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# ETERNITY OF THE PENNY

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DANIEL K. TENNEY

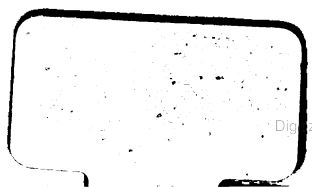
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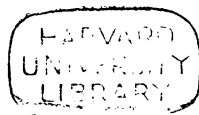
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## P R E F A C E .

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This little book is a reproduction, combined and somewhat enlarged, of five previous monographs pertaining to the same subject, which, during the past thirty years, I have published in pamphlet form, one thousand at a time, for free distribution among friends. Those editions having been exhausted, I have, at the request of several friends and correspondents, decided to thus combine and publish again my views on the subjects involved, for the candid consideration of thoughtful readers.

I am not unaware that most people do not regard as important the question whether the universe is cooling off, whether the earth is eternal, or whether our natural light and heat proceed as such from a red-hot sun. Those of an inquiring mind would, however, it seems to me, desire to perceive the folly of current theories on those subjects and to know the truth. To this end, I have endeavored here to disclose the fallacies and approach the facts.

D. K. TENNEY.

*Madison, Wisconsin, 1905.*



# Eternity of the Earth. Electricity the Universal Force.

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BY DANIEL K. TENNEY.

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## CHAPTER I.

*Criticism of Current Cosmic Theories—Age of the Earth as Shown by Geology—The Nebular Hypothesis Explained—Theory as to Sunlight and Heat.*

**M**Y purpose in preparing these pages is to stimulate inquiry on the subjects treated of; to show the fallacy of some scientific theories concerning the origin and history of the earth and of the solar system; that the suns and planets are eternal entities and not the concentrated product of intensely heated atoms, originally circulating in the realms of space; that the universe is not

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cooling off; to refute the current idea that the sun projects light and heat as such to the earth; to indicate that electro-magnetic force produces such light and heat and is the power behind all phenomena, and to show that the internal heat of the earth is caused by the gravital pressure of its crust. To some candid consideration bearing upon these points, I invite the attention of the thoughtful reader.

The origin of the earth is a problem which has excited the curiosity of men for many centuries. It has always stimulated thought, but can never be fully answered. With the cosmic theories and myths entertained by the ancients, we are pretty familiar. Every nation and tribe seems to have had one. They were projected in good faith by men deemed wise in their day, and, as such, are entitled to respectful consideration. All are now known to be false—most of them even laughable.

It has for ages been a brilliant speculation of cosmic philosophers that the universe is

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controlled by one ultimate principle of force. Referring to the probable demonstration of such a force, Prof. Agassiz once said:

“When the unitary science comes into the world, it will be something so entirely aside from our fixed habit of thought that it will find its first appreciation, probably, among men of large general culture, rather than among specialists in science.”

Having given many years of study and reflection to the subjects here involved, and emboldened by the suggestion of so eminent a scientist, that others than specialists may consider and perhaps solve intricate problems, I shall here criticise and endeavor to discredit certain cosmic notions of the wise men, and to establish in their place something, at any rate, more plausible. I aver, at the outset, my own judgment, that the earth had no origin, but is an eternal sphere, an integral part of the universe, in general substance precisely the same as it always was and always will be. The reasons which impress me with these conclusions I will endeavor to make plain.

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*The Conservation of Energy.*—There is no conclusion of modern science more firmly established than that denominated the “conservation of energy.” It implies that the universe is both the product and the embodiment of intelligent force; that immanent energy and immutable law actuate and control the whole and every part, and that, though continually undergoing transformation, nothing in nature is lost. Invisible force is converted into visible matter. Visible matter is, in turn, converted into invisible force. “All are parts of one stupendous whole,” without limit in time or space. The universe never had a beginning and will never have an end. To most people these propositions are not familiar. Let us see if we can make them so.

*Age of the Earth as Indicated by Geology.*—Geology is one of the most reliable of the sciences. More than one hundred years ago an illustrious pioneer in this field proclaimed:

“In the materials from which geological

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evidence is to be computed, there can be found no trace of a beginning, no prospect of an end."

Commenting upon this, Sir Archibald Dykie, one of the most eminent of English geologists, remarks:

"It is still true that in the data with which we are accustomed to deal, as comprising geological evidence, there can be found no trace of a beginning. The oldest rocks which have been discovered on any part of the globe have probably been derived from rocks older than themselves. Geology in itself has not reached, and is little likely ever to reach, a trace of the first solid crust of our globe."

The rocks composing the crust of the earth, whether sedimentary or metamorphic, disclose abundant evidence of animal and vegetable life, existing at the time of their formation. All such rocks were originally formed by sedimentary deposit, upon the surface of the earth, and have gradually subsided toward the interior. When reaching a sufficient depth they have been metamorphosed by the heat, engendered by the overlying mass of those later deposited. As an



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evidence of this fact, I saw in what are known as the "Glacier Gardens," near Lucerne, Switzerland, a striking illustration. The natural rock in that neighborhood is limestone. In moving away the slight overlying soil there, for the purpose of digging a cellar, on reaching the limestone, several nearly circular holes were found in it, with diameters of from four to ten feet, or thereabouts, and about ten to fifteen feet in depth. These holes were filled with the ordinary soil. Upon digging down and removing it, at the bottom of each hole was found a granite boulder. These range in size from one to three or four feet in length. There is no granite other than boulders, to be found nearer to that point than seventy miles, the nearest being that in natural mass at the summit of Mt. St. Gothrd. Geologists, who examined into the matter, naturally and properly concluded that those boulders must have been forced from that mountain summit by glacial action and transported to the point of discovery, where, coming in contact

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with the limestone, their movement was stopped, and by the force of whirling currents of water underlying the glacier, the holes in which they were ultimately found were excavated. There is nothing strange about this. Analagous phenomena are frequently visible in rapid-flowing mountain streams, where boulders and pebbles of metamorphic rock are often found, imbedded in the softer stratified rock beneath. But here is the curiosity. Upon breaking open one of these boulders, about two by four feet in size, with a cold chisel, there was found imbedded within, plainly and distinctly visible at this day, the fossil impression of a large palm leaf, almost as perfect in form as if the leaf itself had been preserved. How did that leaf get there? It was deposited in the sediment of some shallow water, in a tropical country. It was soon covered by other sediment, sufficient to prevent its decay. Other sedimentary deposits continued for countless ages accumulating above it. These, with the underlying deposits of

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previous ages, and those gradually accumulating above as well, gradually subsided for many, many miles, until that point was reached in the earth where the rocks became potentially molten. The fossil palm leaf made its impression even there. What is now Switzerland was certainly a tropical country, when that leaf was deposited. A change came. By cataclysmal or gradual disturbance, the metamorphic rock underlying that country and all the overlying sedimentary rocks, many miles in thickness, were forced upward and now constitute the Alps of Switzerland, capped with perpetual snow. Other ages passed away. The sedimentary rocks upheaved with, but overlying the granite, were worn away by wind, weather and other abrading forces, until the granite was exposed at the summit of Mt. St. Gothard. The climate had changed. Glaciers ruled and reigned. The little bit of granite, whose history we are tracing, was broken from its surroundings, imbedded in the contiguous ice and moved along by glacial action, until

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clutched by the limestone at Lucerne, into whose depths it subsided, as before described. What length of time is indicated by the fossil career of that palm leaf? Millions upon millions of years surely. Evidence of former life in metamorphic rocks, which once occupied a place in the internal isogeotherm of the earth, are abundant under examination by the microscope.

The time required for depositing the stratified rocks known to geologists, is very great. Darwin placed it at two hundred million years. By more recent authorities it is estimated at six hundred and eighty million years. There is really no accurate basis for these estimates. It is only certain that millions inconceivable were the years covered by that portion of the earth's evolution implied by sedimentary rocks, still existing as such. This period, immense as it seems, is but a trifling circumstance in the history of our globe, as will later be made plain. There is no evidence of time or circumstance, when such deposits and such subsidencies and up-

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heavals were not occurring. Why, then, do we find the scientists of the present century, with general concurrence, insisting that there was a distinct beginning to this planet? It is for this reason:

In the early days of our race, a reputed wise man by the name of Moses, who was endowed with "all the learning of the Egyptians," announced to the ignorant multitude of his time, that the earth and all that in it was created in six literal days, in the course of which "God made two great lights, the greater light to rule the day and the lesser light to rule the night. He made the stars also. And God set them in the firmament of the Heaven to give light upon the earth." This great cosmic revelation was relied upon by all who heard of it, for many centuries, as thoroughly reliable. Moses was not aware of what astronomy has later distinctly demonstrated, that many of the stars are thousands of times larger than the sun, one of them—Antares—being eighty-eight thousand times larger and about thirteen times larger

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than the entire solar system. He thought the earth was the center of the universe, that it was square, and that all the celestial bodies revolved around it. About two hundred years before our era, a reputed scholar, by the name of Ptolemy, adopted and enlarged upon this theory and claimed to demonstrate its general truthfulness. These ideas prevailed everywhere, until about the fifteenth century of our era, when Copernicus, a distinguished scholar and astronomer of that time, demonstrated their absolute falsity and made known the fact that the earth is a globe, revolving on its axis every twenty-four hours, and that the sun and "stars also" do not revolve around it at all. This announcement, called the Copernican theory, was repudiated by many of the wise men of his time, but gradually came to be recognized as an incontrovertible fact. Neither the Ptolemaic nor the Copernican theory antagonized the six-day creation announcement made by the reputed wise man, Moses.

