a rich variety of celestial jewels. It is composed of four principal suns disposed in a quadrilateral. Two of these suns, forming what I may call the base of the quadrilateral, are accompanied, one by a single sun and the other by two. It is, therefore, a system of seven suns, each of them encircled by inhabited planets.

I was on a planet orbiting one of the secondary suns, which revolved in its turn around one of the four principal suns. That rotated in its turn, in concert with the others, around an invisible center of gravity in the interior of the quadrilateral. A celestial mechanism explains these movements, but I shall not dwell on the matter.

I was, in consequence, lighted and warmed on my planet by seven suns at the same time, including one that was larger and brighter than the rest because it was nearer, a second very large and equally bright, a third of moderate size, and two that were like twins. It

never happens that these different suns are all above the horizon at the same time; there are day suns and night suns — which is to say that there is no “night,” as properly defined.

What? Are there other such double and multiple suns in the heavens?

Very many of them. The system of which I am speaking, and others, are known to the astronomers of the earth, whose catalogues count systems of double stars, multiple stars, and colored stars by the thousand. You can study them yourself with your telescope.

Now, on the planet of Orion of which I was just speaking, the inhabitants are neither vegetable nor animal. They could not be placed within any classification of terrestrial life — not even the most basic categories, which constitute the vegetable and animal kingdoms. In truth, I hardly know what comparison to make in order that I might give you an idea of their form. Have you ever seen in a botanic garden the gigantic tapering plant *Cereus giganteus*?²

I know the plant well. Its name comes from its resemblance to the wax tapers placed in three or more branched stands to light churches.

Well, the humans of Theta Orionis bear some likeness to that form, but they move slowly and maintain an upright position by means of a process of suction, analogous to that of the ampullae of certain plants.³ The lower part of the vertical stem is slightly elongated where it rests on the ground, like a starfish, with little appendages that fix themselves to the soil by means of suction. These beings often move in troops, changing their latitude according to the season, but the most singular peculiarity of their organization is one that illustrates the principle of which I have spoken to you, of the union of elementary souls in the human body.

One day I visited this world and found myself in the midst of an Orionic landscape. I beheld a being standing there like a plant ten meters high, without leaves or flowers. It consisted, in fact, of a cylindrical stalk, the uppermost part of which separated into many branches, like those of a chandelier. The central stem, as well as those of the branches, measured about a third of a meter in diameter. The tops of the stalk and branches were crowned with a silver-fringed diadem.

Suddenly, I saw this being agitate its branches and then vanish.

The fact is that in this world, individuals — although quite healthy — literally fall to pieces in an instant. The molecules of which they are constituted fall in unison to the ground. The personal existence of the organism comes to an end; its molecules separate and are dispersed.

They disintegrate, and the atoms fly apart like truants from school.

Almost. I recollect that such disintegrations of the body often took place within the course of a life. Sometimes it was the result of opposition, sometimes of fatigue, and in other instances of a lack of organic accord between different parts. They exist in their entirety, actual and complete, then are abruptly reduced to the simplest elementary forms. The cerebral molecule, which really constitutes each individual, feels itself descending in consequence of the fall of its sister molecules in the long branches, and it arrives on the ground surface solitary and independent.

This kind of vanishing trick would, on occasion, be a very convenient process down here. To get out of an embarrassing situation — a conjugal scene in the Molière mode, for example, or a bad quarter of a hour of the kind described by Rabelais, or a tragic situation such as mounting the scaffold to be executed. One would merely have to let loose one's constituent atoms and . . . Goodbye, everyone!⁴

You choose to regard the matter as a joke, but I assure you that it is an undoubted reality. It would exist on the earth as well as on the planet in Orion if the principle of authority were not so firmly fixed within you. There it is only in an elementary form; your body is formed of animated molecules. According to one of your most eminent physiologists, your spinal marrow is a series of centers, linked together independently and yet under control. The essential constituents of your blood, flesh, and bones are similar. They are provinces that are self-governed but subject to a superior authority.

