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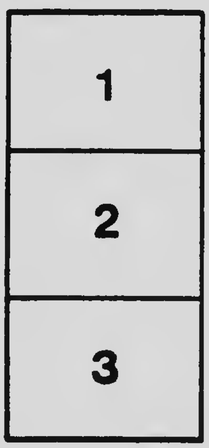

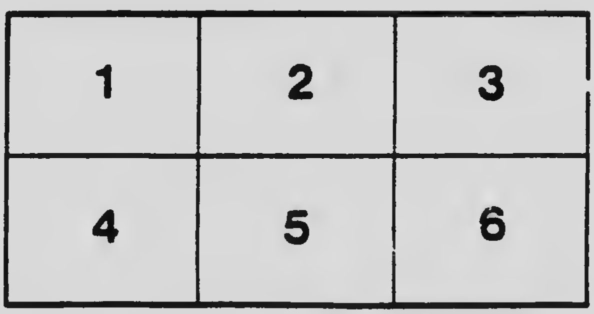

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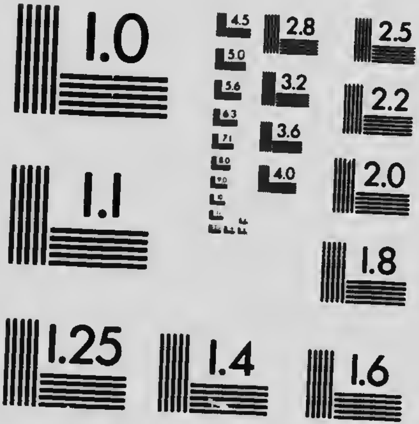

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Glimpses Behind Nature's Veil

By

Joseph Nolte

FOREWORD.

This little book pretends to do no more than to offer to the reader a few glimpses behind the veil in which Nature has clothed herself and which man in his ignorance once regarded as sacred and not to be pierced by profane eyes.

Because the author feels that there is nothing sacred and nothing profane in Nature, and because he is convinced that the welfare of humanity depends on the recognition of this fact as fundamental, he ventures to publish these pages.

STETTLER, ALBERTA,
CANADA.

Chapter I.

FORMATION OF THE ROCKY MOUNTAIN RANGE OF NORTH AND SOUTH AMERICA.

There was a time when the Rocky Mountains formed part of the ocean-bottom. Sufficient proof of this fact is found in the presence of oyster-shells and of other maritime life in the mountains and on the mountain-sides of the whole range.

The coal beds of the Rocky Mountain Range, which were once swamps and bogs, for the most part no longer retain a horizontal position. Jammed in between layers of rock they are now found in every conceivable position, from horizontal to perpendicular. Occasionally they are found even in a completely inverted position, that is to say, the older coal-formation is on top and the younger rock-formation is at the bottom.

Four million years ago the greater part of the whole Rocky Mountain Range, including the continent we call the New World, was beneath the surface of the ocean. We base this calculation on the fact that it required about four million years for our rivers to wash into the ocean the material that once filled their present beds. Take, for example, the Red Deer River of Canada. Every second it carries about five pounds of mineral matter on its way to the ocean, or the equivalent of 217 tons every twenty-four hours. At this rate it would, under present conditions, require about 3,800,000 years to double the size of the Red Deer River valley and the valleys of its tributaries. It is necessary to add "under present conditions," for if the atmosphere of the earth was twice as dense four million years ago as it is to-day, it would have precipitated twice as much moisture, and the rivers would have carried down to the ocean, in consequence of the double volume of rainfall, twice as much mineral matter in a given time as is the case to-day.

Now, before the aforesaid Red Deer River—or for the matter of that, any river—existed, the area of its watershed was beneath the surface of the ocean, which means, of course, that no river was in existence. But the moment this area was raised above sea-level, that moment the river began to come into existence.

About four million years ago, then, the earth was in collision with some other planet. The area of the collision extended from a point west of Cape Horn to a point in the far north, between Alaska and Siberia. As a result of this collision the earth's crust was crushed in and its broken parts were shoved or piled up on each other in an easterly direction. To understand what happened, it may be well to refer briefly to some of the characteristics and the natural laws of our planet.