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*The Nebular Hypothesis.*—About a hundred years ago the distinguished French astronomer, Laplace, projected another cosmic speculation, known ever since as the “Nebular Hypothesis.” Gazing into the starry heavens through the imperfect telescopes then in use, he became satisfied that the sun is an incandescent ball of fire, eight hundred and sixty-five thousand miles in diameter, rotating in space, ninety-three million miles away; that all the planets, asteroids and satellites then known in the field of the sun were rotating in the same general direction as the sun, and the vast nebular masses existed in the heavens, which seemed to be planets or stars in process of formation. It was the universal thought of his time that the sun, seeming to be an intensely hot and brilliant body, transmits a portion of its heat and light, as such, to the earth and to the other occupants of the solar system. He knew also that the earth was intensely hot inside and cold on the outside, and that all space is intensely cold. Reason-

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ing from these premises and philosophizing upon them, he stated as the conclusion of his researches, that, in the remote past, the sun must have been so much larger than at present as to reach out and embrace the elements of the entire solar system. At that time the planet Neptune, which is about three billion miles from the sun, had not been discovered. It is now asserted that two other planets of the solar system, though not precisely located, actually exist, at still greater distances from the sun. According to the hypothesis of Laplace, both Neptune and those new planets must be included in the scheme. All the hosts of heaven which now occupy any portion of the vast diameter of our system, six billion miles or more, had then no separate existence, but were integral components of the great orb itself.

This vast globe of incandescent matter, the sun, was revolving in space, but surrounded by a vaster and more powerful realm of cold, into which the heat gradually escaped. The cooling periphery, by and by, separated from



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the more heated interior and was cast off by centrifugal force. This ejected material, still in a molten condition, gradually concentrated, by its own gravital attraction, into the earlier planets. The sun kept on its independent course, gradually cooling at its surface, and from time to time cast off other planets, molten at the time, which afterwards assumed the form of oblate spheroids, and cooled down around their respective gravital centers, until, at length, what is now the earth was thus cast off from the sun and ultimately assumed substantially its present form. Subsequently, Venus and Mercury were thus ejected and became independent planets. In the meantime the molten earth cast off its satellite, the moon. A host of other things occurred from time to time, which I need not particularize.

Involved in this same theory was the idea that the boundless universe was also, originally, in a state of still more intensely heated attenuation; that out of such material the sun and all the stars and planets were

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evolved by cooling and concentration, though many of them, the astronomers tell us, are so far distant that it requires some millions of years for their light to reach us, and even these, they say, are only on the threshold of the heavens.

A necessary sequence of this hypothesis is, also, that the suns and all the planets are losing their heat into space continually, so that in time there will be none remaining. All will become absolutely dark and cold and incapable of sustaining life in any form. One writer says this fearful period, with us, will not be reached in four million years, but certainly will be in less than ten million.

### *Time Required for the Exhaustion of Heat.*

—Now I submit to the candid reader this proposition. Let him consider and answer it for himself. The stratified crust of the earth, subject to the careful examination of geologists, has occupied in its formation from one hundred million to six hundred and eighty million years in its formation. During all that time volcanoes have been per-

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petually disgorging upon its surface its internal contents, accompanied with continuous volumes of heat entirely inconceivable. Earthquakes and hot springs also have all along been engaged in the production of a like discharge, from the center to the circumference. The earth is only eight thousand miles in diameter. With such continuous outflow of heat, how long would be required for the escape of the entire internal heat of the earth, to the surrounding atmosphere? The nebular theory indicates that the little heat which has escaped has required from one hundred million to six hundred and eighty million years. And yet, only a few thousand feet below, it is just as hot as ever! Does such a theory even approach the truth?

*A Nebulous Universe Doubted.*—When, more than forty years ago, this hypothesis was explained to me as actual truth, I was obliged to doubt it. My mind is not endowed with the capacity for believing strange things, except they are clearly proven. It did not then seem to me, and does not now,

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that the intelligent and eternal power of nature, by whatsoever name called, or with whatsoever characteristics endowed, had projected a universe as an attenuated hot mist, to finally wind up in cold storage. The scheme, however plausible, always seemed to me ridiculous.

*General Acceptance of the Nebular Theory.*  
—This nebular hypothesis, however, found immediate support with many eminent astronomers, and soon found general acceptance with geologists also. The science of geology was then in its infancy. It was thought natural for a globe, assumed to have been originally created in a state of liquid incandescence, to cool off and form a crust on its exterior, retaining its molten interior. The earth was known to be hot inside and to cast forth from volcanoes vast masses of molten and incandescent matter. It was therefore agreed that the earth must have a molten interior, just as it should have on the theory of Laplace as to its origin. Therefore, also, that the nebular theory was cor-

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rect beyond question. Each theory was thus summoned to prove the other. Nothing in then concurrent knowledge was inconsistent with either. Everything known conformed to both. For a long time these proofs were considered indubitable. Both are now known to be as false as those of Moses and Ptolemy.

*Solar Light and Heat Imagined by Scientists.*—Let us examine some of the wondrous tales which have been told by scientific men in virtue of this singular hypothesis. It is assumed in all of them that the sun is a gaseous body of intensest heat and radiance, wasting itself into space from day to day.

Prof. C. F. Young, one of our most eminent astronomers, says:

“If we could build up a solid column of ice from the earth to the sun, two and one-quarter miles in diameter, spanning the inaccessible abyss of ninety-three million miles, and if then the sun should concentrate his power upon it, it would dissolve and melt, not in an hour nor in a minute, but in a second. One swing of the pendulum and it would be water. Seven more, and it would be dissipated in vapor. The thickness of the ice

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crust which the sun would melt off his own surface in a minute, would be nearly fifty feet. To produce this amount of heat by combustion would require the hourly burning of a layer of anthracite coal more than sixteen feet thick over the entire surface of the sun; nine-tenths of a ton per hour on each square foot of surface—at least nine times as much as the consumption of the most powerful blast furnace known to art.

“The temperature of the sun was estimated by Secchi at eighteen million degrees Fahrenheit; by others, as low as three thousand; but Rosetti places it at eighteen thousand degrees, which is considered nearest correct.”

Prof. Langley, another eminent astronomer, says:

“The heat of the sun is enormous, beyond conception, for there is enough to warm two thousand million worlds like ours. Every minute there is enough of the sun’s heat falling to the earth to raise to boiling thirty-seven thousand million tons of water, but the heat which thus falls on the earth is not one thousandth of one per cent of what the sun sends elsewhere, and all the coal beds of Pennsylvania, for instance, though they can supply the country for hundreds of years,

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would not keep up this heat during the one thousandth part of a second.”

Sir Robert Ball, the great English astronomer, in a recent address, is said to have made this strange and startling declaration, which will later be shown to be ridiculous :

“If one could go to the sun with a measure, he would find that it had shrunk sixteen inches in twenty-four hours. Ten million years ago, the sun was nearly a million times larger than at present. \* \* \* The entire coal supply of the world would not give the sun’s heat for more than the ten thousandth part of a single moment of time. \* \* \* The sun, it is said, by the mere fact of an attraction of its particles, gives us as much heat as could be got from burning eight thousand globes of coal. When this calculation is worked out and it is remembered that it is only to the earth that the sun gives heat, it shows that the sun might be kept going for twenty-four million years. If radium is in the sun, as it is in the bulk of the earth itself, instead of a paltry twenty-four million years of life allowed to the sun, it would be one billion years.”

One of these days, when the heat of the earth is exhausted and that of the sun wan-

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ing, some astronomers say, our planet and all the others, in turn, will tumble back into the sun. They will meet with a warm reception for a time, but later the sun will freeze up also. Among the numerous scientific predictions on this point, I will quote the doleful prophecy of Prof. Miller, only:

“When the earth crashes into the sun it will supply him with heat for nearly a century, while Jupiter’s large mass will extend the period nearly thirty thousand years. \* \* \* Looking into the ages of a future eternity, we can see nothing but a cold and burnt-out mass remaining of that glorious orb which went out in the morning of time, ‘joyful as a bridegroom to his chamber, and rejoicing as a strong man to a race.’”

Current literature has been padded with dolorous and shivery predictions of this character, ever since I can remember, and many are the glowing and gloomy pictures to which we have all listened with breathless interest, asserting a torrid beginning and frigid ending of all things. The subject has been one of interest to me. Study and reflection long since convinced me that all such



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talk is purely speculative and the theories imaginary. No two strictly scientific writers on this or any other abstruse subject ever reach uniform conclusions. Their skyward views are exceedingly nebulous. Their conclusions, however elegantly uttered, must be received as hypothetical only.

*Explanation as to Higher Altitudes.*—If the sun is so terribly hot at home and projects its heat to the earth, it is not plain to untrained minds why the tall mountains, even those at the equator, are covered with perpetual snow and ice; that aeronauts have no difficulty in ascending by balloons to a temperature of zero, and that there is a known decrease in temperature and light for every one hundred feet of altitude. We are, indeed, told that the difference is caused by the greater rarity of the atmosphere there. This supposed explanation of the diminished heat and light of great altitudes, instead of showing that our heat and light proceed from the sun as such, shows conclusively that they do not. Our atmosphere is known

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to grow dryer and more rare according to altitude, until its limit is reached, supposed to be thirty or forty miles. Beyond the limit there is no atmosphere. If atmosphere is requisite for the development of heat and light, as stated, and as is undoubtedly true, then surely there can be no heat or light beyond the limits of that atmosphere. All must be dark and cold there. Heat and light cannot travel millions of miles *incognito*, as cold and darkness. Such a thought is the height of folly. But it is manifest that something does travel from the sun to the earth, which produces heat and light when coming in contact with our atmosphere, less at high altitudes and greater at lower. What is this imponderable and invisible force? Surely not cold heat and dark light, as claimed. Currents of electro-magnetic energy do the whole business, as I will later explain. It is urged that the rays of the sun are hot, because, by concentrating them through a double convex lens, a match can be lighted, gunpowder exploded, etc., at a

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focus. Such phenomena are quite familiar and may be produced even by using a piece of ice in proper form for such a lens, with the surrounding temperature far below zero. But it is not heat, proceeding as such from the sun, that passes through the lens. It is rather rays engendered in our atmosphere by electro-magnetic currents proceeding in cold and darkness from the sun and here transformed into heat and light. Surely heat, as such, cannot pass through a cake of ice. Electricity can.