The working of this superior authority is a condition of human life: a condition that is less exclusive among the inferior animals. Each ring of the worm called *Lumbricus* is a complete individual, so that a worm consists of a series of similar beings constituting a

living co-operative society.⁵ Cut into rings, the worm would be so many independent individuals. In the tapeworm, a solitary creature, the head is of greater importance than the rest of the body and possesses the faculty of reproducing the rest of the body after it has been cut off. The leech is a further example of united individuals; cut it into five or six rings and the operation gives you as many leeches. Thus, also, a cutting of a branch of a tree will grow. In like manner, a crab's claw or a lizard's tail will be regenerated. In reality, the vertebrate animals, including human beings, are essentially composite in structure. The spinal cord, and the gross expansion of its material that is the brain, consist of segments placed in juxtaposition, whose individual nervous systems each possess an elementary soul.⁶

The law of authority in action upon the earth has determined in the animal series a preponderant direction. You are composed of a multitude of entities grouped together, dominated by the formative attraction of your personal soul—which, from the center of your being, has formed your body from its embryo and has united about itself in a microcosm a whole world of beings that have no consciousness of their individuality.

On the planet of Orion, then, nature itself is an absolute republic?

A republic governed by law.

But when a being finds itself thus disintegrated, how can it reconstitute itself as a whole thereafter?

By willpower, often without the least effort, or even by casual desire. Although separated from the cerebral molecule, the corporeal molecules are still intimately connected with one another. At a given moment, they combine, each taking its place. The directing molecule draws the other from a distance as a magnet attracts iron filings.

I can easily picture this Lilliputian army, when summoned by a whistle, drawing to its center to organize a reunion: all the little soldiers climbing over one another, taking their places in a trice to reconstruct the human taper that you have described. One really should leave the earth, to behold such rare wonders!

You are still judging universal nature by the atom that you have

before your eyes, and you are able to comprehend only the facts that lie within the sphere of your observations—but I assure you that the earth is not the type of the universe.

The world of Theta Orionis, with its seven circling suns, is peopled by an organic system like that I have just described to you. I lived there 2,400 years ago, and I can see myself there in accordance with the time that light occupied in coming from that point in space to Capella.

While there, I was acquainted with the spirit who was incarnated on the earth in the present century and published his studies under the name of Allan Kardec.⁷ During our terrestrial life we did not recollect that we had known one another before, but we often felt attracted to one another by peculiar intellectual sympathies. Now that he, like myself, has returned to the world of spirits, he also remembers the singular republic of Orion and can see it. Yes, this is very curious, but it is perfectly true. You have no idea, on your poor planet, of the unimaginable diversity of worlds, which affects their geological as much as their physiological organizations.

These conversations may serve to throw light on your knowledge of this general truth, which is so important in the conception of the universe, but the greatest scientific service they can render you is to make you understand that light is the mode of transmission of universal history. With the powerful visual faculty that we enjoy here, we can distinguish the surfaces of distant worlds. The eye of the spirit is not like the bodily eye.

In terrestrial sight the rays diverge, so that a very small object placed quite near the eye fills the interval of the two rays, while at a greater distance a larger object is necessary to fill the same space, which is increased in proportion. In our eyes, by contrast, the visual rays enter in parallel lines, so that we see each object in its real proportions and in its normal size, its apparent size being quite unaffected by distance. We do not see the whole of large objects, but only sections of them proportionate to the openings of our special retinas—but these parts are seen by us with equal clarity at any distance, when there is no atmosphere to veil it.⁸ A tree in a prairie

on a celestial body as far away as Theta Orionis is from Capella is perfectly visible to us.

On the other hand, in accordance with the principle of the successive transmission of the rays of light, all the events in nature, and the history of all worlds, are depicted in space as a universal tableau: the most true and magnificent in all creation.⁹

As these conversations have shown you, I have traversed a great many celestial countries and have also studied creation without fixing myself in any one place. I hope in the course of the next century to be reincarnated on a world within the retinue of Sirius. The humankind there is more beautiful than that of the earth; birth is effected by means of an organic system less ridiculous and less brutal than that on Earth, but the most remarkable characteristic of life on that world is that its humans can perceive the physicochemical operations that maintain the body. From every molecule of the body proceeds a nerve that transmits to the brain the various impressions it receives, so that the soul has absolute knowledge of its body and rules over it as a sovereign.