Geologists estimate that the earth has a hard crust of four to nine miles in thickness. Beneath this crust there is a heavy mass of molten metals, on which the earth-crust floats like ice on water. Metals do not, of course, have the same weight or specific gravity. Thus, platinum is twenty-one times, gold nineteen and one-half times, and rock only two and one-half to three times as heavy as water. Accordingly, since the lighter substance floats on the heavier, the metals in the bowels of the earth increase in weight with the approach to the centre of the earth. Let us also recall that the earth's crust is very thin in comparison with the earth's diameter. As the latter is about eight thousand miles and the former on the average about six miles, it appears that the earth's crust is relatively hardly as thick as the thin skin or membrane just inside the shell of a hen's egg. Remembering, furthermore, that the present velocity of the earth in its course around the sun, is at the rate of 82,000 miles an hour, or twenty-three miles a second, let us now try to see what would happen in the case of a collision such as the one just referred to.

At the time of the collision there would necessarily be created a tremendous air-pressure. Assuming the earth-crust to have an average thickness of about six miles, this air-pressure would be about three times as great as the resistance offered by the earth-crust. Therefore, if we do not take into account the velocity of the planet colliding with the earth, we shall calculate the time required to pile up the Rocky Mountain Range and its table-lands, at not more than six minutes. This time would be reduced if we could tell the velocity of the colliding planet. If we suppose this planet to be moving at the same rate of speed as the earth, then we should reduce the time by three minutes.

The first or initial impact of the two planets occurred in the south, and moved northward. This is abundantly proved by the peculiar formation of the Cordilleries of Chili and Peru. The collision may be illustrated somewhat as follows:

Crush in the thin ice of a frozen lake; then shove the broken ice-crust aside so that its pieces are shoved under and over each other. These pieces will represent the pieces of the earth-crust that formed the Rocky Mountains. Now, if any ice-floes are shoved under the unbroken part of the lake-ice, they will, just because ice is lighter than water, lift the unbroken lake-ice above them. This unbroken ice, lifted as just indicated, will represent the continent of America. If we but recall the tremendous air-pressure created at the time of the collision, we can readily understand why immense masses of the crushed-in earth-crust were shoved beneath the unbroken crust of the earth. That part of the ocean which is now the Pacific was, of course, greatly deepened by the collision. The great masses of mineral matter that raised America above the ocean, were taken from the bottom of the Pacific. The depression created in the earth's surface was immediately filled with water and this lowered considerably the ocean level all over the earth, causing land to appear in many parts of our planet.

CHAPTER 2.

MATTER IS INDESTRUCTIBLE.

So far as we know all gec'.. sts agree that matter is indestructible, and it is .. difficult to see the reason for their agreement. For if matter were destructible there could be no matter. Let us take water as an example. If we change water into steam, water is not destroyed; it has merely changed its form and characteristics. It has been transformed into an air-like or vaporous condition, and will return as rain to its former state.

Now just as water passes perpetually through its particular cycle of change, so all matter that is subject to change of form. A tree, for example, takes during the .riod of its growth a part of its nourishment fror he air through its leaves, just as our lungs inhale air from which they retain for our bodies those component parts that are beneficial, and exhale substances that are not beneficial. A tree, furthermore, takes another part of its nourishment from the ground through its roots, just as the human stomach takes up or digests food for the human body, the only difference being that the roots of a tree take their food from minerals and from air "stored" in the form of soil. If a tree is deprived of its leaves it cannot continue to live because it has been deprived of its lungs, through which it procures nourishment from the air.

It follows that a tree is nothing more than stored air and mineral substance, and that, if a tree be burned, nothing further happens than to return it to those states of existence from which it came, namely to air and mineral substance, the latter being contained in the remaining ashes. The ashes, too, return to the condition in which they were prior to becoming part of the tree. All we have done, then, in burning the tree is merely to change the form of matter contained in the tree. Not a particle of the matter itself has been destroyed, and by burning the tree we have made it possible for another tree to pass through the same cycle.