*How Far Can Heat Radiate?*—But suppose we concede for a moment that the sun is as hot as the nebular hypothesis and most of the astronomers claim it to be. They say its heat is equal to that which would be produced by the combustion, every hour, of sixteen feet of anthracite coal over the entire surface of the sun. Surely that would make a hot fire. Think a moment. How far away from the sun would the heat of such a fire extend? Suppose the earth to have such a fire prevailing over its entire

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surface. How far above would a balloon have to ascend to be beyond the influence of that heat? One mile? Ten miles? One hundred miles? Ninety-three million miles? The strongest artificial heat is about four thousand degrees Fahrenheit. How far would we have to stand from a fire of that temperature, on a clear zero night, to be beyond its influence? Not many rods. The best opinion of the temperature of the sun, it is said, makes it four and a half times hotter, or eighteen thousand degrees Fahrenheit. How many miles would such a heat be perceptible? Ninety-three million miles, we are told. Who believes it? Nobody nowadays ought to. Because our atmosphere is lighted and heated by influences mainly proceeding from the sun, it is assumed that it must be sufficiently hot and light to project rays of heat and light over the immense distance which separates us. No wonder that Secchi thought that eighteen million degrees of heat would be necessary. Light extends to a considerable distance from its source, heat only a short distance.

## CHAPTER II.

*The Hypothesis of Ether Criticised—Sunlight and Heat Shown to Be Visionary—Heat and Cold Are Concurrent Forces of Nature.*

THE ETHER THEORY.—For the purpose of annihilating the natural difficulties which I have suggested, comes an illustrious representative astronomer from the Institute of France, Prof. J. Norman Lockyer, and explains the whole matter so clearly that he who runs may read! Hear him:

“There is no air all the way between us and the moon, or all the way between us and the sun, yet we get light from the moon and from the sun. How is this? In case of light, as in the case of electricity, about which we are uncertain, there is no transmission of anything but a state or condition of things, a distribution or a vibration between the sender and the receiver. The light, for instance, which appears to be given out by a candle and which is received by our

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eyes, does not come bodily from the candle. The sender, in this case the candle, is simply a something which puts something in motion.

“Physicists imagine that there is something which they call ether, infinitely less gross in structure than air, which permeates all nature and all bodies, and that the disturbance or light wave, produced by a light-sender, is transmitted along the ether, very much in the same way as the wave state is transmitted along water, or the state of motion is transmitted along a rope. Associated with this ether, we have the undulatory theory of light, which supposes that everything that sends out light sets the ether in vibration, and that these vibrations travel without any transmission of the ether, from each sender of light to each receiver of light. Here we have one of the triumphs of modern science. Because we see the sun, we think that there is some medium present which has been named ether. Light phenomena are due to vibrations of light sources, communicated to us, not by anything coming bodily from the light source, but by corresponding vibrations set up in the mysterious ether.”

It will be observed that in order to obtain our light from the sun, according to Prof.

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Lockyer, scientists have imagined the existence in space of what they have named "ether," along which light is communicated to us as a "state or condition of things, a disturbance or a vibration," as a state of motion is transmitted along a rope, between the sender (the sun) and the earth (the receiver), where it becomes light again. Or, in other words, sunlight is attached, at the sun, to a sort of ethereal rope and wafted in undulatory fashion to the earth. This, he says, is "one of the triumphs of modern science." That is to say, it is a triumph of modern science to have imagined that there is such a thing as ether, through which light can travel in undulatory waves, millions of miles in darkness, and then emerge in full brilliancy. A singular triumph, indeed, for science! No doubt Baron Munchausen would highly appreciate it! Manifestly this ether theory was born of an ardent desire to furnish free transportation for light and heat from the sun to the earth, as no other way was seen to account for their presence

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here. The plain and practical theory of electro-magnetic currents does not seem to have occurred to the eminent French professor. It is these, and not ether, which “permeate all nature and all bodies,” and which constitute the power that engenders heat and light, and sustains, moves and vivifies the vast universe and all things therein.

*Death of Ether Theory.*—Now let us hear a recent opinion upon this point by Prof. Wilhelm Oswald, of the University of Leipzig, an authority of eminence and independence, concerning the undulatory theory of light. We will get some new light here, straight goods, unadulterated with ether:

“The life of this undulatory theory, as a mechanical hypothesis, has been a limited one, for it has been borne to the grave in our time without display, and been *replaced by the electro-magnetic theory*. The cause of its death is shown very plainly when we dissect the corpse. The hypothetical ether, on which the task of undulating was imposed, had to do this under particularly hard conditions, for the phenomena of polarization demanded peremptorily that the undulations



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should be transversal; but such undulations presuppose a rigid body; and Lord Kelvin's calculations have shown, as a final result, that a medium with such properties as this ether must have, is not stable. Whence the conclusion is inevitable that it can have no physical existence."

Thus, it appears that the theory of an undulatory and luminiferous ether is exploded. So no ethereal rope remains for Prof. Lockyer's "state or condition of things, the disturbance or the vibration" in the red-hot sun, to be wafted upon, to illuminate and to warm us. But still we have on earth that joyous "state or condition of things" embodied in ample light and heat, and without "disturbance or vibration." It reaches us by the electro-magnetic telegraph of universal cosmic energy. We do not need the ether or the undulations. They were ingeniously invented, but do not work.

*Nebular Hypothesis Discredited by Modern Astronomers.*—I have thus stated what seem to be elementary reasons for disbelief in that cosmic scheme which calls for an in-

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candescent gaseous sun, out of which all the other sky tenants of the solar system were ejected, as successive steps in the process by which the universe shall be ultimately frozen up and abandoned. It will better satisfy the reader, however, to know what some of the scientists and scholars think about the cooling universe theory.

Prof. Holden, upon gazing through the then most powerful telescope in the world, at Lick Observatory, makes this important statement:

“There is no object in the heavens which we must not observe as if viewed for the first time. It has compelled us to learn everything anew. Even the most familiar of supposed facts are found, in this great revelator, to be not facts but errors.”

If such are the revelations of the Lick telescope, what may we not expect from other and better ones to be mounted in the future?

Prof. Ball, the great English astronomer, though a believer in the nebular theory, says:

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“The nebular hypothesis is emphatically a speculation. It cannot be demonstrated by observation or established by mathematical calculation. Thousands of bodies occupy our solar system and together compose it as a whole. These have orbits of every sort of eccentricity and direction, occupying all possible planes which can pass through the sun. They circle around the sun, some backward and others forward. Only the planets seem to conform to the common order.”

Prof. Heysinger, in his recent work, says:

“It must not be supposed that this great generalization of Laplace is established, or that the difficulties in its way are not so enormous as to be insuperable. There have not thus far been observed in all the heavens, any gaseous nebulae which render the slightest support to the nebular hypothesis. All the matter of our planetary system together is only one-seven-hundred-and-fiftieth of the sun. If this were added to the sun’s bulk, it would but slightly enlarge it. But all this solar and planetary matter together, if distributed over the space occupied by our planetary system—and by the nebular hypothesis, this is requisite—and having an actual diameter one-half of its equatorial, would have had the density of only about one-four-

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hundred-thousandth that of hydrogen, at atmospheric pressure. That is to say, such a volume of the lightest substance known would make four hundred thousand solar systems like our own."

Prof. Newcombe, another high authority, says:

"Should anyone be skeptical as to the sufficiency of the nebular hypothesis to account for the present state of things, science can furnish no evidence strong enough to overthrow his doubt until the sun shall be found growing smaller by actual measurement, or the nebulae be actually seen to condense into stars and systems."

Prof. Helmholtz, another distinguished astronomer, says:

"If the mass of the sun were composed of two elements, capable by combination of producing the greatest possible heat and light, to-wit, hydrogen and oxygen, in the proportions in which they unite to form water, calculation shows that the heat resulting from their combustion would be sufficient to keep up the radiation of the heat from the sun, only three thousand and twenty-one years. Even profane history teaches that the sun has lighted and warmed us for three thousand years, and geology puts it beyond

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doubt that this period must be extended to millions of years.”

*Prof. Young Explains the Source of Sun Light and Heat.*—Now let us view the hot-sun hypothesis from another direction. Bear in mind that, according to the nebular theory and its numerous able advocates, the sun used to be six billions of miles in diameter or more, and embraced the entire solar system. All was in a state of attenuation, four hundred times thinner than hydrogen gas, the lightest thing known to science until the recent discovery of radium. Before that, the entire universe, including our sun, then diffused within it, had been in an infinitely more heated and attenuated condition, finally developing our sun and all the other suns and planets of interstellar space. This chaotic stuff, of which the sun was first composed, has been cooling, shrinking and casting off its planets, small and great, some four or five hundred in number, until it has reached its present diameter, is still about as hot and as thin as ever, and presumably

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disposed to increase from time to time the planetary family. It will be of interest to see what Prof. Young has to say about this, as he seems to be the fountain of learning in America on this subject:

“As to progressive changes in the amount of solar heat, it can be said that there is no evidence of anything of the sort since the beginning of authentic records. There have been no such changes in the distribution of plants and animals in the last two thousand years, as must have occurred if there had been any appreciable alteration in the heat received from the sun.

“So far as observation goes, we can only say that the outpouring of solar heat, amazing as it is, appears to have gone on unchanged through all the centuries of human history. What, then, maintains the fires? It has been shown that even if the sun were made of solid coal, burning in pure oxygen, it could only last about six thousand years. It would have been nearly one-third consumed since the Christian Era. Nor can the source of its heat lie simply in the cooling of its incandescent mass. Two definite theories have been proposed, which are probably both true to some extent. One of them finds the chief source of solar heat in the

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impact of meteoric matter, the other in the slow contraction of the sun. As to the first, it is quite certain that a part of the solar heat is produced in that way, but the question is whether the supply of meteoric matter is sufficient to account for a great proportion of the whole. As to the second, there is no question as to the adequacy of the hypothesis to account for the whole supply of solar heat, but there is as yet no direct evidence that the sun is really shrinking.