There is an immense variety of worlds. On one of the planets in the system of Aldebaran, very curious in this respect, the vegetables are all composed of a substance that is analogous to asbestos¹⁰ because silica and magnesia predominate in its constitution. The animals feed on this substance exclusively, so most of the beings inhabiting this world are incombustible.¹¹

Upon the world of which I speak, night is illuminated by phosphorescent light. I have visited other worlds where night does not exist at all—where day and night do not succeed one another as upon the earth, because every portion of their spheres is continuously supplied with light by several suns that never leave them in darkness for an instant. Sleep is unnecessary there, for humans, animals, or plants.

On your planet sleep consumes a third of your life, its primary cause being the rotation of the earth on its axis, which produces day and night in succession in the various parts of the globe. On these

worlds where it is always day, the inhabitants never sleep, and it would greatly surprise them to learn that there exists a humankind that passes a third of its life in a lethargy resembling death.

Not far from this lies a world where night is almost unknown, even though it does not possess a nocturnal sun, like the one in the quadrilateral of Orion, and has no satellites. The rocks of its mountains, being of a chemical composition that reminds one of the phosphates and sulphates of barytes,¹² store up the solar light received during the day, and during the night they radiate a gentle, calm, translucent light that illuminates the scenery with a tranquil nocturnal clarity. There, too, one sees curious trees bearing flowers that shine in the evening like fireflies; they resemble horse chestnuts, but the snowy flowers are luminous.

Phosphorus is an important constituent of the composition of this curious and remarkable world. Its atmosphere is constantly electrified. Its animals are luminous as well as its plants, and its humanity partakes of the same quality. The temperature is very high, and the inhabitants have had little need to invent clothing. It so happens that certain passions are manifested by the illumination of the body.

This is, on a larger scale, what takes place on a small scale in your terrestrial meadows, where one sees glowworms silently consumed in amorous flame on mild summer evenings. In the fireflies seen in northern France the male is winged and nonluminous; the female, on the other hand, is luminous but cannot fly. In Italy both sexes are winged, and both can become luminous. The humankind that I am describing to you has all the advantages of the latter type.

Certain forms of terrestrial life recur among many of the kinds of extraterrestrial humanity. Thus, we find in some cases the same thing that occurs on Earth in the ant world, where all the males die of exhaustion on the day of their aerial unions; and in the world of bees, where the procreators are sacrificed pitilessly; and among spiders, where they are devoured by their companions unless they can escape immediately. There are versions of the habits of a great num-

ber of insects, which never see their offspring and lay their eggs in surroundings in which the newly born will find their first food.¹³

The human body on this earth owes its form and its state of being to the atmospheric environment, and to the conditions of density, weight, and nutrition by means of which terrestrial evolution operates. The human being proceeds from the fusion of a microscopic masculine corpuscle with a minute feminine ovule. This fusion gives birth to a little cell that is transformed into the embryo, in which the heart, the head, the limbs, and the different organs gradually appear. The nervous system of this embryo may be compared to arrays of delicate threads proceeding from a central point that will become the brain. Under the influence of solar light and vibrations in the air, one of these nerves is developed at its extremity and forms the eye. This is undefined at first and almost blind in an elementary state, like the eyes of the trilobites and fishes of the Silurian period, but it develops into the admirable eyes of birds, mammals, and humans. The senses of smell and taste proceed from the nerves in the same way. These latter senses, with that of touch, are the most primitive, the earliest, and the most necessary to life. There are two senses that place human beings in communication with the outer world — sight and hearing — but the eye is the only organ that puts us in communication with the entire universe.

Millions of these little nerve threads proceed from the brain, extending throughout the body, without producing any other than the five senses — unless we except certain sensations of touch that are intimate and personal, and which have been described as a sixth sense, of which you shall hear more. Now, there is no reason why the process of formation and limitation that has taken place on our little planet should be duplicated elsewhere. In proof of this I must tell you that not long ago I visited two worlds on which human beings have two senses of which we have no conception on Earth.