It is a matter of small importance whether solidified air is changed into a vaporous state through fire or through chemicals. Destruction of matter remains always unthinkable, and since it is indestructible, it follows that it could never have had a beginning. It is possible to interrupt such a natural cycle, as just described, temporarily, by protecting the stored-up air, let us say, in a tree, from combustion or decomposition. We may bury it in the ground or keep it under water instead of burning it, but we thereby destroy none of the elements that make the trees. Its matter remains and sooner or later Nature will again bring these elements, or this matter, into the cycle of its changes.

Chapter 3.

THE INDESTRUCTIBILITY OF MATTER IN THE HUMAN BODY.

What has been said heretofore of the indestructibility of matter in general applies in particular to the substances of which the human body is composed. Let us take, for example, one of the chief substances or elements of the human body, namely phosphorus.

If we ask ourselves where phosphorus existed before it got into the human body, and what becomes of it when the human body disintegrates, we observe in the first place that phosphorus was contained partly in the food that nourished the body, namely in animal and vegetable matter. But where did it exist before it became part of the plants? Largely in the air, but partly also in that "stored-up" air which we call soil, and in minerals. Now, any given plant takes part of its phosphorus through its leaves from the air, and another part through its roots from the soil. We all know how well a plant thrives on soil in which animal matter has been buried.

Like the plants, our bodies, too, obtain part of their phosphorus directly from the air. We breathe the air into our lungs and these retain only those particles that are beneficial for the body, and expel or exhale those that are not. The process is similar to that of our digestive organs in respect of the food we eat.

But if the air we breathe contains phosphorus, we have a right to ask how phosphorus gets into the air, and this question is best answered by an illustration.

Let us assume that we burn some animal or vegetable matter. By doing so we release all the phosphorus this matter contains into the air as a vapor or gas. This vaporized part of the burned matter is soon distributed over a wide area by the wind, so that every living being, and every plant in this area obtains its tiny share of the released phosphorus.

How often the phosphorus in a particular human body has passed through this process, that is to say, how often it has been a part of other human, animal, or vegetable bodies, cannot of course be determined. The reason for this is quite simple: it is not possible to fix any point of beginning in any natural cycle. It is equally impossible to say how often the phosphorus in any given human body at the present moment will reappear hereafter in other human bodies, animals, or plants. For, as there is no determinable beginning in a cycle, so there is no determinable ending. The whole process is one that moves in a perpetual circle. If by some great catastrophe to our planet all human bodies should be snatched from the great cycle of natural change and, let us say, become petrified or solidified, like coal, the phosphorus these bodies contain would not thereby be destroyed. It would merely be withdrawn, for a longer or shorter period, from the cycle in which life moves.

CHAPTER 4.

HOW PETROLEUM ~~GETS~~ INTO THE EARTH AND RETURNS TO THE EARTH AFTER COMBUSTION.

We were speaking one day of the indestructibility of matter, when the question was asked, "If it is true that petroleum continues to exist after it has been burned and that it loses by burning neither weight nor substance, but merely changes its form, how does it get back again into the ground and how did it get there, anyway, in the first place?"

The question is no more difficult to answer than that which has been answered in the preceding chapter concerning phosphorus in the human body. Petroleum passes through a cycle similar to that we observed in phosphorus.

According to the generally accepted opinion of geologists, petroleum is derived from coal. But geologists are by no means agreed when it comes to the question of how coal is transformed into petroleum. Yet the question would not seem difficult to answer providing we keep in mind the principles of the indestructibility of matter.