“Sir William Thompson has calculated the amount of heat which would be produced by each of the planets falling into the sun from their present orbits. The collapse of all the planets upon the sun would thus generate sufficient heat to maintain its supply forty-five thousand six hundred and four years. The only question then is, whether any such quantity of matter can be supposed to reach the sun. In the first place, if meteoric matter is so abundant, the earth ought to encounter more of it than she does—enough, in fact, to raise her temperature above that of boiling water. Astronomers generally, while conceding a considerable fraction of solar heat to meteoric impact, are disposed to look further for their explanation of the principal revenue of solar energy. They find it in the probable slow contraction of

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the sun's diameter and the gradual liquefaction and solidification of the gaseous mass. The same total amount of heat is produced when a body moves against a resistance which brings it to rest gradually, as if it had fallen through the same distance freely and had been suddenly stopped.

“A contraction in the sun's diameter of about two hundred and fifty feet a year would account for its whole annual heat emission. If the contraction is more rapid than this, the mean temperature of the sun must be actually rising, notwithstanding the amount of heat it is losing. If the sun be wholly gaseous, we could assert positively that it must be growing hotter; for it is a most curious fact that the temperature of a gaseous body continually rises as it contracts by loss of heat. By losing heat it contracts, but the heat generated by the contraction is more than sufficient to keep the temperature from falling. No conclusion of geometry is more certain than that the contraction of the sun from a diameter even many times larger than that of Neptune's orbit to its present dimensions, if such a contraction has actually taken place, has furnished about eighteen million times as much heat as the sun now supplies in a year, and therefore that the sun cannot have been emitting

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heat at the present rate for more than that length of time, if its heat has really been generated in that manner. If it could be shown that the sun has been shining as now for a longer time than that, the theory would be refuted; but if the hypothesis be true, as it probably is in the main, we are inexorably shut up to the conclusion that the total life of the solar system from its birth to its death is included in some such space as thirty million years."

### *The Professor's Explanation Discredited.*

—I have a profound respect for any man who has devoted his life to science, and especially for a true astronomer. I dare say that Prof. Young can produce whole folios of beautiful equations in higher mathematics, in proof of the strange assertions above quoted. I prefer the simple rules of arithmetic—subtraction, for instance. The more heat taken from a quantity of gas, the more heat remains! It was not so in my day! Being of the legal profession for forty years or so, I assume the customary privilege of examining into the credibility of any statement of facts or of principles called to my

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attention, and this without regard to the source from which they emanate. I regard the statements of this eminent sunlight as extremely gaseous. Let us see whether, after extracting some of the heat from the gas, it will still be hotter than ever.

Although, according to the nebular theory, the sun has been gradually diminishing in its volume of heat, and cooling and contracting in size from year to year, Prof. Young says that there is no evidence that either has occurred during the last two thousand years. If this is so, why did he not stop there, and admit that the cooling and contracting theory is untenable for want of proof? But no, he sticks to that theory and proclaims that the solar system, from start to finish, cannot occupy more than thirty million years. He concedes that if the sun were a solid body of coal, burning in pure oxygen, it would be wholly consumed in only six thousand years. Now coal, with plenty of oxygen, it seems to me, is about the best material for propagating a fire. If it would

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require only six thousand years to consume such a body, this would seem to be pretty good evidence that there is no fire there. Such I believe to be the fact. But there must be a fire, and a big one, for the nebular theory requires it! So he tries the theory of meteoric impact, by which the fires of the sun have been thought, by some astronomers, to be fed by meteoric cordwood tumbling into them. But he finds a scarcity of this fuel for the purpose, and ascertains, from an eminent authority, that, even if all the planets should fall into the sun, they would keep up the supply of heat for only about forty-six thousand years. As none are known to have tumbled in yet, and the supply of meteors seems extremely limited, he concludes that only a small part of the heat is supplied in that way. How ridiculous to suppose that any heat worth mentioning proceeds from such a source! With a solar system hundreds of millions of years old at any rate, such meteoric fuel, if there ever was any in quantity, must long

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since have been practically exhausted. Besides, there is no reason to suppose that any considerable heat was ever derived from that source, or that any planet ever did or ever will fall into the sun. It is a vision of the brain and nothing else. The meteoric impact scheme was invented by some astronomer, who thought it necessary to account for a perpetually hot sun, and could not see how else to do so. Prof. Young himself seems to prefer another method of stoking, but I do not consider it any better.

He proceeds to say that the source of the sun heat cannot lie simply in the cooling of its incandescent mass, but does lie in the contraction of it. This seems a paradox. The contraction, if any, is caused by the cooling. They are concurrent causes. But he says that there is no evidence that there has been any contraction for two thousand years, and, by the same token, none that it has ever cooled or contracted at all. But, if it has contracted, or is now contracting, the process is so slow that it would produce

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no heat upon the surface of the sun, whatever it might do to the interior. The crust of the earth, by reason of vast bodies of matter continually cast forth from its interior by volcanoes and hot springs, necessitating corresponding depression toward the center, is continually contracting, always has been, and always will be. Yet it always remains of the same size and mass. Why does not this action heat up and liquefy the globe, outside as well as inside? Simply because the theory is nonsense.

But the professor finally finds the source of the great heat. It lies in the "contraction of the diameter and the liquefaction and solidification of the gaseous mass." "A contraction of the sun's diameter of about two hundred and fifty feet a year would account for its whole annual heat emission." Two hundred and fifty feet of contraction a year—eight and one-half inches a day—melts a coating of ice all over the sun forty-eight and a half feet thick every minute!

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Who believes it? But this it must be able to do if this wonderful discovery is true.

Prof. Young, as we have noticed, holds that the solar system, from its torrid beginning to its ultimate frigid ending, cannot occupy more than thirty million years, of which eighteen million have already elapsed. Yet he says that if the sun has contracted more than two hundred and fifty feet a year, its mean temperature has all along been actually rising, notwithstanding the amount of heat it has been losing. But he seems to doubt whether it has contracted as rapidly as that. Now if the sun, in its ancient red-hot nebulous condition, had a diameter of six billion miles—which it must have had and a good deal more, before the birth of Neptune—and has only cooled down at the rate of two hundred and fifty feet a year, I figure that it would require about one hundred and twenty-five billion years to get down to its present diminished diameter of eight hundred and ninety-five thousand miles, and it has been shining all that time.

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It must also have required one billion, nine hundred and fifty-seven million years, at that rate, for the sun to shrink its ninety-three million miles in distance even from the earth. So our good planet the earth must be at least two billion years of age. But as the professor says that only eighteen million years have thus far been occupied in the shrinkage process, the rate of shrinkage, instead of two hundred and fifty feet a year, has been more than three hundred and thirty-three miles a year, or five billion, nine hundred and ninety million, one hundred and thirty thousand miles in all; and during the two thousand years of astronomical observation, six hundred and sixty-six thousand miles; and yet no astronomer has noticed any contraction whatever. So it seems, according to this learned astronomer, that during his entire eighteen million years of past solar life, the shrinkage has been so enormous that the sun must have been growing hotter and hotter, instead of colder and colder. It begins to look, does it not, as if

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the sun must have been very cold at the outset, instead of very hot, and that the nebular theory has placed the icebergs on the wrong end of the procession? Maybe the planets were cracked off the sun by frost, instead of being ejected as molten magma! Notwithstanding all this learned talk of the eminent professor about sun shrinkage, he says that there is no evidence that there has been any shrinkage at all since the beginning of authentic records. Why, then, does he continue to delude himself and his readers with the idea that the sun is a molten mass of fire? His logic leads to no such conclusion. Careful study of it exhibits an extreme vagueness, either in the mind of the professor or that of the student. It seems to me some billion times thinner than infinite nonsense!

But there is more to this. The professor says:

“If the sun be wholly gaseous, we could assert positively that it must be growing hotter, for it is a most curious fact that the temperature of a gaseous body continually



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rises as it contracts from loss of heat. By losing heat it contracts, but the heat generated by the contraction is more than sufficient to keep the temperature from falling."

Reader, has it ever worked that way with your gas stove? It never has with mine. Let us think about this a little. It should be remembered that one of the strong arguments in favor of the nebular hypothesis is that the planets first cast off by the sun from its great periphery, and when it was necessarily thinnest and hottest, were Neptune, Uranus and Saturn, whose density is less than one-seventh that of Mercury, the youngest of the solar family, and that this would necessarily be so, on account of the extreme heat and attenuation of the sun, at that early period of its incubation. If the sun, at the start, was wholly gaseous (and it surely was, according to Laplace and his theory), "we could assert positively that it must be growing hotter, for it is a most curious fact that the temperature of a gaseous body continually rises as it contracts from loss of heat." So the sun has

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forever been contracting from loss of heat, but, after all, has been all these millions of years growing hotter and hotter because it has lost so much heat. The more it has lost the hotter it grew. The colder it grew the hotter it was! Why did we not know that before? How strange that astronomers should be trying to heat up our glorious sun with meteoric impact, when its fuel increases in quantity by natural increment the more it uses!

But the professor dethrones his own theory. With many "ifs" he says:

"No conclusion of geometry is more certain than that the contraction of the sun from a diameter, even many times greater than that of Neptune's orbit, to its present dimensions, if any such contraction has actually taken place (and he admits that there is no evidence of it), has furnished about eighteen million times as much heat as the sun now supplies in a year, and therefore that the sun cannot have been emitting heat at the present rate for more than that length of time, if its heat has really been generated in that manner."

And he concludes:

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“If it could be shown that the sun has been shining as now, for a longer time than that, the theory would be refuted.”

Now, every geologist knows that even the stratified crust of the earth, subject to careful examination, and full of evidence of former animal and vegetable life, discloses the age of stratification as one hundred millions of years and more, beyond intelligent dispute. The sun has thus necessarily existed, the same as now, during all that period and for countless millions of ages before and since Neptune's alleged birth. So has the universe at large. Thus, the theory of the accumulation of heat in the sun by contraction meets a timely death. Astronomers and philosophers have speculated a great deal upon this subject, but have demonstrated nothing. Their visions and hypothesis are quite akin to those of Prof. Young, Moses and Ptolemy.

