

ARTICLE III.  
ASTRONOMICAL MYSTERIES.

BY THE REV. ENOCH F. BURR, D. D., LYME, CT.

ONE of the most signal facts emphasized to us by the study of the universe is its *mysteriousness*. We stand, as it were, in the heart of an immense fog, through which, at great intervals, a few strong lights succeed in struggling.

Of the things just about us we know only a very small part; and our knowledge of the things we are said to know is exceedingly fractional and superficial. Our intelligence is like a bird which alights on a twig here and there, and picks up a seed. The nearest and most familiar thing we see has an unexplored interior which is the despair of our science. But as the distance of an object from us increases, the proportion of the known to the unknown rapidly diminishes. Whole estates, provinces, continents come to be hardly more than names. How little is known of Africa, and the Polar Regions, and the ocean-depths, and the deep interior of the planet! Our dredgings, the chippings and borings of our geologists, the corkscrew peerings of our microscopists, have merely crossed with a farthing candle the threshold of vast realms still buried in profound darkness. How little is understood of that familiar complex which we call the *weather*, or of that annual miracle of Nature-restoration which greets the eyes in Spring! It certainly is only an appreciable fraction of our own planet that we can be said to know, or to be able to know, or to have any prospect of ever being able to know.

How much smaller a fraction of the truths contained in the *Solar System* falls within the scope of our opportunity and intelligence; and, as our thoughts go out to still remoter systems, how dwindles the trifle at every step—

much faster than the square of the distance increases—till at last we come to a profound of darkness unalleviated by a single ray! Is that star some sixty thousand years of light-travel away? Yet still beyond may stretch infinite amplitudes of creation—unknown and, for the present at least, unknowable. On the whole, what we know is less than the stray sparks from a mighty conflagration. As a whole the universe is a Sphinx. Facts known are few; imaginations are more; the unimaginable are, beyond compare, the most. Such heights and depths of the unintelligible, such far-sweeping horizons and huge spheres of incomprehensibility, such ample field for even an immortality of lightning-eyed and lightning-paced investigation—there is at least one nebula that does not shine by its own light, or by any other.

But let us look at this great mystery more closely. Space—the great astronomic theatre itself, the roomy region in which all the stars dwell and move, stretching away on all sides of us not only beyond any assignable limit but into absolute limitlessness, along whose diameter thought at its fleetest may fly forever without once doubling on its track—is certainly a great mystery in itself. Who has mastered the idea of infinite, necessary space? It is an impregnable castle that defies all our philosophy. From the beginning giants have been beating and summoning at its barred gates, and trying to scale its frowning walls of solid shadows and midnights; but the last man is just as far from success as was the first. By this time we ought to know, and *do* know, that its interior is hopelessly inaccessible to such minds as ours. That which is incontestably real, whose existence as a mighty fact forces itself, beyond the possibility of rejection, on the knowledge of all, but the nearest wall of which our intelligence has never passed and never can pass, certainly deserves to be called a mystery.

But our astronomy has as close relation to infinite duration as it has to infinite space. Infinite space itself in-

habits eternity. The stars inhabit both of these shadowy mansions as nothing on the earth does. Each earthly thing, of course, exists in space and time; but how small a part of either does it occupy? Its place is but a point amid the endless regions about it; its time (that during which it remains the same thing), but a moment amid outlying eternities. But the stars occupy and reign in space and duration more largely and durably than any other objects of physical science. Even the soul of man is inferior in this respect; for though, in common with the stellar hosts, it may be expected to inherit all the future, it inherits infinitely less than they of the past. For aught that appears, all space is populous with worlds: for aught that appears, there never has been and never will be a moment without the presence in it of created worlds. The uncreated and indestructible amphitheatre of duration in which the stars run their courses, and the absence of which is inconceivable, is equally august and infinite with that of space, and equally unintelligible. They are twin mysteries—great cloudy homes within whose coincident and sublime architectures dwell all other mysteries, all created Nature, and even the Supernatural.