When petroleum is burned it is changed into a vaporous state, or gases. These gases are taken up and converted into solid matter by plants, and later form peat-beds or peat-moors. Whenever some cataclysm, or great natural disaster, takes place and the earth's surface is violently changed, these moors are often submerged beneath the surface of the ocean. Thereafter rivers wash down mud from their valleys into the ocean and this mud is deposited in part over the submerged moors, which gradually petrify or harden. Of course, we must not imagine this process to take place within generations or even centuries. Under the present conditions of our earth, it would require about 80,000 years merely to deposit an inch layer of mud over a submerged moor, assuming that the deposit of mud were distributed equally. The words "under the present conditions" were used advisedly, because the period of 80,000 years would be shortened appreciably if the density of the air should be greatly increased. Suppose, for example, that the density of the air were twice as great as at present, then the air would of necessity precipitate twice as much moisture, our rivers would be twice as large, and they would, as a result, carry down to the ocean twice as much mud as at present.

Assuming now that a two-fold disaster were to occur, such an one as is referred to in our discussion of the "Formation of the Rocky Mountains," then the solidified air, by which we mean the vegetable matter that has become petrified or hardened, as submerged moors and what we commonly call "coal," would be pushed, with its hard crust, into the soft mass of earth. The crust having been broken and one part being shoved over or beneath another, the lower crust with all its coal would be held firmly in the molten, gas-free metals beneath. Despite the fact that the layers or slabs which are thrust below may often be lighter than those above, they cannot escape from their position because they are held down by the weight of the layers or slabs that rest on them. In this position they are, like the lower part of an iceberg, in a liquid mass, and the lowest of them are in molten metals of great specific gravity. Under these conditions the coal that is contained in this lowest layer or slab cannot possibly remain in the form of coal. It cannot, however, burn or oxidize, simply because there is no air for it to burn in. Consequently it passes through about the same process to which coal is subjected in cokeing ovens. We put the coal in a large receptacle, shut off the air from it, build a fire beneath, and melt the fluid parts or substances out of the coal. This liquid mass we call coal tar, and from it we derive benzine and many other chemicals. Now, the difference between benzine and gasoline is but slight, benzine being procured chiefly by an artificial process from coal, gasoline from natural coal oil. Similarly, the difference between asphalt and coal tar is very small.

The liquid parts that have been melted out of coal in the bowels of the earth are extremely light, and have the tendency to rise, and since the layers or slabs that are above it contain rents or fissures, the liquified coal or coal oil, commonly known as petroleum, ascends as near to the surface as it possibly can. Now, if by any chance we bore into one of the rents or fissures that are filled with rising coal oil, we bring back petroleum to the surface, and can, of course, start the process all over again by burning it.

Here, too, it is impossible to estimate even remotely how often this cycle has repeated itself in respect to any given quantity or mass of petroleum. We can, as was pointed out heretofore, go back to no beginning when we are dealing with a natural cycle, neither can we look forward to any ending.

Chapter 5.

EARTHQUAKES AND VOLCANOES.

Anyone who has followed the explanation given in the foregoing, of the transformation of coal into petroleum, will perceive that there is a possibility of a further transformation, provided petroleum as it rises in the rents and fissures of the ground comes in contact with an air-pocket. In this case there is generated what we call natural gas. Within its limited space this gas naturally creates an ever-increasing pressure. The moment this pressure becomes greater than the resistance of its envelope or enclosing material, that moment the latter is burst open. Explosions caused in this manner, through which the compressed gases find an outlet and escape, we call earthquakes.

Now, if after the explosion, cavities are left in the ground, these begin to fill with air again, so that a new explosion will take place in time if there is left, in the vicinity of the cavity, a sufficient quantity of petroleum to develop gases of explosive force.

When coal oil or petroleum evaporates through an explosion it leaves a residue or deposit, which we call asphalt. Should it happen that an explosion of natural gases creates a permanent connection with the outer air, then we observe the coming into existence of volcanoes. For the gases that are now permitted to escape continually, are very apt to ignite, provided the evaporation of the oil is of considerable proportions, and if the crack or rift through which the now burning gas is escaping has another vent through which air is supplied, the column of fire eats its way deeper and deeper into the rift and continues to do so just as long as sufficient air is provided to maintain it. These conditions are often such as to allow the fire to penetrate down to the coal oil itself and even to its deposit, the asphalt.