One of these senses may be described as electrical. One of the little nerve threads of which I have just told you is developed into a multitude of ramifications that form a sort of cornet. Under the scalpel and the microscope these appear to be tubes placed in juxtaposition, the outer extremities of which receive the electrical fluid and transmit it

to the brain, much as our optic nerves receive the waves of light and our auditory nerves receive the undulations of sound.

The beings provided with this sense perceive the electrical condition of bodies, material objects, plants and flowers, animals, the atmosphere and clouds. To these beings the electrical sense is a source of knowledge that is entirely forbidden to us. Their organic sensations are completely different from yours. Their eyes are not constructed like yours — they do not see what you see, but they see what you do not; they are conscious only of the ultraviolet rays — but their mode of existence differs from yours most particularly by virtue of their electric sense; the electrical constitution of their world is the cause of the existence and development of this sense.

On a second world I found another sense, of quite a different character, which seemed even more striking. This was the sense of orientation. Another of the nerve threads proceeding from the brain produced a sort of winged ear, very light, by means of which the living being directly perceives his bearings. It is conscious of the points of the compass and turns instinctively to the north, south, east, or west. The atmosphere is full of emanations that you never perceive, but this singular sense orientates its possessors infallibly. It also enables them to discover things concealed in the center of the sun, and gives them an insight into some of nature's secrets that are completely hidden from you.

Thus I seek to demonstrate to you that in the vast domains of creation an infinite variety exists, and that eternity will be inexhaustibly occupied in gathering and partaking of its flowers and its fruits.

There are worlds where old age is unknown, where lovers are consumed in a delirious fantasy, transported by the intoxication of the body and careless of the morrow. Members of the active sex never survive these nuptials; the passive, oviparous sex, having secured the perpetuity of the species, fall into their final sleep. These celestial worlds where one never grows old are not without their advantages.

Worlds exist in which the vital movements of respiration and assimilation, and the organic periods — day and night, the seasons,

and the years — are all of extreme length. Although the nervous system of the inhabitants is highly developed, and thought is prodigiously active, life there appears to be endless in duration. Those who die of old age have lived more than a thousand years, but they are so rare that only a few have been preserved in the historical records of this humankind. War between nations has never been invented, because there is only one race, one people, one language.

The natural constitution of these organisms is remarkable. Diseases are almost unknown; there are no doctors. As a result of their great mental activity, the extension of life becomes a perspective without end, and eventually burdensome. Suicide is, therefore, almost universal; the custom has been habitual since very ancient times. The few old men who, from whatever motive, have not put an end to their lives are looked upon as exceptional and rather eccentric individuals; suicide is the norm.

But it is impossible for me to describe to you all the curiosities of the universe, my dear friend. Let it suffice that I have raised the veil enough to give you a glimpse of the incommensurable diversity that exists in the animate produce of the many and various systems that are disseminated through space. While accompanying me in spirit on this interstellar voyage, you have passed several hours away from the earth. It is good to isolate oneself periodically in this way, among the celestial solitudes. The soul obtains a fuller possession of itself, and in its solitary reflections it penetrates profoundly into the universal reality.

Terrestrial humanity, you understand, is the result of the particular forces of the earth, morally as well as physically. Human strength, physique, and weight all depend on these forces. Organic functions are determined by the planet. If your life is divided between work and rest, activity and sleep, it is because of the rotation of the globe and the cycle of day and night. In the luminous globes and those lighted alternately by many suns there is no sleep. If you need to eat and drink, it is because of the insufficiency of the atmosphere. The bodies of beings who do not eat are not made like yours, since they have no need of a stomach or intestines. The terrestrial eye enables

you to see the universe in a certain way; the Saturnian eye sees in a different manner.

There are senses that perceive things other than those you perceive in nature. Every world is inhabited by an essentially different race, and sometimes the inhabitants are neither animal nor vegetable. There are men of all possible forms, dimensions, weights, colors, sensations, and every other variable character. The universe is infinite. Our terrestrial existence is only one phase of the infinite. An inexhaustible diversity enriches the marvelous field of the Eternal Sower.