The contents of mysterious space and duration are partly matter. What is matter? We have our definitions of it, but they do not let us into the secret of its substance. Is it infinitely divisible? A question often asked and never settled. Of how many sorts is it? Once men said four; now they say more than sixty; by and by, perhaps, they will say more than a hundred, but more likely *one*. Matter was created, say we theists—something out of nothing—here is a mystery. Matter was created, we say; but *when*? If any one can answer more definitely than the Bible does, *In the beginning*, he is more knowing than the rest of mankind. Was all matter created at one time, or did it appear at great intervals; and will there yet be creations from time to time? Has matter ever been annihilated? Some venture to say, No; but they are

either those who venture to say that it has never been created, or they mean that it never ceases to be by means of natural forces or processes. Does GOD ever reduce matter to its primal nothingness? No answer.

In connection with matter we find a something easily seen to be much higher in its nature, around whose brightness even thicker veils seem to be drawn. I mean *spirit*—whether human or brutal. The last distinction between it and matter; its relation to form, size, space, organization; the tie that binds it to the body; their interactions; why the human spirit is not able directly to discern itself, or discover its own exact situation in the body; the genesis of thought, feeling, choice; the philosophy of sleep and dreams; instincts, heredity, the metaphysics of free-will, responsibility, and immortality,—all such matters, however speculated and dogmatized upon, suggest not only no end of hard questions, but no end of questions whose answers are as far beyond sight as is the remotest star.

Whether there are things besides matter and spirit that go to make up the substance of the universe; and if so what and how many they are, who can tell? It certainly is possible that our present senses and consciousness cover only a small part of the constitution of Nature. As there may be other kinds of matter than those at present known: as there may be other kinds of spirit than those we have happened to notice within our narrow beat; so there may be other kinds of substance than the spiritual and material—other kinds now known to higher natures than ours, or to ourselves when some dormant faculty shall awake and slip leashes. There is room for such discoveries in the great Cosmos. Experience even seems to hint and feebly promise them. But they are Delphic promises—*nebulae* whose interior no telescope can sound.

*Force*—what is it? The word is on the lips of all men; science just now swears by it; all Nature is quick with the thing itself; some of its forms and laws and relations are known; but who can be said to know the last essence

of force? Despite the endless discussions from time out of mind, we cannot yet tell what that is in a thing which enables it to act on itself or something else—enables it to produce motion or tendency to motion, change or tendency to change—what it is and how it brings itself to bear on its object. We speak of chemical forces, and vital forces, of the forces of gravity, and electricity, and magnetism, and heat, and spirit—indicating different classes of effects from which causes worthy of at least different names are inferred—but what that something is which is common to all these forces and makes them such, and what that is which discriminates the essence of one force from another, nobody knows—not even he who says that all force is motion, and that various forces are only various modes of motion. Even he will be ready to admit that causation, especially on the astronomic field and in the endless intertwinings and entanglements and strifes of the celestial motions, is full of unresolvable problems. Can we answer such questions as one can ask about gravity? Does it act at infinite distances from its seat? Is a medium essential to its action on remote objects? Were a particle or a world created would its attraction be felt *at once* in all parts of the universe? In whatever way such questions are viewed they cry mystery at both ears. There are mysteries enough in the doctrine of causation alone to keep scientific thought on the stretch till the day of judgment.

Ascending to the realm of the organic, we find ourselves in the presence of perhaps still profounder problems. Whatever we have learned of the structure and functions of vegetable and animal bodies still leaves them greatly in the dark. The mere words, *life, death, growth, reproduction*,—what a nest and nexus of perplexities and impossible solutions do they suggest to us? Yet they stand for matters that have been in the focus of all eyes and thoughts from the beginning. The last foundations of heredity; the structural termini of species, stature,

growth, period, and life—how wholly blind is our science as yet, and likely to be, in all such matters!

How many atoms compose the earth—in view of such facts as that a single grain of copper can be shown to be composed of at least one hundred millions of atoms! To the infinite number making a globe eight thousand miles in diameter add as many infinites as there are globes in the whole heavens. Now you have a number which you can talk about, and gather within the shining tentaculæ of poetical description; but as to any proper mental grasping of such an abyss of figures, it cannot be done. So in looking at the sky we stand face to face with the mystery of incalculable and endless *number*.