Chapter 6.

GROWTH AND DECAY OF ROCKS.

Little can be said of the growth and decay of rocks that is not already known to most of my readers. Like all forms of matter, rocks have their cycle of change. For example, if a sliver of rock is broken from a cliff through the action of water, of a spring or a river, and finds its way into the river-current, it comes in contact with numerous other slivers of rock. In the river-current this contact is repeated over and over again and the sharp edges of the sliver are gradually worn away. These abraded parts of the original sliver are extremely small and often so tiny that they are absorbed into the water and carried with it into the ocean. In course of time they are then deposited on the bottom of the ocean, and the mass which is so deposited we call mud, or ooze. The larger parts that are abraded or worn from the original sliver cannot, of course, be absorbed in the water, but are gradually ground down to small kernels which we call sand. In this form they, too, are ultimately washed down into the ocean. Meanwhile the original sliver itself is rolled slowly along the river-bed, grows harder, rounder and smaller, and is carried only very slowly toward the mouth of the river. Now it happens not infrequently that here, at the mouth of the river, such a rock-sliver becomes frozen in a glacier. When that part of the glacier in which the sliver is imbedded, breaks loose and floats out to sea as an iceberg, it carries with it all the particles of rock that have been frozen in it. At times, icebergs containing many bits of rock are stranded in some shallow part of the ocean, and melting there deposit all their rocky matter. Now mud, sand or gravel so deposited gradually solidify or harden into a deposit of rock or ledge. Whenever, as was the case in the formation of the Rocky Mountains, anything happens to upheave this rocky layer, then it again begins its process of disintegration, only to arrive again, in the course of thousands of years, at the ocean's bed, there to solidify once more into rocky layers.

It will be seen that it is not possible to speak in this case, too, either of a beginning or of an end. A beginning and an ending are absolutely excluded from any cycle of natural change.

Chapter 7.

SUNLIGHT AND SUNWARMTH.

It is commonly believed that sunlight and sunheat are derived from the sun directly. But if this were so, how does it happen that the temperature on the tops of high mountains is much lower than in valleys or on low-lying plains? The invention of air-planes has made it possible for airmen to make the same discovery without being in contact with the earth itself. The higher they fly the colder it grows. It is also well known that the air becomes less dense and more rarefied the higher we ascend. Just below the equator there rears itself in Africa, the Kilomonscharo (Kenia) Mountain to a height of 18,000 feet. Snow and ice cover its peak two thousand feet down during the entire year. How are we to explain these and similar facts?

Let us begin with the observation that any increase of atmospheric density increases the friction of any substance passing through it. Is it not possible, then, to explain sunlight and sunheat as being generated or caused by atmospheric friction? And can we not say that every increase in the density of the atmosphere or air must produce an increase of both light and warmth?

We must accept as a fact the existence of a solar energy that acts upon our planet. We do not know the nature of this energy or force. But we must reason that the moment this energy or force comes in contact with the earth's atmosphere or air, some friction is created. It is this friction that produces the effects that we call sunlight and sunwarmth.

Let us take a few examples. We know that there exists an energy called electricity, but we do not know its nature. We cannot create electricity, nor can we destroy it. When we speak of "generating" it, we do not mean that we create it. Thus, with the aid of a dynamo we collect or concentrate electric energy, and this we conduct through mineral or metallic substances (such as tungsten, etc.). These substances (as, for example, tungsten) offer resistance to the electric current, and this resistance creates friction, which in turn produces light and heat. If, for example, we take two inches of tungsten in an electric bulb, we generate twice as much friction, and therefore twice as much light and heat as though we had only one inch of tungsten in the bulb. We may accordingly conclude that if our atmosphere contained twice as much air as at present, the sun would produce for the earth twice as much light and heat.

As a matter of fact, it would seem as though we human beings had really produced conditions on our planet that have caused the solar energy or the force of the sun as it comes in contact with our atmosphere to generate more friction and therefore more warmth. These conditions have not been brought about by mankind for the purpose of increasing the sunheat. This increase has been purely incidental and quite without our knowledge.