*Another Astronomical Light Extinguished.*  
—Prof. Simon Newcomb, another astronomer, in his recent work, “Chapter on the

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Stars," seems also to adopt a view concurring with the authority just criticised, that the more heat escapes from an intensely heated gaseous mass, the hotter the mass becomes. He announces it as one of the most obvious conclusions of science, that "the sun and stars have, for untold millions of years, been radiating heat into space." But he says that the heat is radiating so rapidly that, therefore, "the actual heat of the sun would only suffice for a few thousand years' radiation, if not in some way replenished." Then he seeks for the source of replenishment. Concerning the meteoric impact theory, heretofore referred to by me, he says, "critical examination shows that this theory cannot have any possible basis." He then adopts the contraction, cooling and growing-hotter theory, and says that the amount of contraction of the sun, necessary to keep up the present supply of radiation, would be about four miles in a century. He insists that the sun must be a gaseous body. He says, however:

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“It is certain that any small mass of gas (even as large as the earth), taken into celestial space and left to itself, would not be kept together by the mutual attraction of its parts, but would merely expand into indefinite space.”

Why the sun, if a gaseous mass, does not so expand and disappear, he attributes to its gravital center. Strange, is it not, that a mass of gas, as large as the sun, should have a gravital center, and one as large as the earth have none? Astronomers have some queer notions. But the learned professor says that, notwithstanding the stars grow hotter and hotter, the more heat they lose, still, by and by, they must begin to grow cool, and he thinks the sun has about reached its hottest period and must soon begin to grow cooler. Then he adds:

“On this theory, the age of the sun can be at least approximately estimated. About twenty millions of years is the limit of time, during which it could possibly have radiated anything like the present amount of energy. But this conclusion is directly at variance with that of geology. The age of the earth

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has been approximately estimated, from the great variety of geological phenomena, the concurrent result being that stratification and other geological processes must have been going on for hundreds, nay, thousands of millions of years. This result is in direct conflict with the only physical theory which can account for the solar heat."

Then, the following:

"What we see must, therefore, suggest at least the possibility that all shining heavenly bodies have connected with them some form of energy of which science can, as yet, render no account."

The data of geological estimation is, to a considerable extent, reliable. That of astronomy, as we have seen, when pertaining to cosmology, or to the age of suns or planets, is altogether unreliable and really without significance. It leads to weird speculation, guess work, and nothing else.

*Where Does the Cold Come From?*—  
Speaking of the disposition of all things to grow cold, where did that vast cooling power come from? If the entire universe originated in an intensely heated and attenuated

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mass of atoms, as Laplace assumed, where was the cold located? Was it originally distributed throughout the heated mass and later ejected and stored around the periphery? Did it then commence attacking the heat in an attempt to recover its old home-stead? The only answer given by science is that heat is merely the absence of cold. This is certainly correct. So is cold the absence of heat. The answer proves nothing. None of the cosmic theories, ancient or modern, tell us anything as to the origin of cold. They simply assume it for the sake of their argument. It is quite evident that one is always present where the other is absent, and that each is an ever-acting force of nature. Consult the encyclopedia concerning "Heat," and whole pages will be found devoted to the subject. As to "Cold," all that can there be found is: "Cold—see Catarrh."

In a recent lecture to which I listened, by the eminent Prof. T. C. Chamberlain, head of the Department of Geology in the Chicago University, he exploded the nebular theory

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completely. Later, in an article in the *Journal of Geology*, he again asserts the impossibility that the earth could have been formed from a hot gaseous ring, and says that the force of gravity could not cause such a ring to form a sphere, and that the present mechanical arrangement of the solar system could not be derived from a spheroidal nebulae, such as Laplace assumed. He gives abundant reasons for these opinions.



### CHAPTER III.

*The Nebular Theory Discredited—Spectrum Analysis—Some New Astronomical Visions—What Geology Suggests—Evolution Does Not Build Suns and Planets—Internal Heat Caused by Gravitational Pressure.*

ORBS OF SOLAR SYSTEM DO NOT REVOLVE IN UNIFORM DIRECTIONS. The argument of Prof. Young, for an incandescent sun, stated in the previous chapter, is suggestive of that adopted by a number of other eminent astronomers, in support of the nebular hypothesis. They say that planets, asteroids and satellites are found revolving in uniform direction about their primaries. If they were all projected upon the scene by chance, they would revolve in all sorts of directions, but this they do not do. If they were evolved under the nebular theory, from the periphery of a common par-

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ent, they would adopt the precise orbits in which we find them. Therefore they must have been so evolved. If evolved by chance, the chances are many thousands to one that they would not assume substantially uniform direction. Therefore, again, the chance that the nebular hypothesis is not correct is only one in many thousands. Now Prof. Ball, as we have seen, tells us that "thousands of bodies occupy our solar system and compose it as a whole; that these have orbits of every sort of eccentricity and direction, and circle around the sun, some backward and others forward, and that only the planets seem to conform to the common order," which, it was supposed, came so near proving the nebular theory. But who, other than some feeble-minded person, has ever supposed that the orbs of heaven started out in their course by chance? Nobody! That they are controlled by the intelligence of natural and inexorable law is most certain. They proceed in their revolution and in their circuits, not by chance,

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but under the guidance of an eternal energy, the very embodiment of intelligence, as does everything else in the universe. So here falls another argument urged to sustain the hot fog and cooling sun theory.

*Waste of Sun Heat Discredited.*—Equally important as discrediting the current fire-ball theory of the sun is the great waste of energy said to be emanating from it, to which reference has already been made. Of the total amount of heat proceeding from the sun, it is claimed that only one-two-billion-two-hundred-millionth part reaches the earth. Of even this small fraction, only one-thousandth part is stored away by animals and plants. All the planets combined only utilize one-two-hundred-and-thirty-two-millionth of the light and heat of the sun. And the astronomers say, “If we inquire what becomes of the principal portion of solar heat which misses the planets and passes off into space, no certain answer can be given.” It is thus seen that the entire light and heat appropriated by all the plan-

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ets is almost none at all. All the rest of it, so far as we can perceive, is expended for no purpose. Why this waste? To my mind it is incredible. Nature nowhere else exhibits such a prodigality of useless expenditure. If there were no other antagonizing circumstance, this one would, to me, be conclusive of the fallacy of the nebular theory.

*Argument from Relative Planetary Density.*—Another singular contention was presented by the disciples of the nebular theory, based upon the relative density of the planets according to age. It was claimed that when the gaseous mass of the ancient sun was of a diameter sufficient to embrace the space now occupied by the most distant planet, its material was so extremely attenuated, that the first planet it would cast off would necessarily have the least density, the next one a greater density, and so on to the last. If this were so, the sun should still have the least density of all. Now the density of all these bodies have been ascertained, so they say. Taking the earth as

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the unit, we find their relative density, in order of age, to be as follows:

Sun .....	0.25	Mars .....	0.70
Neptune .....	0.16	Earth .....	1.00
Uranus .....	0.17	Venus .....	1.03
Saturn .....	0.13	Mercury .....	1.12
Jupiter .....	0.24		

It will be observed that Saturn, the third planet cast into space, is much less dense than Neptune, the first one excluded. Those two, and Uranus, are conceded to have a density fully equal to that of cork, and all three far less than that of the sun, this still having almost twice the density of Uranus. Yet the sun is said to be a body of incandescent gas, heating and lighting the earth and squandering unlimited heat elsewhere, though still it has almost twice the density of cork. A burnt cork argument surely! Who ever heard of a body of gaseous, incandescent cork, sending heat and light for millions of miles? Besides, if the rule holds good, that the first planet cast off by the sun should be the least dense, it should hold good with the satellites cast off by the plan-

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ets. Yet the scientists tell us that three of the satellites of Jupiter are much more dense than their ungrateful parent. Is it not strange, too, that Neptune, oldest born of the planets, farthest from the sun, and skirting along the periphery of the system where the cold most be intense, has during all these æons of time been able only to cool off and settle down to a density of far less than the sun and less than one-sixth that of the more youthful earth? Stranger still, that the sun, having in the scummy and frothy days of his youth, cast off a lot of corky planets, with densities of only 13 to 17, and later got rid of the earth at par, has since expatriated Venus and Mercury, much tougher specimens—103 to 112—which are still so hot and heavy that nobody can live upon them, and yet himself remains a constituent unit of glowing and consuming gas, with less than one-fourth the density of the child which last left his embrace. Starting, it is said, with the natural and necessary law of getting rid of his lightest

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material first, he has later reversed it and thrown off the heavier. This argument from planetary density, summoned to support the immaculate birth of the earth from the sun, seems to me at least four hundred thousand times thinner than infinite nonsense.

Let me add some further reflections of my own on the subject. If the sun has always been simply a body of incandescent gas, as alleged, and been surrounded by the infinite and more potent cold of space, why has not the heat passed out of that gas long ago? The gravital attraction of so huge a mass should be immense. Why has it not concentrated the matter of the sun into solidity, similar to that of the earth? The history of stratified rocks on the earth covers a period of several hundred million years safely. Venus and Mercury are later planets of great age and respectability. Has not the sun in this vast period had time to eliminate the heat from its gas? The heat has been ready to go and the cold all the

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time strongly attracting and ready to receive it. Why does the heat linger so long? Gravity does not attract heat, but does attract, and under proper conditions, solidifies gas. The hypothetical forces of nature have, of course, been all along at work trying to organize and throw off another ring from the sun, out of which to form a new planet, but the heat sticks so close to the gas that no more rings are in sight. From all appearances, the ring rule has been abandoned by the sun.

*Laplace and His Followers Deceived.*—It thus plainly appears that Laplace and his followers were mistaken in the data of their calculations; that as the sun is neared, cold and darkness increase; that heat cannot radiate to any great distance; that there are no gaseous nebulae in the heavens having gravital centers; that there are no planets or stars in process of formation; that many of the small planetary bodies are revolving in opposite directions to that of the sun; that the internal heat of the earth was not



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caused from an original molten condition of that body; that if the matter of the entire solar system was at one time diffused through the space now occupied by that system, having a diameter of about six billion miles, its condition of attenuation and dispersion was four hundred thousand times greater than is that of free hydrogen gas, hence an impossibility; that if such a diffused mass did exist, it must have possessed a gravital center, or it could neither have concentrated nor revolved. If it possessed such a center, attracting all its particles to a common point, none of them could have escaped into space to become planets; that planetary gravital attraction is necessarily greater than centrifugal force, otherwise there would be no heavenly orbs at all, for all would fly to pieces.