Also with an equal mystery of *size*. On the earth we find things mysteriously small; in the heavens things mysteriously large. Here we have not merely inanimate atoms that are inconceivably minute, but also living beings furnished with all the organs of sense in the highest perfection and yet barely visible as so organized under a microscope magnifying two hundred and fifty thousand times. And how far may even these living infinitesimals be from the last minims of animated Nature! On the other hand, peering up through the night, we discover a world to which our earth is almost a nothing—twelve thousand million times greater—also a system of worlds within which could be packed away, at average star-distances from one another, the cube of that number of such spheres—nay, a system that actually embraces within its glorious rotund the whole materialism and spiritualism of the universe. There is magnitude for you! A magnitude that is confounding—magnitude that is a mystery. Try your powers upon it, and confess their inadequacy. You can do nothing. You are lost. Yet not more so than when, resigning telescope and telescopic imagination, you take up the microscope and, fancy aided, carry your observation down among miracles of smallness. How far apart these extremes—both equally wonderful! On the one

hand Nature swelling into immeasurable hugeness, on the other dwindling into immeasurable littleness.

When the ancients wished to express a vast difference they said, *toto orbe*. But their orb was not much. We find in the astronomic field as now known to us a much stronger figure at our service. What an interval parts us from the nearest of the heavenly bodies? How much greater still the space between us and the nearest fixed star, and especially from the last star that appears in the field of the largest telescope! And yet what inexpressible distances beyond even that lie the frontiers of Nature! We talk freely of such distances, but who of us understands them? We marshal long lines of figures whose unit itself is enormous beyond comprehension, and try by various comparisons to gain some faint conception of what the whole amounts to; but the baffling figures seem to laugh at and mock us as they stream away and at last disappear in the depths of distance and endless fog. No one has tried to give some just idea of the larger astronomical distances without feeling the utter inadequacy of speech or symbol faithfully to represent them. We are forced to content ourselves with some glittering generalities—with flashing out into the night some colored rocket of poetical description; and we are glad of the momentary blaze, though it does make more sensible the greatness of the darkness. No doubt it will always be so. However far our science may advance, and culture expand our powers, they will still have to exclaim with astonished eyes and hands, and with discouragement painted on every feature, *Oh, those mysterious distances!*

The simple transfer of an object from one place to another by a physical agent in immediate connection with it is not commonly thought to be mysterious. But when the motion takes place—without any such agent, or without any sensible medium of connection with such agent; when the motion is seen to affect every thing, so that there is not an atom of matter at absolute rest in all Nature, or

even at rest relatively to the other atoms of the same body, and even so that it is by no means the easiest thing in the world to disprove the hypothesis that every object, however dense and rigid it may seem, consists of atoms revolving in orbits about their common centre of gravity at intervals from one another relatively as great as those between the members of the Solar System: when the motion is seen to be incessant as well as universal, and sometimes at the rate of more than 180,000 miles a second; when it means the transfer through space of huge worlds and huger systems of worlds at the rate of 50,000 and even 1,200,000 miles an hour; where such a motion as this is combined with a thousand other motions woven together inextricably and yet never interfering with one another and separately calculable—as when a moon moves on its axis, also around its planet, also around the sun, also around the sun's centre of revolution, and so on indefinitely; when each of these motions has superimposed on itself myriads of other motions called *perturbations* struggling toward all points of the compass; we find ourselves as much lost in this vast wilderness of motions as ever was traveller in new lands or babes in a wood. So many questions can be asked about them that science cannot answer, nor hope to answer. What endless mazes! How the shuttles fly through the heavens in all directions; weaving out, we know not how, law and order and stability! Who can disentangle the threads that make up the wondrous web? Where is Ariadne? Astronomy is helpless and hopeless in the presence of such labyrinths.

As a consequence of these mysterious motions we have an incessant change going on in the aspect of the sky. A chart of the sky as the first terrestrial animals saw it would differ very considerably from one now made. Our earth has a constant movement of translation through space: so that the space it now occupies it has never occupied before and will never occupy again. As much is true of every other heavenly body. So there is a gradual change



n the positions of all the stars relative to one another, mysteriously less than one would expect, considering the enormousness of the celestial motions, but real, and one that must at last tell on the general aspect of the sky. But, from the nature of the case, this change is infinitely beyond calculation. If we knew that gravity controlled all these movements the task would be hopeless: how much more when we do not know but that there are many other forces with quite different laws in operation! Individual items of this change we can perceive and measure; but the great sum total pours itself in such floods over the face of Nature that we dare not venture to launch our exploring bark on any thing but here and there a creek putting in from the great Atlantic.