We speak of changes in the climate. When the first settlers came to the Province of Manitoba, in Canada, they found it almost impossible to bring wheat to maturity. To-day, Manitoba is one of the greatest wheat-belts in the world. It is said that the corn-belt moves northward from five to ten miles each year. Fifty ears ago wheat could be matured with difficulty in South Dakota. To-day corn is grown there.

When the author first came to the Province of Alberta, in Canada, in 1903, and made inquiries concerning the climate and the raising of wheat, he was told by an old Ontario farmer that the time had not yet come for the raising of wheat in Alberta, and that he would be well advised to content himself for the present with the cultivation of barley and oats. But the same farmer declared also that the time was sure to come when excellent wheat could be matured in Alberta. When the author questioned this old settler on what grounds he made his prophecy, he replied that precisely the same change had taken place in Ontario.

Now, the author could not rest content with a mere statement of this kind. He wished to know what caused the observed change in climate, and when he asked for a reason for this change, he was told that it was due to the cultivation of the soil. But when the question was put to his informant, why cultivation of the soil should cause the sun to emit or produce greater heat, no satisfactory answer was forthcoming.

It so happened that the author was in the southern pampas, or prairies of Patagonia (South America) in 1901 and 1902. Here he was informed that the severe climate of the Fire Islands and of Patagonia had been much modified in recent decades. Surely the cause of this increase of warmth could not in this case be found in the cultivation of the soil, because no such cultivation had taken place except at an immense distance.

Or let us take another instance. During the last half century the glaciers of the Alps have perceptibly decreased. How are we to explain this decrease? Surely not through any great increase of soil-cultivation.

Without enumerating further, instances of this kind, we can affirm that the heat of the sun is everywhere greater on the earth to-day than it was fifty or one hundred years ago. The decrease of the Alpine glaciers and the steady northward movement of the wheat and corn belts is due to one and the same cause. In order to explain this cause we must go back to that law of nature which we have condensed in the sentence "matter is indestructible."

In recent years considerable quantities of "stored" air, namely of coal, petroleum, etc., have been drawn from their hiding places, and have been converted again, through burning, into an atmospheric condition or airlike state. This has produced a slight increase in the density of the air and consequently (as heretofore explained) an increase in the friction of the sun's energy as it comes in contact with the air. Increased friction of this kind necessarily raised the atmospheric temperature.

But, it will be asked, is not Nature constantly at work solidifying the air and embodying part of the solidified air in plants, animals, etc.? And does not this natural process, which is but a phase in the cycle of natural change on which we have insisted heretofore, constantly remove a considerable part of the solidified air for the time being from the process of evaporation, for example, by submerging it beneath the surface of the ocean? Quite true. Every combustible substance that is deposited in the bottom of the ocean or that is solidified in the form of humus (mould), does rarefy the air to the extent of its withdrawal from immediate evaporation. But we must consider the huge amounts of coal and petroleum that have been burned in the last fifty years as a result of the tremendous increase of industries. All of this coal and petroleum, or at least a very great part of it, has been changed into gaslike substance, and with this the air has become charged. There is no reason to assume that Nature increases the process of solidification, and consequently we must conclude that relatively the greater part of the burned coal, petroleum, etc., remains in the air. In other words, during the last fifty years we have transformed several hundred times as much solidified or "stored" air into natural air as Nature has transformed natural air into solids.

Chapter 8.

DEATH AND REBIRTH OF THE EARTH.

In order to describe how the earth "dies," or loses its vitality and revives or renews its vitality, we must return to the problem of the air.

It is easy enough to determine the weight or specific gravity of the air, one of the best means of doing so being the suction pump. At sea level the air balances a water-column of the suction pump at a height of thirty feet. By this we mean that a suction pump can raise, at sea level, a column of water thirty feet. The higher we go above sea level, the less will become the height to which a suction pump can raise a column of water. Thus, on the peaks of our highest mountains a suction pump cannot raise a column of water to half the height to which it could raise the column at sea-level. Now if the average height to which a suction pump can lift water be taken as twenty-seven feet, it follows that the air surrounding the earth would balance an ocean of twenty-seven feet in depth, assuming the ocean to be of an equal depth round about the earth. Water has about two-thirds the specific gravity of coal, so that the total weight of the earth's air is about equal to an eighteen foot layer of coal, assuming once more such a layer round about the earth.