*Developments of Spectrum Analysis.*—It must not be forgotten that, in recent years, many interesting developments have been made by what is known as spectrum analysis. By projecting into the solar spectro-

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scope what are supposed to be heat and light rays, proceeding from the sun or from some star, it is claimed that the several constituents of the body sending out such rays can be determined with considerable accuracy, because those constituents are vaporized by the intense heat of those bodies. These phenomena are cited in support of the nebular hypothesis. It seems to be the fact, however, that by these spectrum tests the sun and all the planets and stars have, substantially, the same chemical composition as the earth. The atmosphere of the earth is known to be filled with minute attenuations of every substance known in its solid composition. Whatever it is that proceeds from the sun and other heavenly bodies, whether electro-magnetic currents or ether vibrations, passes through our atmosphere before it enters the spectroscope, and necessarily shows on the screen the chemical constituents of such impalpable atmospheric matter. The attenuated matter which may exist in the atmosphere of those celestial bodies

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which send forth the impulses, may affect the result also. This may account for the general uniformity shown in the spectra of the different orbs. The Royal Society of London has considered this matter. Under its auspices, experiments with the solar spectroscope have been made by balloon ascensions. At the altitude of four miles the spectroscope showed none of the usual Fraunhofer lines, nothing but uniform yellow, clearly signifying that at such a height atoms of chloride of sodium alone were present. If it be the chemical constituents of the sun's atmosphere alone, which are shown by the solar spectroscope, then the disclosure at high altitudes should be the same as on the surface of the earth. The fact that but one color was shown seems conclusive proof that the spectroscope discloses not the chemical constituents of celestial vapors, but those of our own atmosphere. So the spectroscope tends to contradict instead of affirm the hot-sun theory.

*Knowledge of the Sun.*—All we really do

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know about the composition of the sun, from observation, is that it is surrounded by a luminous atmosphere, within which clearly appear vast spots which puzzle astronomers and perturb the magnetic currents of the earth. True, our friends of the telescope claim that, by gazing into these spots, they occasionally get a glimpse of the sun itself, and see volumes of effervescent gas pouring out through the crevices! So far as I can discover, no two of these observers have reached the same conclusions from their observations, and not even one of them entertains anything more than a hypothesis derived from them. It is claimed that they have weighed the sun, also. Whether the celestial steelyards are accurate or not seems uncertain, but the sun tips the beam at two octillions of tons. This result shows it to be much lighter, relative to size, than the earth, but vastly too solid and heavy to be composed of gas; hence it seems to be foolish to further contend that it is a gaseous body.

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*Some Recent Visions.*—The astronomer in charge of the Lick Observatory in California, by means of a reflecting telescope, has been developing some celestial photographs, which he claims have a tendency to confirm the nebular hypothesis, and explains the matter in this way:

“And especially among these mysterious and wonderful clouds of faintly glowing gases called nebulae, has this telescope proved its exceptional power. Vast spirals, immense gulfs of blackness, surrounded by luminous walls, intricate patterns of nebulous tracery, as delicate in structure as the finest lace work, beaded with stars, inter-linked rings of light, gleaming like the phosphorescence of the sea, but each so stupendous in circuit that the whole solar system and many solar systems together, might be embraced by it, orbs of pale fire whose gigantic whirling motion and whose gradual compaction into new suns, under the pressure of gravitation, are all but visible. Such are some of the marvelous shapes and appearances that these photographs show.”

Well, that is a pretty brilliant picture, to be sure! They seem to be making suns and

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planets up there nowadays, faster than they used to when old Sol and his family were generating. It is a vision of the intricacies of far-off space. A photograph of a sunset on Lake Tahoe would be equally beautiful and equally confirmatory of the nebular hypothesis. The distant space, whose contents are alleged to be represented in that celestial photograph, is so far away that, as astronomers tell us, it would require one or two million years for light from thence to reach the earth. Does a photograph, taken at that distance, even through a telescope, prove or disprove the nebular hypothesis? No more than would a dream. It simply proves the ardent and commendable desire of the stargazer to see something which is not visible, with a view of confirming an exploded theory, found "in the books." Astronomical demonstration is one thing. Astronomical guess work is another.

That there are evidences of what are called nebulae floating in the skies everybody

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knows, but very little is known of their physical constitution. Prof. Simon Newcomb, one of the enterprising astronomers of our country, has had these Lick Observatory photographs under consideration and has produced copies of some of them recently, in the Popular Science Monthly. He thinks that the nebulae shown are of a "gaseous or other attenuated form, situated in the distant stellar regions and that they are thousands of times the dimensions of the whole solar system," and says that "they are transparent through and through." "That they should be completely transparent, through such enormous dimensions, shows their extreme tenuity." Except as a curiosity, what does a photograph amount to of a bunch of infinitely attenuated gas, billions of miles distant, thousands of times larger than the whole solar system, and so thin that we can easily gaze through it. It is simply a vision as of wafting clouds or dust somewhere in distant space. It does not foretell a planet, it proves nothing.

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ing touching the origin of worlds. A distinguished astronomer, with abundant eyebrows, once suddenly discovered, through his telescope, an enormous spot on the sun having "vast spirals, immense gulfs of blackness, gigantic whirling motion," and the like. He was greatly delighted, and summoned his assistant to take a look at the new development. He gazed and saw nothing, but, upon looking the professor square in the face, discovered a healthy louse roaming aroun in one of the professor's eyebrows! The phenomena was accounted for. This is suggestive that strange phenomena do not always indicate what the discoverers fancy that they do.

*No Geological Evidence of Ancient Nebulosity.*—It should be remembered that by the upheaval of the crust of the earth in mountain ranges, and in many other ways, we are able to study its contents, almost as the pages of a primer. Our knowledge of its constituents is well-nigh perfect. If this crust were the cooled rim of a once nebulous



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mass, would it contain no evidence of the fact? The story told by the rocks is one of countless active ages, during which the forces of nature have been tearing down, distributing and rebuilding. For many miles in depth the rocks are all stratified and filled with evidences of former animal and vegetable life. Beneath are only found other rocks of similar constitution, but metamorphosed under great pressure by the internal heat. Where do we find here the evidence of a former nebulous and molten globe? Of evidence of a beginning there is none. Prof. Huxley, referring to men of science, said, "There is not a single belief that it is not a bounden duty with them to hold with a light hand and to part with it cheerfully, the moment it is proved to be contrary to any fact, great or small."

*No Evidence that the Earth Is Born of the Sun.*—From the general but patient investigation which for many years I have given the subject, I am unable to see or believe that the sun is materially different, except

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in magnitude, from the other planets. It certainly is not known to be more heated to incandescence than is the earth. Both are necessarily hot internally, from the gravital pressure of their exterior, and will so remain forever. So I reason that our good earth was not excommunicated from or born of the sun.

*A Rest Necessary in Evolutionary Theory.*—For my own part, though entertaining no doubt of the application of evolutionary principles to the development of earthly things, I am of the opinion that we are not authorized to extend them to alleged universal atomic matter. If so, we must go back of those atoms also. No stopping place is apparent. Shall we say there was a creator back of all atomic matter, or an eternal intelligent energy? If so, we must go back still further into the precedent atoms of that creator or that energy. Such speculations extend beyond the bounds of thought or imagination. We must rest somewhere. I am unable to perceive that because

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all mundane things are found to be, or to have been, in a perpetual state of evolution, that therefore the earth and the universe, at one time, had no specific existence. We certainly know that there never was a time when nothing had existence. We should assume the independence of this terrestrial sphere from eternity, because we know nothing to the contrary. We do know that there was never a beginning to matter, motion, force or intelligence. It is idle to speculate of a first cause, of which there is no trace in nature.

*The Carboniferous Argument.*—As confirmatory of the former nebulous condition of the earth and its consequent gradual cooling and condensation, much stress has been placed upon the evidences in its crust of what is called the carboniferous period, during which it has been thought that the vast coal deposits occurred. It has been generally contended that these indicate a former climate exceedingly warm and an atmosphere containing much more carbonic acid

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than now prevails. These caused a dense vegetation, such as is now nowhere known on the earth, and which was transformed into coal and other carboniferous products. This argument was once quite convincing to my mind of the former molten condition and subsequent cooling of the earth. It is so no longer. Let us inquire into this a little. As near to the poles as we have been able to investigate, abundant fossil evidences have been discovered showing a former tropical climate there. Likewise, also, is it reliably demonstrated that an exceedingly frigid climate once prevailed at what is now the Equator. How has it happened that the earth, if once molten and gradually cooling, is now a hundred degrees or more warmer at the equator than it was a hundred thousand years ago or thereabouts? What do these evidences demonstrate but this: That this little globe of ours has, during the inconceivable ages of the past, encountered an experience with the forces of nature, the cause of which it is not now possible to definitely

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understand. The most learned of our contemporary scholars inform us, however, that the cause of all these wonderful developments and other queer experiences, through which the earth has passed, are involved in changes in the position of the earth with reference to the sun, easily demonstrated. Glacial periods, torrid periods and temperate periods, the one slowly succeeding the other, have been the experience of the earth times without number, and so will be forever.

The question of the origin of the coal deposits was considered and discussed at a recent meeting of the Royal Society in London. With great unanimity the conclusion was reached that the former theory of a once strongly carbonic atmosphere is entirely erroneous, and that coal veins were produced by the ordinary deposit of vegetable matter in shallow waters, subsequently covered with sediment, and subsiding to the depths among stratified rocks where, by natural chemical causes, the vege-

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table matter was transformed into coal. This recent conclusion of competent scientists adds weight to the theory, for which I have long contended, that the earth was never a part of the sun. So, the carboniferous argument, once so strong, proves to be a chimaera.

*Independence and Eternity of the Earth.*  
—Let us now consider the chief matter to which all that has preceded tends. We have found that, despite oracular utterances and plausible theories, scientists remain profoundly ignorant of the origin of the earth, or that it had an origin. My conviction is that it had none, but is a self-existent, eternal globe, related to others in its action, which in like manner always have been.