How it happens that amid this bewildering maze of movements no collision has yet been noticed among the stars, or seems to threaten—what natural arrangements, if any, perpetuate indefinitely the mazy systems that, with their vacuum-centres and eccentric orbits and widely dissimilar planes and directions of revolution, defy the conditions of stable equilibrium in the Solar System—who can tell? We may get some light on the matter in particular cases; but the whole problem is plainly so large as to forbid its solution by any finite powers.

Who can suppose that our infant science has done any thing more than make a beginning, an insignificant beginning, on the great field of nature? Doubtless, elements, forces, and laws far more numerous than those yet discovered hide behind various veils. As our prying into the world just about us, and especially in new places, are constantly being rewarded by new discoveries, we have reason to think that if we could transfer ourselves to distant worlds we should repeat this experience after a still more brilliant fashion and find whole kingdoms of knowledge of which we have not now the slightest inkling. As a man with three senses ought not to pronounce it incredible that there should be five senses, revealing attributes in

Nature of which he knows nothing, so we with our five senses ought not to pronounce it incredible that there should be beings with ten senses, each as different from all its fellows as sight is from taste, and revealing quite new departments of the creation. Did the stars come to an end just where the naked eye ended its vision, or where halted the vision of any one of the long apostolic succession of improving telescopes up to the huge Rossian? What astronomer supposes that at last we have seen the last of the stars? And surely it is likely rather than otherwise that essential Nature does not end just where our present powers of observing it happen to halt—likely rather than otherwise that a great realm of attributes to which no man in the present life has the key, and whose name is therefore *mystery*, lies deep within the Nature that we know.

What a profound of exquisite contrivances and uses; what prodigal riches, beauties, and grandeurs; what earnest and delighted study of these things, and sacred pilgrimages from world to world by radiant intelligences for the purpose of such study, are, in all probability, hidden away from us beyond yonder blue depths! As we are continually finding new uses in terrestrial objects, even in many which at first seemed most forbidding, and have been doing so for a long time, we cannot doubt that a great deep of such utilities still remains to be explored just about us. How much greater deeps must there be in the numberless other worlds, every one of which was made by a wise and benevolent God, and to every one of which our science is only a tangent! What stores of bright and precious things are ever coming forth in dribbets from the bosom of the earth; and who doubts that these are mere hints and prophecies of what the earth contains, and that a genuine clairvoyance through the strata away to the planetary heart would reveal vaster stores of silver and gold and gems than ever shone in dreams or Arabian Nights! Among the innumerable stars

and their still more numerous attending worlds, how much of such wealth lies in hiding—the stars from whose golden light sometimes comes through our spectroscopes the light of gold! We can only speak nebulously; but we more than suspect that as our eyes rest on the evening firmament there silently enters them the sheen of inestimable riches. Also, the sheen of landscapes without number whose beauty and grandeur befit worlds where sin has never reigned, and among which come and go bright-winged intelligences on such pilgrimages from the “many mansions” of the central Heaven as we are told have often been made to our world. For, we cannot think that our small orb is the only one to receive such delegations; but, on the contrary, must believe that far and wide the celestial spaces are flashing with radiant forms hastening along on sublime voyages of discovery, and studying from world to world and from system to system the wondrous works and ways of God. Mysterious activities of mysterious populations among mysteries of power and wisdom!

We have our biographies of individuals and nations. Geologists undertake to give us a sort of biography of this globe itself. But what we actually secure in all such cases, when sure of our facts (which is not so often as we could wish), are a few of the easier and more superficial particulars that go to make up history. What is recorded is as nothing to what is left unrecorded. Here and there a ray of light touches a hill-top; or we single out a star on the nearer outskirts of a nebula; or we pick up a stone or shell or sea-weed that may serve as a sample of the contents of that ‘great and wide sea in which are things innumerable,’ but whose abysses our eyes never penetrate. This is all our terrestrial history amounts to. As to the celestial history we know less. If a complete history of a thing is a full account of all that has befallen its parts from the beginning; and if we cannot give a full account of what has happened to a single atom for a single day,

much less for what is practically an eternity, what a hopeless and unimaginable unknown to us must be the full history of a planetary system, and especially that system which embraces all Nature! We cannot put girdle about such a folio even in fancy. It exists in the mind of God, written out fully, down to the minutest particular of punctuation; and doubtless each event, however trifling, has left some trace of itself in Nature which an Infinite Being could read; but to such powers as ours such a Book of Remembrance must ever be sealed with more than seven seals—must be mysterious beyond expression.

