Natural Alchemy of Religious Opinion
The Origin of the Earth

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Natural Alchemy of Religious Opinion
Part I. The Origin of the Earth
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Because it regulates his conduct, it is difficult to conceive anything of greater importance to man than his religion. Even though it be unconscious and ill defined, every person has a philosophy of life, which determines his thoughts and actions in the face of the innumerable circumstances by which, from day to day, he is confronted. He is aware of his own existence, and he is aware of the existence of other entities and forces that himself. It is impossible to ignore these other energies and persons and things, for continued existence demands they be recognized and due allowance made for their values as life-supporting or life-destroying factors. Thus each person is constantly called upon to make an adjustment to meet the requirements of contact with this or that entity, person, or force. The nature of the adjustments so many depends upon his philosophy of life, conscious or unconscious, and which, although you may be inclined to reject the word, may, in its broadest sense, he turned his religion.

The atheist may scorn the word religion, yet nevertheless, he has a philosophy of life, in which Deity plays no part, by which his conduct to other men and to natural forces is regulated. The materialist may abjure religion, because of its connotations, yet his philosophy, that death is the end of personality, regulates his conduct, and may broadly be considered his religion. The agnostic regulates his conduct by his admitted lack of knowledge regarding matters spiritual and divine, and the man professing to have no religion really places his confidence in, and acts upon, a philosophy of drifting with the current and following the line of least resistance. Issue may be taken of using the word religion as synonymous with philosophy of life, but I am unable to find any other single word that so adequately defines man's conception of his relation to all entities and forces without himself, and in this course of lessons I shall signify such a conception, or philosophy of life--all those ideas and emotions astrologically governed by the Ninth house of the birth chart--as a religion.

In ancient and medieval times, Natural Alchemy constituted one of the 21 branches of occult science. Natural alchemy, as then professed, consisted in using natural processes to produce abnormalities. In this course of lessons, as abnormalities of all kinds are already too prevalent in the world today, we are not going to study formulae for producing others. Instead, we shall investigate the processes, and follow the natural development of these alchemical changes that have produced by far the most monstrous abnormalities the world has ever known; those powerfull and sometimes pernicious cyclops known as religions.

Of course, to religion out of our own affiliation--both yours and mine--is neither monstrous nor of normal, and is far from from pernicious, whichever a chance to be. But usually a thousand and one other religions that still are believed in by some, are more or less so, in

varying degree. We of the West are not slow to pronounce a religion which demands that its devotees throw themselves beneath the "car of juggernaut" to be killed or maimed for life or one that demands that the widow be burned upon her husband's funeral pyre, or one that requires sacrifices to appease an angry God, or one that requires the ceremonial eating of human flesh--such religions that exist today--we are not slow to pronounce these religions abnormal, monstrous, and pernicious. Further, although we are a load to admit the charge, the more enlightened peoples of the East pronounce the doctrine called Hell Fire and Everlasting Torment, no less monstrous, quite as pernicious and fully as abnormal, as any of these.

The important thing to bear in mind here, however, without attempting to decide the relative abnormality, monstrousness and perniciousness of the doctrine cited, is that human beings act upon such religious concepts, because they have accepted them as a part of their philosophy of life. If mankind believes the Calvinistic dogma that there are infants in hell, a span long, mankind acts upon that belief and insists upon infant baptism. If man accepts as a philosophy of life, that man shall only slay his fellowman when the slaying is wholesale and sanctioned and applauded by the people of this country, murder will be rare, but wars will continue. Not that I am here upholding or denouncing war; I am only pointing out that so long as wars are sanctioned by the prevalent religions, that long will there be wars, for man's conduct is determined by his philosophy of life.

Because his conduct is regulated by his philosophy of life, perfect conduct depends upon a perfect religion, and a perfect civilization, depending as it does upon man's conduct is impossible without a perfect philosophy. Such a perfect religion must define man's proper relation to all other entities in the universe. But we can only formulate a system of relations between a man and other men and entities from a knowledge of the man and his functions and a knowledge of other men and entities and their functions. Perfect relationship can only be determined from a complete knowledge of the man and a complete knowledge of other men and entities. Such complete knowledge of man and such complete knowledge of all other entities and forces of the universe is not at hand. Consequently there can be no such thing as a complete and perfect religion.