*Internal Heat Caused by Gravitational Compression.*—Let us, therefore, proceed upon the hypothesis that the earth is one of the eternal things in nature, and see whether or not it is sufficient unto itself. The earth is composed, on its surface, of about one-fourth land and three-fourths water. In this re-

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spect we have no reason to suppose that its components were ever materially different in distribution from what they are at present. As a whole, it is as rigid as a solid globe of glass. The material of its interior is more than twice as dense as that constituting its crust. Geology makes no other revelation of the nature of its internal composition. Surrounding this globe have ever been the abrading, eroding and denuding agencies of atmosphere, of frost, of water, of wind, and of glacial and chemical action. These have at all times been gradually wearing and carrying away the materials of the dry lands and depositing it under the lakes and seas. The temperature of the interior is one of intense heat. It increases about one degree for every fifty-three feet in depth, on the average.

The earth is by no means a cooling sphere. Its internal heat is well accounted for by the scientific axiom: "Heat is produced by friction, percussion, compression, by arrested motion, and under certain circum-

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stances, by electrical contact." These propositions are well known and indisputable. The force of gravity drawing toward the center of the earth every particle of its matter, the atmosphere included, undoubtedly produces a compression at great depths, causing many thousand degrees of heat continually. At a depth of 7,000 feet, the pressure of the over-lying mass in the Simplon Tunnel, lately completed, reaches 131 degrees Fahrenheit. Similar results have become apparent in hundreds of other borings and excavations elsewhere. Besides, the earth is in a state of perpetual tremor, agitation, friction, percussion and arrested motion, caused chiefly by the descending water which is converted into steam, at great depths, and seeking escape through the over-lying rocks. The record of all seismometers definitely establishes this fact. The cracks, crevices, tiltings, contortions, folds, dykes, earthquakes and volcanoes, well known to investigators, are products of this ceaseless agitation. How can any thoughtful scholar



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doubt that such well known friction, percussion, compression and arrested motion, ceaselessly acting in the interior of the earth, are entirely adequate to produce this internal heat—always have been and always will be.

I am pleased to see that this clear explanation of the internal heat of the earth, which I have been advocating for many years, has recently been adopted by Prof. Chamberlain, an eminent geologist connected with the University of Chicago. In an address delivered at Ann Arbor recently, he announced “that the interior heat of the earth is due to gravitational compression.” He also repudiates the nebular hypothesis.

Every particle of matter cast forth from the earth by such powerful agencies, and by hot springs, is replaced all along by the descent of other matter. There is a slow but continuous movement from the interior to the surface, and from the surface toward the interior. Electrical currents, and radium also, may contribute to the same re-

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sult. Think, also, of the compression and arrested motion caused by the ceaseless winds and the pounding of the waves and tides of the sea upon its shores the world over! Do these not also contribute to the internal heat? If not, why not? It is conceded by all geologists that even that portion of the earth which consists of stratified rock was countless millions of years in process of formation, and that the rocks underlying these, which used to be called primary rocks, are composed of rocks formerly stratified, and which, descending toward the earth's center, became metamorphosed by the internal heat. If the stratified crust of the earth has thus existed for countless ages, with its internal heat all along escaping to the surrounding atmosphere through hot springs, earthquakes, volcanoes and ordinary radiation, why is it that at a depth of a few thousand feet it remains yet in such an intensely heated condition? Would not a little eight-thousand-mile globe, if cast forth from the sun, ages and ages ago, in a

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molten condition, with its heat continually escaping, have cooled off from surface to center in a few thousand years, if it had no source of continuous supply? Who can doubt it?

The internal heat of the earth is abundantly accounted for on rational principles. The crust of the earth has forever been in a continuous evolution. As high lands and mountains have been worn away by the tooth of nature and their debris spread upon the floor of the seas, the increased weight has pressed them downward to the fiery center where they have been melted, thrown up again by volcanic action, or elevated into mountain chains and the like, only to be again eroded and carried seaward in a perpetual succession, so that the interaction of natural agencies has transformed the earth from hot to cold, from center to circumference and back again, times without number, and will so continue forever. If this circulatory rule prevails as to the earth, it is reasonable to assume that it is in the sun and

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in all other celestial bodies, so that all may be as well adapted for life, intelligence and beauty as this little orb, our present abiding place. For reasons which astronomers claim to demonstrate, the climate at the pole has been torrid, and that at the equator frigid. Glacial periods and periods of great caloric have succeeded one another almost everywhere. No nebular theory can account for both.

*Evidence of Life in All Known Rocks.*— But the geologist is prone to fix a period during which all stratified rocks can have been deposited. As has been stated, this period is estimated at many million years. Vestiges of former life, in fossilized condition, are very abundant in most sedimentary rocks. It was thought, for a time, that no evidence of life existed in the lower stratifications. This is now known to be a mistake. Not only is there evidence of former life in the lowest known sediments, but in the metamorphic rocks beneath, into which they have by heat been blended. When rocks have

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reached the point of fusion, as have those lying at the base of the earth's crust, the appearance of fossils is apt to be obliterated, and so such are seldom observed. But that life actually existed prior to the lowest known rocks, as heretofore shown, is now known to have been the case. This is so, though the forms of such life are entirely different from those now existing, continuous evolution and development, from lower to higher function, being apparent throughout. So it is known that the order of geological structure is, under natural law, to fuse the lower portions of the earth's crust by the force of overlying weight and descending moisture and resultant steam, to crowd the lower material to the surface through enforced openings, and to supply its place by the gravital inclination of that overlying. It cannot be otherwise at present. It cannot have been otherwise in the past. So we see a continuous revolution and remingling, as one of the natural processes, as to which no beginning and no end

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can be conceived. Why, then, fancy that the earth is any number of years or ages old? Why fancy that it had at one time no existence, and that, by and by, it will be dead? Have we longer use for such legends and theories concerning it?

*Subsidence and Upheaval.*—It is certain that what is now dry land has been alternately under the sea and out again, times without number. This is the conclusive testimony of the sedimentary rocks, all of which were formed under water and under great pressure. Equally certain it is that all present dry land will be beneath the sea again, many times, in endless succession. In like manner it is certain that, as the present continents, or portions of them, subside beneath the sea, others will rise from the sea. No reason is perceived why the equilibrium of the sea and land will not always prevail. The product of the last glacial period, that is to say, the ground of this northern region, will disappear for ages under the sea. Upon it will accumulate sediments, as of old.

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These, by chemical action, and under pressure, will become stratified rock. This glacial debris will be elevated in turn, for the attack of the future quarryman and the investigation of the wiser geologist. So, while in the present geological period there may be evidence of not more than one or two glacial epochs, Prof. Ball, in his "Cause of An Ice Age," claims to demonstrate, with mathematical accuracy and for astronomical reasons, that there have been many of them in the past and will be many in the future. He also clearly accounts for the great climatic changes, which are known to have occurred in the history of the earth. If scientists could determine, with accuracy, the origin of all the rocks within the vision of their investigation, surely they would discern several aggregations which were of remote glacial periods. The ever-patient and persistent geologist will, before long, find—if he has not already done so—confirmation of the fact, in the rocky pages of the earth itself. The present crust of the earth is

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geologically recent. From eternity its materials have incessantly acted and reacted, combined and been torn asunder, been alternately exposed to the sun and atmosphere, reburied, descended again into the depths of fusion, and will so continue in a never-beginning and never-ending sequence of modification and improvement.



## CHAPTER IV.

*Celestial Bodies Operate as Dynamos—Sun  
Light and Heat Secured by the Inter-  
change of Electro-Magnetic Currents—  
Was the Universe Ever a Chaos?*

LIGHT AND HEAT THE PRO-  
DUCT OF ELECTRO-MAGNETIC  
CURRENTS — Confirmatory of the  
eternity of the earth, as here presented, and  
further discrediting its nebular origin, let  
us inquire into the source of its natural light  
and heat. In my opinion, natural heat and  
light come to us on a stupendous scale, just  
about as the artificial article does on a  
smaller scale, through the retarding coil of  
our incandescent lamps. In other words,  
there are interchanging currents of mag-  
netic and electrical energy, between the sun  
and all the planets of the solar system, and  
between the earth and the stars as well. By  
the direct and refracting course of these

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currents, retarded by the atmosphere of the earth, the sun and planets, or perhaps by friction with atoms in the atmosphere, natural heat and light are developed to us and to them, and in no other way. This theory is consistent with every known fact in science. It is inconsistent only with some scientific speculations.

On this subject Prof. Crossland says:

“If we suppose the sun and fixed stars to be gigantic fountains of magnetic influence, acting upon our globe and its atmosphere, and likewise upon all the other planets, the phenomena of the universe would then become susceptible to the grandest and simplest interpretations.”

Prof. Heysinger says:

“It is an absolute certainty, that electrical currents of enormous quantity and high potential, are constantly passing between the earth and the sun, and that these currents have so free a passage, far more free than through any metallic circles that we know of, that they pass over this enormous distance absolutely without appreciable resistance. Each of the planetary bodies, large or small, takes its proportionate part

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in the generation of electricity, according to its volume, mass and motion.”

Aristotle, the father of science, declared even in his day:

“All terrestrial phenomena, every conceivable form of force, must be referable to the impulse of the motions of the heavenly spheres.”

Dr. Rogers, an eminent scholar and philosopher, says:

“Brilliant and dazzling though the sun really appears, its brightness, like its heat, is but seeming. The same process which develops sun heat also develops sun light. It is now well known that light diminishes in the direction of the sun, in the same ratio as heat diminishes. Captain Abney, of the Royal Society of London, found, upon measurement, that at the elevation of simply one and one-half miles, the light of the atmosphere was only from one-tenth to one-twentieth as great as that at the surface of the earth. At a little over three miles, the sun appears no brighter than the moon, and at four miles, the sun’s rays are no longer capable of producing the rainbow colors of the solar spectrum. The yellow only is seen, and that without lines. Brilliancy is not a

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quality inherent in the sun. Its dazzling brilliancy, so far from being located in the sun itself, is actually confined to the earth's very surface. Electricity is the sole power or agency through which all inter or retroactions take place between the starry hosts. The earth is a vast magnet, and the atmosphere is more magnetic than any known substance except iron, nickel and cobalt. We may no longer claim that the vast power of the sun resides in itself alone, that heat and light proceed forth from it in all directions and to all distances, as from a great center. The law of the conservation of force stands as a demonstration, that neither power nor influence can go out from the sun in any direction, through the instrumentality of force inherent in itself."