Nature does not, of course, transform the entire store of air into humus, or soil. For if the time should come when Nature had so transformed about half of the air, the air would, at the equator at sea level, become as cold as it is now on top of the Kilomonscharo Mountain, which, as heretofore stated, lies just below the equator and is yet covered the year round with snow and ice. The result of such an extraordinary transformation of air as has just been supposed, would then be that the whole earth would be encrusted in snow and ice. It would be impossible for plant life to continue and with its gradual extinction animal life would, of course, cease to be.

Now it will depend largely on humanity itself how many million years it will require Nature to transform so much of the air into solids as is required to bring about the extinction of plant and animal life. We can economize in our use of air; we can also squander air. For example: supposing the food we consume, after it has passed through our bodies, is conducted to the ocean, then the air is deprived of the weight of this food. If, on the other hand, this same material, instead of being conducted to the bottom of the ocean, is changed into air, or is used, let us say, as fertilizer for plants that once more serve as nourishment for human beings, then we can consume the same food over again without greatly reducing the density of the air. Only those small particles are subtracted from the air that our bodies retain. This economical use of the air can be carried further, even to the disposal of our dead bodies. Why should not Nature receive back our bodies after death? And for the benefit of all mankind, restore these bodies to the cycle of its changes without decreasing the quantity of air through the continued existence of these bodies? The air would be rarefied to the extent that the matter our bodies consist of, remained solid by being deposited, for example, at the bottom of the ocean.

While it is quite clear that we can delay and combat Nature's process of atmospheric rarefication, we cannot prevent it entirely. Therefore, the time must come when the earth will be a dead and cold planet. This will mark the moment of the earth's natural death. But the earth's death can be brought about through a disaster, and death through disaster has as an immediate consequence a revival or a renewal of life.

So far as we know the moon is a dead planet. It is a cold body, with very little atmosphere. In other words, the air of the moon is "stored" in about the same manner as we have described the death of the earth through the storing or solidifying of the air. Having the characteristics of a planet, the moon is subject to the same natural laws as our planet. Now if the moon were to collide with a comet, everything combustible in the moon would be transformed into air; this air would precipitate water, and there would come into existence a sultry and hot atmosphere. The greater the density of the air, the more moisture in the clouds. The difference between the temperature during the night and during the day would disappear almost wholly in the lower strata or layers of the air of the planet on account of the moisture in the air which would prevent the sun's force from penetrating to the lower layers of air and creating there, through friction, sunlight and sunheat. Now, inasmuch as currents of air or winds are created through the unequal heating of the air, there could be almost no winds in the lower and humid layers of the air, and the climate would be very favorable for so-called microbions or exceedingly small forms of animal and vegetable life. Since the two poles (north and south) will cool off, for natural reasons, more rapidly than other parts of the body, animal and plant life would develop at these poles first and would pass through the natural phases of evolution. Every form of animal life would, of course, pass through the stage of microscopic life. Thus life on the now newly revived planet would begin another evolutionary cycle.

What we have tried to illustrate by taking the moon as an example, applies to every planet. All are subject to a similar cycle of death or decay and resurrection or renewal of vital energy. How often this cycle has repeated itself in the case of any given planet, or how often it will repeat itself, no one can say. To make a computation or an estimate is quite out of place. No figures can be mentioned simply because there is no beginning and no ending when we are speaking of the universe. If it should happen that the earth should come into collision with, let us say, a comet, then all life would be suddenly burned up, but there would be released gases through the melting of solids and this would provide the condition for the immediate renewal of life.