Imbedded in these mysteries of history, and indeed a part of them, are mysteries of holiness and happiness, of sin and sorrow, of Heaven and Hell. We know of vast cosmical populations which must have been made for the sake of their relations to happiness and goodness—we know that great numbers of these are *perfectly* good and happy (but perfection in such matters is itself a mystery to us) while others are correspondingly wretched and sinful. So much we know from Scripture. But Scripture leaves heavy veils depending before the places where, the times when, the manner how, and the proportions in which the good and bad, the happy and unhappy, subsist. One can ask no end of questions about such matters to which no answer comes. So much is unknown that, doubtless, when we “fly away” from earth it will be to surprising revelations; and yet such revelations as will never exhaust the darkness on which they prey. It will always be like some far-off stellar nebula which opens more and more under successive improvements of the telescope, but which always retains a background of the unresolved.

The material universe is often called the Book of Nature. It is not only a book but a history. It contains within its mighty lids an exact account of every event that has ever taken place, from that remote time when at the creative word worlds began to be, down to the latest present. Nay more, it contains, and will always contain,

innumerable copies of such event. There is no danger that the universe will not always retain ample materials for reconstructing a complete fac-simile of its whole past.

Of course every event, in the history of this or any other world on which light rests, sends off into space in all directions rays which only need to be focused by an eye in order to make visible pictures of itself. These rays will never cease to travel (such is the general astronomic thought); so that there will always be somewhere in the universe endless latent photographs of the event. Thus the scene of the creation, bathed in the new light, at once sent off copies of itself toward all points of the compass—copies which have been flying ever since, and are now on the outskirts of that great sphere of history which has no absolute outskirts; and an eye there gathering in the flying rays would, if sufficiently sensitive, see the same as a present reality. After the lapse of ages would arrive at the same point on the wings of light the picture of a new geologic epoch: after still other ages the picture of Eden and our first parents: after still other ages the picture of Jesus on the cross: and between these would be constantly arriving intermediate scenes both great and small, each at its proper interval of time. If the observer should tire of waiting for great epochal events, such as the atonement for the sight of which the old saints so hungered and thirsted, he would only need to travel toward the earth in order to shorten his waiting; and if he could flash in a moment through the whole mighty interval to the earth he would successively meet and accumulate into a moment images of all the light-touched events on the globe since its creation. Also, if he should wish to continue his examination of any particular event, he could do so by accompanying the light that reveals it at equal pace; or if he should wish to protract the interval between the arrival of any two events he could do so to any extent by moving at the proper velocity in the same direction. Thus, in the infinite sphere of space that surrounds the

earth the nearer regions are occupied by light that contains potentially the story of the most recent events, the most remote regions by that which contains the story of the most remote events, and all the intermediate spaces by pictures potential of all intermediate events, chronologically disposed. And the time will never come when these latent photographs will not be winging their way somewhere in the universe, in just the same position relative to one another in space as are the events themselves in time. Every visible thing, down to the smallest, is there; and every thing in just the order and interval of its sequence, and as many exact copies of the series as there are radii of the sphere, less one. Like the successive chapters in history, like the slab-records of Babylonia laid up in due order in the temple of Belus. Here are the annals of all time done into pictures; nothing neglected however small, nothing omitted because too large, neither suppression nor distortion of the facts—in short the natural Bible of history, without note or comment, forever beyond the reach of tampering hands; a permanent thesaurus and book of reference as to all facts that have shone in the light of sun or star or other luminary.