Dr. Miner, in his "Cosmic Evolution," in a general discussion of the nebular theory and that of the source of our natural light and heat, makes many pertinent remarks. I cite some scattering but exceedingly apt quotations:

"In all this, there is no waste of energy, no force of incandescence, to light other globes. No radiation of heat, into cold, dark, unrequiting space, as evidence of de-

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caying suns or burnt-out worlds. \* \* \*  
The power that appears upon the earth as sunlight, is awakened within the earth's atmosphere, and, like the power of gravity, gives back to the sun as much as it receives. \* \* \* A high state of temperature at the surface of the sun could have no possible effect upon the planets, in shedding upon them light or heat. \* \* \* As well might water flow up the sides of mountains, or stones and rocks be lifted into space, as the mists of the ocean are lifted, as that the light and heat of the sun should be radiated millions of miles across free space, to the planets. \* \* \* The sun and planets are vast magnets revolving in a sea of electromagnetic force. \* \* \* Sensation is as delicate between sun and planets as between lovers at their bridal altars. \* \* \* The light of the sun is confined to his own sphere of radiance. So is the light of the earth evolved at the base of its incumbent atmosphere, where the gravital sun currents and earth currents meet under the disturbance of the non-conducting atmosphere."

Judge Allen, an astronomer of repute, in his "Solar Light and Heat," says:

"The swift axial rotation of the planets opposite to the excited globe of the sun, by

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inducing the continual circulation of electric currents about each one of them, converts them all into powerful electro-magnets. Thus we have a solar system with a vast electro-magnet and one hundred and fifty electro-magnets revolving around it, each rotating on its own axis. These act and react on each other unceasingly and with intense power, developing the phenomena of solar light and heat. \* \* \* Discoveries of similar elementary substances in our sun and other similar suns render it not improbable that all the solar systems are constituted like our own, with similar molecules and similar inhabitants. \* \* \* If the mere movement of one disk near another develops light, and if the rotation of one cylinder opposite another excites a dazzling light, we may consider that the swift revolution of more than one hundred and fifty great globes about the sun, seven hundred times greater than them all, are similarly employed for the conversion of their mechanical force into the light and heat of sunshine. \* \* \* The great central orb may have an unvarying temperate clime, exempt from extremes of summer heat or winter cold, with no nights of gloom. It may be a bright and cheerful dwelling place, with sunny landscapes, a

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paradise of perennial verdure and ever-blooming flowers.”

Last of all comes Prof. John Trowbridge, of Harvard University, in his book entitled, “What Is Electricity?” and distinctly adopts the electro-magnetic theory of light and heat. His concluding words are:

“We have already strong grounds for believing that we live in a medium which contains to and fro, or periodic movements to us from the sun, and that these movements are electro-magnetic, and that all the transformations of light and heat, and indeed the phenomena of life, are due to the electrical energy which comes to us across the vacuum which exists between us and the sun.”

*The Earth and the Sun Vast Dynamos.*— That the earth is a vast magnet polarized in space, and that all the other orbs are likewise, is practically conceded by the scientific world. No less is it admitted, that there is sympathy and interaction between the electro-magnetic currents of each and all the others, of opposite polarity, and especially between the earth and the sun. The forces animating the universe must at all times be

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in equilibrium. Heat, light and electricity are known to be different expressions of the same force and convertible into one another. Such being the case, and it being thus easy to see that electric currents proceeding from the sun, under appropriate conditions, can be converted into our heat and light, and that we can actually convert them into heat and light ourselves by machinery, why should we longer entertain the ancient notion that these cheering forces are ejected from an igneous orb, many millions of miles distant, to be wafted in waves of ether through cold and darkness, before they can show their true colors here?

*Currents Interplay Between Orbs of Opposite Polarity.*—The electro-magnetic theory of heat and light does not imply that between each orb of the heavens and every other there is an interplay of such currents. Only between those of proper responsive polarity does it occur. The moon, for instance, only shows its full face to us once a month. If between it and the earth an in-



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terchanging electro-magnetic current prevailed, the full face would, when above the horizon, be visible every clear night. The same might be said of other celestial bodies. Between the sun and the moon a circuit of interchange undoubtedly exists. This causes the moon to appear luminous only on the side toward the sun. Only so much of that side as faces the earth appears luminous to us. Astronomers and physicists tell us that light, proceeding from the sun, cannot develop, as such, except in contact with atmosphere, and, if the earth possessed no atmosphere, neither heat nor light would be here developed. This is undoubtedly true, whether the light and heat proceed as such, wafted upon undulatory waves of ether or as consequences of electro-magnetic currents. But many astronomers tell us also that the moon has no atmosphere. Are they not mistaken? If the moon were really the rusty, lifeless waste which it is said to be, and without atmosphere, it could reflect no light to us. It is true we cannot see the

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moon's atmosphere, nor any clouds within it, because, perhaps, it is without material moisture. Neither can we see our own atmosphere, but, being filled with moisture, we can see the clouds when that moisture concentrates into them. Electro-magnetic currents are engendered between bodies in rapid revolution. The moon revolves on its axis only once a month. This slow motion, may be, is also influential in preventing an interflow of the requisite heat and light producing energy between moon and earth. Improved telescopes, now in process, will likely soon make us wiser than we are about the peculiarities of our alleged satellite.

### *Analogous to Artificial Electric Currents.*

—Let it be remembered that the earth revolves on its axis at the rate of twenty-four thousand miles a day, moves in its orbit at the speed of one thousand miles a minute, and, besides, that the earth, together with the whole solar system, moves through space at the rate of seven hundred thousand miles every day, or two hundred and twenty-five

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million miles every year. Think of these bewildering velocities! Every orb in the heavens moves with speed somewhat similar to this. To what useful end are they thus whirling in space? Electricity is evolved by the rapid movement of material bodies in the presence of, but not in contact with, others. Thus are engendered from our atmosphere, at the ordinary supply stations, the currents which supply the arc and incandescent lights through our cities, and heat and power for various purposes, even to the fusing of iron and steel. Now the heavenly bodies are magnetic globes, known to be such, circling with velocities inconceivably greater than any machines devised by man. They not only do, but must, engender vast currents of electrical energy which outflow to their fellows, each in proportion to attracting mass, and these currents must interact and reciprocate between all bodies of proper polarity. They can move only in circuits. Such currents are conceded to be thus interacting. They are

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capable, by retardation and refraction, of producing our natural light and heat. Why deny them the achievement and attribute it to something else, which we now see cannot and does not accomplish it? For no other reason, than because somebody said so a hundred years ago or more, when even wise men were too ignorant to know any better. We have never seen the body of the sun or of any of the planets. It is their gaseous envelope, their luminous atmosphere only, that is perceptible. In my belief, there is no demonstrated fact or just inference indicating that any one of them is not as fit an abode for health and happiness, as this little sky speck which we so much enjoy and for whose warmth and illumination we were formerly told all the others were placed in the sky above us.

*Myriads of Celestial Bodies.*—An eminent writer on astronomy estimates that seventy-seven million suns are visible from the earth by means of the improved modern telescope. Allowing to each of these the same number

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of worlds that revolve about our sun, it is calculated that ten billion planetary worlds exist within the range of telescopic vision. All these are but infinitesimal specks among the universal multitude.

*Was the Universe Ever a Chaos?*—When, upon a clear night, we view the firmament above us, studded with countless thousands of star worlds, of such vast magnitude and at such inconceivable distances as we know them to be, most of them many billions of miles away, and reflect that all these are but scattering grains upon the threshold of the sky, revealed by the modern telescope, and that even those thus revealed are as nothing to the infinite and invisible realms beyond, must we conclude that the earth and all these worlds and suns and systems, were at one time “without form and void”? I think not. When science tells us we must adopt such a conclusion, we will. Science has never said that we must. It never will. Nothing is demonstrated to justify any other opinion than that the earth and all the other

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orbs of heaven have from eternity existed, substantially as they are revealed to our vision today. Pursue the inquiry as we will, this must be the conclusion at last.

The sun appears bright and hot to us because the electro-magnetic currents returning to it from other orbs, and those as well which proceed from it to them, engender light and heat in its atmosphere. For the same reason the stars look bright to us and the earth to them. There is no permanent expenditure of energy. All is conserved by retroaction. These currents do not play where there is nothing to attract and interchange with them. There is no waste. The sun is not going to cool off. The earth will not cease to be the happy abiding place of man. There is no universal ice-house approaching. No spent planets. Nothing but independent orbs, each in business on its own account. Evolution toward the good, full of life and hope, discontented today, happy tomorrow.

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Such is the sun. Such is the earth. Such the planets. Such the state of man. Doubt it who will. So "let the sea roar and the fullness thereof, the world and they that dwell therein, let the floods clap their hands, let the hills be joyful together, sing, rejoice and be glad."

*The Cooling Universe Theory a Dream.*—The ideas here embodied are supported, so far as known, by the logic of all actual knowledge. Of proof to the contrary there seems none. Yet the schools, the colleges, universities, and well-nigh all current literature, continue to inculcate the fallacies of the nebular theory; to insist upon an incandescent sun as the progenitor of all the orbs of our system; that it furnishes light and heat, ready-made, sliding down to us on a toboggan of ether; that the universe has forever been growing cold, and that ultimately life will be impossible anywhere within its boundless space. Is it not about time that the scientists, the schools, and the great

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writers—all eminent and excellent men—should reconsider the subject, ascertain the truth in the light of modern knowledge, and proclaim it fearlessly to those who depend upon them for facts on obscure subjects!