The role of science is to study all that the terrestrial senses are capable of perceiving. The role of philosophy is to form a synthesis of all defined and determined ideas and facts, and to develop the scope of thought.¹⁴

What would you say if I told you not only about the physical diversity of humankind, but also its moral and intellectual diversity? Its varieties are many — far too many, in fact, for you to understand them thoroughly. I will give you just one noteworthy example.

In your terrestrial humanity, intellectual or moral worth counts for nothing in advancing a man, whatever the value of his ideas or the worth of his character might be, unless he possesses the means and determination to push himself forward. No one searches for hidden merit. A man must needs make his own way, and struggle against intrigue, cupidity, and ambition — a strife which is the very opposite of what it ought to be. In consequence, therefore, the noblest and most worthy people remain in obscurity while position, wealth, and social distinction are often showered on worthless intriguers.

Well, I recently visited a world belonging to one of the most luminous regions of the Milky Way, where a completely different moral order exists: where the constitution of the government is such that only those distinguished for their virtues are placed at the head of the state, and their function is to seek out and place in responsible positions men worthy of their trust. In that country, in brief, the search for the discovery of merit and intelligence is as eager as that for gold and diamonds in yours. All is done there for the benefit of

humanity. They have invented no Academy, because they cannot conceive that a man of worth should be compelled to waste his time in ceremonial visits — only to find, probably, that a titled nonentity more skilled in the cajoling of votes has been preferred to himself — instead of being sought after. Thus, the system prevailing in other worlds is far more enlightened than that of yours.

Now, my dear terrestrial friend, you know what the earth is in the universe; you know something of what the heavens contain; and you also know what life is, and what death is.

We shall soon see the first light of morning, which puts spirits to flight and brings our conversations to an end, as the approach of your terrestrial day causes the brightness of Venus to fade away. But I should like to add to the preceding ideas a very interesting remark suggested by the same observations. If you set out from the earth at the moment that a flash of lightning bursts forth, and if you traveled for an hour or more with the light, you would see the lightning as long as you continued to look at it. This fact is established by the foregoing principles. But if, instead of traveling with the exact velocity of light, you were to travel with a slightly lesser velocity, take note of the observation you would make.

I will suppose that this voyage away from the earth, during which you look at the lightning, lasts a minute. I will suppose also that the lightning lasts a thousandth of a second. You will, therefore, continue to see the lightning for 60,000 times its own duration in our first supposition that the voyage's velocity is identical to that of light. Light has occupied 60,000 thousandths¹⁵ of a second in going from the earth to the point where you are; your voyage and that of light have coincided.

Now, if instead of flying with precisely the same velocity as light, you had flown a little less rapidly, and if you had employed a thousandth part of a second more to arrive at the same point, instead of always seeing the same moment of the lightning, you would have seen, successively, the different moments which constituted the total duration of the lightning, equal to the thousandth part of a second. In this entire minute you would have had time to see, first, the

beginning of the lightning flash and could then analyze the development of it — its successive phases — to the very end.

You may imagine what strange discoveries one could make in the secret nature of lightning, increased 60,000 times in the order of its duration. What frightful battles you would have time to discover in the flame! What pandemonium! What sinister atoms! What a world, hidden by its volatile nature from the imperfect eyes of mortals!

If your imagination were adequate to allow you to separate and count the atoms that constitute the body of a man, that body would disappear before you, for it consists of thousands of millions of atoms in motion; to the analytical eye it would be a nebula animated by the forces of gravitation. Did not Swedenborg imagine that the universe by which he was surrounded, seen as a whole, was in the form of an immense man?¹⁶ That was anthropomorphism — but there are analogies everywhere. What we know most certainly is that things are not what they appear to be, either in space or in time — but let us return to the delayed flash of lightning.