It will be observed that such collisions of planets as were referred to in explaining the formation of the Rocky Mountains, or as were referred to in speaking of the Death and Rebirth of the Earth, are necessary for the continued existence of man, animal and plant life. Nature is constantly at work eroding and wearing away the continents of the earth and transferring their substance into the depths of the ocean. The ocean tides never cease to wash away parts of the continents and rivers wash out their beds deeper and deeper until they are down to the ocean level. Crowded by the inflowing mineral material from its greater depressions, the water of the oceans must rise gradually higher and higher, and since the uneven surface of the earth must gradually be worn down to an even surface, the waters of the ocean are bound to cover the whole earth in time. Human beings would be obliged to build huge dams in their struggle against Nature, in order to keep the lands of their habitation from being inundated. We are, therefore, profiting to-day by a disaster that occurred millions of years ago, and it is disasters of this kind that prevent humanity from becoming extinct.

Chapter 9.

THE INCREASE AND DECREASE OF THE PLANETS.

For a long time the unequal size of the planets was a mystery. To-day it is possible to assert with confidence that planets would not remain of equal size even if, by some coincidence, they should suddenly become of the same size.

It is well known that our planet receives each year meteoric bodies, and there is no doubt that these bodies come from other planets. But how it was possible for these bodies to go adrift from other planets remained a puzzling mystery, so much so that some scientists contented themselves with a mere assumption and held that meteoric bodies were thrown off by planets as a result of too rapid revolution. This assumption has, of course, no foundation, and we shall have to look elsewhere for an explanation of the origin of meteors.

Suppose we recall the manner in which the Rocky Mountains were formed and then take into account the tremendous air-pressure that was created by the collision of two planets. We shall then be obliged to concede that the separation of the two planets, following their collision, necessarily produced a rarefication of the air. When the colliding planets separated, crushed fractions of planetary crusts, temporarily detached from their planetary bodies, were suspended in space between two forces of attraction, or, as it were, between two great magnets. They had neither the power to follow the one, nor the power to follow the other. Since the two planets separated with great velocity, these broken particles of their crusts, of greater or smaller dimensions, remained "behind" or suspended in space between the rapidly separating planets. In the absence of an "up" and "down" in the universe,* objects once suspended in space must so remain until some planet comes into their vicinity and attracts them. Now if it should happen that our planet should attract to itself, during the period between two collisions, more meteoric bodies than it lost in the first collision, it has of necessity increased. If it attracts fewer such bodies, it has with equal necessity decreased. That it should attract, during such a period, exactly as many meteoric particles as it lost, would be most unlikely. It follows that the matter of which our planet is composed, contains matter of which other planets are composed, and that the matter composing other planets contains matter that at some time or rather at often repeated intervals was part of the earth.

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*The words "up" and "down" can be used only in reference to gravity. We can employ them commonly only in connection with the earth.

Chapter 10.

THE INFINITE IN THE UNIVERSE.

There is no such thing as an end in the universe. Yet people sometimes, or perhaps very commonly, regard the universe as having limits, and if they are asked what they suppose lies on the other side of these limits, they may reply, as did an acquaintance of the author recently: "Space." If the question is then pushed a little further and they are asked, what lies beyond this so-called space of theirs, the reply is very apt to be that it is without limits.

There is in the universe no "up" and no "down." If there were such a relation as that which we call "down," heavenly bodies would, of course, all fall toward this "down," or "bottom," and then just where would they arrive? If there can be no "down," it follows that there can be no "up" in the universe. The number of heavenly bodies, like our earth or our sun, etc., is infinite, which means nothing more or less than that there is no number. Were we, for example, to imagine ourselves on the most distant heavenly body that we can perceive from the earth, we should then behold as many more new heavenly bodies. Because there is no limit to the universe, there can be no limit to the number of heavenly bodies.

For this reason it is a mistake to regard the earth as a *part* of the world-whole. For if we so regard it, then we necessarily limit the number of bodies in the universe. It is no more reasonable to think of the earth as part of the universe than it is reasonable to think of a second as a part of eternity.

The world existed always, and will continue to exist always.