Perfection is too much to expect, for this is a progressive existence, and progress demands new adjustments from time to time. We can conceive of no limit to the information it may be possible for man to obtain. New information must be assimilated by any adequate religion; for to be adequate it must be based upon as complete a knowledge of man, and other entities as possible. Religion, to be adequate, must not remain stationary. It must progress, even as knowledge progresses. It must include, as a basis for man's actions, every new fact gained. And while we may expect perfection in religion, no more than perfection in knowledge, or perfection in power, yet we have a right to expect a religion to be adequate to meet all the demands of the time in which we live, and to progress sufficiently to meet whatever demands the future holds. But such a religion, to be adequate, must rest upon as comprehensive a knowledge of man as possible and upon as comprehensive a knowledge of other entities as possible.

Such knowledge is not to be attained by theorizing, or by building fantasies--such as the human mind is prone to follow this line of minimum resistance--but by painstaking observation of men and other entities, by careful research into the life-histories of man and all other living things, by investigating the psychology of the human mind and that of other creatures, and by extensive research also on other than the mundane plane. Only upon the most inclusive knowledge of nature, can we hope, at last, to build a theory accurately and truthfully portraying--insofar as present-day circumstances will permit--man's relation to all.

The theory of human life and conduct so derived, which we may call religion, itself should not be founded upon numerous fantasies and unproved doctrines, but be built logically from

as many unassailable facts as possible.

It is the function of Nature-Study, to furnish such unassailable facts, the more numerous and the more thoroughly verified the better. Yet nature, and her various ramifications is so vast that any one man may personally investigate thoroughly only a small fraction of the whole. Hence, men of science usually specialize and devote their chief endeavor to some single section, or small department of nature. They attain great skill in research, and gain much precise knowledge concerning the minute region of the universe to which they direct life-long attention. But because of this they are hardly better fitted to pass judgment on the whole than the man who has made no study. To pass a competent judgment about the universe, there must be available for comparison facts, not merely about a single department, but fundamental facts regarding his many departments and sections of nature as possible.

It is my intention to give in this course of lessons, a survey of such fundamental facts, insofar as it is possible to cover so vast a field and saw limited a space. Necessarily this outline must be brief, and because the scope of nature is so limitless, that which is included is as a pebble to a mountain to that which is both interesting and important that must be omitted. Yet if I can sketch ever so brief, though a clear picture of the processes that, according to the latest findings of material science, have brought the world from its primitive star-dust to where it is inhabited by civilized man, with that part of the work I shall be quite satisfied.

Nevertheless, I also expect to include occult subjects, and some of the Old Hermetic Teachings. But to start with, as we know for certain she that we are on the earth and that the earth is here, let us see what science, in her latest explanations, has to say regarding the manner in which the Earth was formed.

If we turn a telescope upon the vault of heaven at night, several classes of objects are revealed, which help us somewhat to understand the origin of the earth. There are stars of various sizes and colors, there are star clusters, multiple stars, visible stars and temporary stars, there are nebulae of several different kinds and colors, there are comets and meteors, as well as the Milky Way, the Magellanic Clouds, the Zodiacal Light, and the Aurora Borealis.

While these objects, as well as the earth upon which we stand, are composed of, or are the light from, matter. All atoms are composed of protons and electrons, which are positive and negative charges of electricity. These are undoubtedly motions in the universal ether. And if we step beyond what material science has a yet excepted, the Hermetic Initiate will tell you that etheric substance is composed of astral substance which has been slowed down through polarity, and that astral substance is composed of a still finer, more rapidly moving spiritual substance that has undergone polarity, and this of a substance still finer and more rapidly moving--and so on.

But if you are to ask how there came to be any substance in the first place, how existence started, I must reply that such a question is in itself a sophism arising from an appearance. The human mind has had some experience with substances of different degrees of density that have been some instances conveyed the impression to his senses that in certain locations or at certain times there was complete emptiness, or lack of any substance whatever. Science proves this is an illusion, for even a vacuum there is etheric substance. Yet we have no logical right to assume that a condition ever existed unless in some manner experience points toward that condition. All our experience, however, has been with substance, and not with complete emptiness. Absence of substance is merely an abstraction drawn from our experiences with substances of relative degree of density. Logically, we cannot say that an object is all black and all white at the same time. Nor without an equal violation of logical processes, can we conceive of a complete absence of substance. Nothing in experience teaches such a condition to be possible. In fact, we must believe that substance in reality

cannot be separated. There always has been and always will be some kind of substance filling all existence.

Likewise, because we have never had any experience with substance, not in motion, there is no occasion to account for motion. Nor are we called upon to account for the origin of intelligence. Even if we adopt the more materialistic view that intelligence is but substance organized and moving in a particular way, yet we must concede that in some manner the intelligence was inherent in substance and motion. But each new investigation in this field brings more clearly to the notice of science that intelligence in some degree inheres in all matter. The Old Hermetic Initiates taught that substance, motion, and intelligence were inseparable and eternal.