When you travel with the velocity of light, you see constantly before you the scene that was in existence at the moment of your departure. If you were carried away for a year at that same rate, the same event would remain before you throughout that time. But if, in order to see more distinctly an event that would have taken only a few seconds — such as a landslide, an avalanche, or an earthquake — you were to delay, slackening a little in your pace compared to that of light, you would see the progress of the catastrophe from its first moment to its second, and so on consecutively, so that you might see the end only after an hour of observation. For you, the event would last an hour instead of a few seconds. You would see the rocks and stones suspended in midair, and could thus ascertain the mode of production of the phenomenon and its incidental delays.

Your terrestrial scientific knowledge already enables you to take instantaneous photographs of the successive aspects of rapid phenomena, such as lightning, meteors, the waves of the sea, volcanic eruptions, falling buildings, and to make them pass before you grad-

uated in accordance with their effect upon the retina. Similarly, on the other hand, you can photograph the pollination of a flower through each stage of expansion to its completion of the fruit, or the development of a child from birth to maturity, and project these phases upon a screen, depicting in a few seconds the life of a man or a tree.¹⁷

I see in your thoughts that you are comparing this effect to that of a microscope that could magnify time. That is exactly what it is; we thus see time amplified. Such a device could not, strictly speaking, be called a microscope, but rather a chronoscope or a chronotelescope (to see time from afar).

The duration of a reign might, by the same process, be augmented according to the pleasure of the body politic. Thus, for example, Napoleon II reigned for only three hours, but one could see him reign for fifteen successive years by dispersing the 180 minutes of the three hours over a period of 180 months, in removing oneself from the earth with a velocity a little inferior to that of light. So, by setting out at the very moment when the chamber had proclaimed Napoleon II emperor, one would arrive at the last minute of his supposed reign only at the end of fifteen years. Every minute would have lasted a month, every second twelve hours.

The conclusion of this conversation is based entirely on this principle, my dear seeker after knowledge. I have endeavored to show you that the physical law of the successive transmission of light in space is one of the fundamental elements of the conditions of eternal life. According to this law, every event is imperishable and the past is always present. The image of the earth as it was six thousand years ago is actually present in space at the distance that light has crossed in that six thousand years. The worlds situated in that region see the earth of that epoch. We could see again our own immediate existence and our various anterior existences; all that we require to do so is to be at the appropriate distance from the worlds in which we had lived. There are stars that you see from the earth that no longer exist, because they became extinct after they had emitted the luminous ray that has only just reached you. In the same way, you might hear at a distance the voice of a man who might be dead before the moment

at which you heard him, if perchance he had been struck by apoplexy immediately after he had uttered his last cry.

I am pleased that this last sketch has enabled me, at the same time, to trace for you a picture of the possibility of living forms unknown to the earth. Here, too, you see that the revelations of Urania¹⁸ are grander and more profound than those of all her sisters. The earth is only an atom in the universe.

I must stop here, for not all of these numerous and diverse applications of the laws of light are apparent to you. On the earth — in this dark cavern, as Plato appropriately termed it¹⁹ — you vegetate in ignorance of the gigantic forces active in the universe; but the day will come when physical science will discover in light the principle of every movement and the inner rationale of things.

Already, within the last few years, spectrum analysis has demonstrated that by the examination of a luminous ray from the sun or from a star you can discover the constituent substances of that sun and star. Already you can determine, across a distance of millions and millions of kilometers, the nature of celestial bodies from which a ray of light has come to you! And the study of light will afford even more splendid results, both in experimental science and in its application to the philosophy of the universe.

But the refraction of the earth's atmosphere is projecting the light shed by the distant sun beyond the horizon. The vibrations of daylight will no longer let me talk to you. Farewell, my good friend — or perhaps *au revoir*. Great things are going to happen around you. When the storm is over, I might perhaps return for one last visit to give you proof of my existence and show that I have not forgotten you.

Then, later, when your life upon this little planet is done, I shall come to you once again, and together we shall resume our real journey through the indescribable splendors of immensity.²⁰ Nor can you ever, in your wildest dreams, form even a faint idea of the stupendous surprises and inconceivable wonders awaiting you there.

cules — as, indeed, they are — but he has not the means to make a category distinction between molecules and cells.

18. The French translation of the *Arabian Nights* made by Antoine Galland (1646–1715) left a deep and enduring impression on French culture, but the questioner's reference to it at this point seems a trifle odd.