But are there not many events which occur in the darkness—especially such as cannot bear the light? Are there not still others which shine but whose rays are intercepted on all sides by impervious media—as by the walls of windowless dungeons or encompassing earth-strata? Also, are there not spirits and spiritual things, such as thoughts, feelings, purposes, character, which never directly reveal themselves by light, and, from the nature of the case, cannot do so? Will not all such things fail to get registered in nature's great House of Records and universal archives? It may well be questioned whether there is any spiritual thing that does not so pulse on the outward materialism that so closely hugs it on every side as to leave on it some characteristic impression of itself—as it may be questioned whether any event in the world of matter ever takes place

in absolute darkness, or has its outward-going rays totally cut off by perfectly opaque substances. But, granting that such rayless events do occur in the world of matter, it seems plain that they must so record themselves in space in all directions by characteristic micrographs that they can well be understood from them, by at least a Divine Mind. From the nature of the case they must all be faithful expressions of the source from which they come: like fresh coins they must all bear a picture of the sovereign from whom they issue. No atom can change its position without affecting in some way its neighbor. And this amounts to saying that every such change has an endless series of consequences in both space and time. So there is everywhere a state of things somewhat different from what would have been if that change had not occurred, and so a state of things from which the proper powers could infer the event which has impressed itself upon it. From the law of gravity it follows that no particle can undergo any change of place without somewhat altering its attraction on every other particle, always in degree and almost always in direction. But the attraction of gravitation is not the only means which a particle has for influencing other particles. It may act chemically on its immediate neighbors, and this action alters their relations somewhat both chemically and mechanically to *their* immediate neighbors; and so wavelets of influence and results go out indefinitely in every direction. At whatever point a wavelet is found, it carries wrapped up in itself all the peculiarities, both essential and circumstantial, of the original cause, and the proper analytical powers could interpret the cause from the result with perfect accuracy and completeness—just as our feebler analysis can resolve a given planetary motion into the various sub-motions of which it is the resultant, and refer each one to its own cause; this to the moon, that to Venus, another to Mars. Thus every event that occurs is itself a cause, casting off in every direction an infinite number of autographs, as it

were, which if studied under sufficient magnifiers can be made to surrender every feature of the cause however minute. As every man's handwriting has its peculiarity by which an expert can identify him: as every man's handwriting at a given time contains the whole story of those physical and spiritual conditions whose resultant at the time guided his pen, though the deciphering is too much for us, so every event is really a chirography in whose mazy strokes is accurately registered a full account of all the influences which have made it what it is.

Certainly the ongoings of all Nature for a single moment would overwhelm with their countless items the memory and comprehension of the most gifted scholar. How much more these ongoings from the beginning till now! How much more still the infinite *records* of these endless movements indelibly written in scientific cipher on all the broad face and profound heart of the creation—the lines crossed and recrossed, imposed and superimposed, woven and interwoven, beyond all the interpreting powers of man for a single solid sentence of the mighty scripture, though we are able to make out here and there a letter and perchance a word which we call science. In the alcoves of this immense *librarium*, this inter-stellar Alexandrian that will never suffer arson, we linger and wonder—we glance along its mighty corridors to where the vista ends in a star—we gaze up its dizzy altitudes and stages where tomes rise o'er tomes, archives o'er archives, without end. Hugest bibliotheca, hieroglyph, chronograph, MYSTERY! Will it ever cease to be such? Where will you find a surer or a greater? In the fact yet to be mentioned?

Yes, the celestial spaces contain a greater mystery than any we have yet mentioned, *viz.*, that of GOD. Somewhere out in yonder sublime material heavens, in the midst of a still sublimer created spiritual realm for the sake of which the material was made, dwells a Person to whom belongs the unfathomable mysteries of self-exist-



ence, trinity in unity, creative force, omniscience as well as omnipotence; and whose sceptre touches without exception and with infinite ease every atom and event in the universe. That such a Being *is*, we can understand, but who can understand such a Being? I lift up my hand to the glowing firmament and challenge answer from every star. "Canst thou by searching find out God? Is there not a voice in all the populous heavens to cry back, Yes?" And a voice does come to me—I cover my face as I listen. "Yes, I know Him. I have computed his eternity, I have sounded his knowledge and power, I have measured his goodness, I have bounded all his faculties north and south and east and west, I have taken the altitude of his throne. Yes, I know Him altogether." That voice thrills me through and through. Yes, Lord, it is even so. There *is* One that can well say even as much as this. It is THYSELF. But every creature, from brute to supreme archangel, is either dumb or says, *Touching the Almighty we cannot find him out. His greatness is unsearchable.*