Returning to our telescope, our attention is drawn to the nebulae. By far the more numerous are the white type, which tend to assure a spiral form. These occur in greater and greater numbers we direct to telescope away from the Milky Way and at right angles to its plane. That is, if the Milky Way is considered as a plate, or lens, with ourselves a little above the center, insofar as the thin dimension is concerned--and this lens formed by the Milky Way is really our universe--then toward the edges of the lens there are a few spiral nebulae, but at right angles to it there are a million of them that are now known. Quite a number of eminent astronomers have concluded that these spiral nebulae are other universes, comparable to ours, at distances of 100,000 to 1,000,000 light-years away. But other equally eminent astronomers pull that this is not yet proved. Among those more conservative as Professor H. N. Russell, who says-- "We may as well, for the present, think of the larger spiral nebulae as lying at distances of several thousand light-years, and as being themselves a few thousand light-years in diameter. This is certainly big, but small indeed, in comparison with the size of the Milky Way, which is measured in hundreds of thousands of light-years. If there were not enough stuff in these nebulae to make millions of suns, it is hard to see why these fast-growing condensations do not fly off in straight lines instead of their obviously curved path.(1)

Whether they are, or are not, comparable in size to our universe, or are merely reduced models of it, we mostly for the astronomers yet to determine with certainty, but when we consider that light travels at the rate of 186,330 miles per second, and that a light-year is the distance light travels in one year, even if but a few thousand light-years in diameter their size staggers the imagination.

Next let us look toward the edges of our universe, the Milky Way, which is, as above quoted, measured in hundreds of thousands of light-years in diameter of the lens, and about 1/6 of this diameter in thickness. This Milky Way--our universe--according to Professor Archibald Henderson of North Carolina University, contains about as many stars as there are human beings upon the earth--say about 1,800,000,000. These stars are suns, comparable to our Sun. Out on the fringe of our universe are the globular star clusters. Sixty-nine of these are known, each consisting of an immense number of suns closely grouped, comparatively speaking, in a globular system of suns. Shapely, of the Harvard Observatory, finds that these globular clusters themselves, taken as a whole, form a huge flattened cluster, probably 300,000 light-years in diameter, and about 100,000 light-years in thickness. The center of this globular system is, according to Russell, some 70,000 light-years from our Sun, while the center of our universe as a whole--the Milky Way--is, according to calculations by Shapely, about 50,000 light-years from our Sun, toward the constellation Sagittarius. The archer of the sky, so it seems, is the center of the huge target presented by our universe to its neighbors. But we are off-center, some 50,000 light-years as regards its diameter, and a little above center as regards thickness.

Also, on the fringe of our universe toward the South Pole of the celestial sphere appear to luminous roughly circular objects. They are called Magellanic Clouds he, occupying spaces

singularly devoid of bright stars, the larger covering a space of 42 square degrees and the smaller covering 10 square degrees. They appear as a promiscuous intermingling of star-clouds, star-clusters, and gaseous nebulae. Little is known at present concerning them.

About the gaseous nebulae, however, which has a greenish cast, much has recently been found out. They are less numerous by far than the white spiral nebulae, and unlike the latter instead of avoiding the Milky Way prefer for it. Some of them appear small, roundish and sharply defined at the edge, looking thus much like planets. They are called planetary nebulae and their light comes from luminous gas.

The diffuse, or irregular nebulae, with the exception of those in the Magellanic Clouds, are practically confined to the Milky Way. These nebulae do not all show a gaseous spectrum. In fact, only about half of them do, the spectrum of the others indicating them to be composed of fine particles of dust. These diffuse nebulae seem to be found always in the neighborhood of some star. Professor Harry Norris, Russell says--"Nebulae are set shining by something that comes from the stars. And this is not ordinary light."(2) The nebulae in the vicinity of cold stars show dark lines indicating that the nebulae is cold; and the nebulae in the vicinity are hot star shows bright lines, indicating that such nebulae is far from being cold.

Another type of nebulae, which is thought not to differ from the diffuse type accepted it is not luminous, is the dark nebulae. They are easily visible to the naked eye when pointed out, being seen as dark patches in the sky, patches where no stars appear, due to their light being cut off by these vast clouds of fine dust. Some of them are dozens of light-years long, others are smaller and better defined, and more opaque. It is thought that these nebulae are very numerous, but that they may only be discerned when they so occur as to cause an abrupt cutting off of the light of the stars that lie beyond them.