THE FIFTH CONVERSATION

1. What was originally Part IV of the fourth dialogue is separated out in the revised text as a fifth conversation. The opening paragraph is abbreviated somewhat, but the text then proceeds much as it had in the first edition, except that the first few references to Lumen's memory of having actually been the alien entity he observes, 2,400 years before, are removed.

2. *Cereus giganteus* is the Saguaro, an arborescent cactus that grows in the deserts of Mexico and the southwestern United States.

3. The “ampullae” (*ampoules*) to which Flammarion is referring are those used for attachment by echinoderms such as starfishes, not “certain plants” (*certaines plantes*).

4. Jean-Baptiste Molière (1622–73) and Rabelais are cited here as exemplary farceurs.

5. *Lumbricus* (which the 1897 translation renders, nonsensically, as “lombric”) is a genus of earthworms. The example is not a good one; although the body of an earthworm is segmentally organized, the capability of each segment to live independently, if severed from the whole, is very limited. The example that follows it, of the tapeworm, is far better; although the embedded head generates the other segments in the manner observed by Flammarion, each segment is, in effect, a complete individual. Leeches, on the other hand, are not segmentally organized at all, although their powers of regeneration — like those of other flatworms, especially planarians — are nevertheless considerable.

6. The modern equivalent of this quaintly formulated notion is the distinction drawn between the central and autonomic nervous systems.

7. Hippolyte Rivail (1804–69), alias Allan Kardec, was the leading advocate of spiritualism in France; he published *Le Livre des esprits* [The Book of Spirits] in 1856 and *Le Livre des médiums* [The Book of Mediums] in 1864. Flammarion, who joined Kardec's psychical research society in the early

1860s, delivered a eulogy at his funeral in March 1869; this passage must have been written soon afterward.

8. This contradicts an earlier passage, which asserted that clouds could not obscure spiritual sight — and that even solid matter might, in principle, be no barrier to it. The means by which the spiritual eye defies the principle of perspective remains, in any case, stubbornly unclear.

9. The text following this text break is considerably rearranged in the revised version, partly because the first edition introduces a reference to the impending dawn long before the conversation actually concludes. It makes good editorial sense to move that passage closer to the end, although the introduction of several text breaks in rapid succession (all of which are ignored in the 1897 translation, although I have kept them) may seem a trifle eccentric to some readers.

10. The 1897 translation offers the obviously incorrect “loadstone” rather than “asbestos” as a translation of “l'amiante,” apparently having confused the word with “aimant” several paragraphs earlier — which the 1897 translation also gives as “loadstone” although I have preferred “magnet.”

11. The following two paragraphs were added to the 1897 edition for the first time; it is interesting to observe that Flammarion neglects the simplest means of producing perpetual daylight, making no reference to a hypothetical planet that presents the same face perpetually to its primary, as the moon does to the earth.

12. “Barytes” here refers to salts of barium.

13. The paragraphs between this point and the next text break are slightly rearranged and considerably augmented in the 1897 translation, presumably according to Flammarion's instruction.

14. The next three paragraphs are original to the 1897 translation.

15. The 1897 translation has “tenths,” which is nonsensical, although it is an accurate translation of Flammarion's “dixièmes” — which occurs in both the first and revised editions, although the situation of this block of text is different.

16. This notion was by no means original to Swedenborg, having previously been part of various mystical cosmologies. Echoes of it can be traced back to a number of creation myths, including the Norse myth in which the earth and heavens are formed from various parts of the body of Ymir, progenitor of the frost giants, and a Hindu myth contained in the *Rg Veda* in which creation consists of the dismemberment of Purusa, the primeval man.

17. This paragraph is original to the 1897 translation; even so, Flammarion was writing at the very infancy of slow-motion and time-lapse cinematography.

18. Urania, the muse of astronomy (*Uranic* in French) was to play Lumen's role in Flammarion's next popularization of these same ideas, *Uranic* (1889).

19. The reference is to the famous allegory of the cave in the *Republic*.

20. The 1897 translation renders "l'immensité," incorrectly, as "speed."