Hubble has shown that luminous nebula derives its light from some star, and in some cases at least the luminous region is but a section of a great dark nebula, which is illuminated by the presence of the star. In other cases, the material which becomes luminous through the influence of the star, is gas. Also, he has shown that gaseous nebulae, and particularly those called planetary nebulae, are always associated with stars of the hottest type. So it would seem that dark gaseous and diffuse planetary nebula are much the same except that the material occurs in different states of rarity and in association with different kinds of stars.

Further, there has been a "more recent discovery that nebula are in general dark rather than luminous. If bright they are usually associated with hot and massive stars which either cause them to shine by their reflected light or by the electrical excitement which they produce. The dust-like particles of which the nebulae probably chiefly consist are believed to have been expelled from the surfaces of the associated stars by the pressure of their own light."(3)

These nebulae, undoubtedly are the primitive stuff of which songs and worlds are formed. But before taking up the formation of a sun and solar system from the nebula of space, but is very briefly, that we may dismiss them, speak of the composition of other celestial objects.

The Aurora Borealis, or Northern Lights, as explained by Dudley, is due to the presence of that rare element neon in the atmosphere. This inert gas is supposed to become condensed by the cold near the poles of the earth, and when acted upon by magnetic discharges from the earth, or by electric influences from the sun, it holds the magnetic screams, and as it has the property of become a luminous when acted upon by magnetic discharges, arches and streamers of white, or golden yellow edged with bands of red and green appear in the polar skies.

The Zodiacal Light is seen in the west after evening twilight in the spring and in the east

before morning twilight in the autumn. It is a pearly radiance that, cone shaped, slants up from the sunset glow, or from before sunrise sometimes almost to the Meridian, but always follow in the zodiac, or path of the sun. In the Northern Hemisphere, therefore, it leans to the south. It may consist of light reflected from diffused meteoric dust, but its nature is not clearly understood.

Meteors, or shooting stars, are of two kinds--siderolites, containing an admixture of iron and stone; and siderites, composed almost entirely of iron and nickel, with a small percentage of hydrogen, helium, and carbon. The stone meteors are also called aerolites. They are more numerous than the iron kind and move with much smaller velocities. Some meteorites are so small that they are invisible, others are larger, occasionally ranging up to several tons in weight. They swarm through the space traveled by the Solar System, and it is estimated that between 10 and 100 million of them enter our atmosphere every day.(4)

When they travel in a group they become a comet, for the nucleus, or central part of the head, of a comet consists of a swarm of iron meteorites. Such a crowd of meteors, when they come under the gravitational influence of the sun, tend to travel about it either in an open curve, never to return, or in an elliptical orbit returning with considerable regularity. While far away from the sun, they have no tail, but as they approach it, they give off a fine vapor-like matter that may stretch out from the comet one hundred million miles or more. Due to the pressure of the light streaming from the sun this vapory trail is driven away from the sun and always flows out from the comet on the side opposite. The tale is lighted by some unknown force, possibly of an electrical nature. The earth passed through the tale of comets twice during the last century, and nothing was felt. The head of a comet is more formidable, however, and Meteor Crater, near Canyon Diablo, in northern Arizona is supposed to have been formed by a monster meteorite of some 500 feet in diameter, that was one of a flock that formed the nucleus of a large comet it that struck the Earth not more than 5000 years ago.

Meteors are usually dark objects that can not be seen until they come within the Earth's atmosphere. They fall toward the earth with enormous velocity, and the friction with the atmosphere generates the heat. That makes them luminous. Usually the meteor begins to glow at some 70 or 80 miles above the Earth, and gets so hot it entirely disintegrates by the time it comes within about 20 miles from us. The larger ones, more commonly burst into fragments, long before reaching the earth. It is only an occasional one that permeates the pneumatic cushion by which the Earth is protected from this constant and terrific bombardment.

We are now ready to turn our attention to the stars. Not all of them are single like our Sun. In numerous instances two stars form a system and revolve in elliptical orbits around a common center of gravity. Sirius, the brightest star in the sky, is such a binary. Then there are triple stars, in which three stars form a system; and Theta Orionis, the star in the nebula in the sword of Orion, is composed of six stars. One multiple, as they are called, has been discovered, that is really composed of a closely related system of 16 different stars. Such systems of more than one star often have one or more members of the family that are dark stars, whose presence may be known only by their passing between us and some of the others.

Then there are variable stars. These shine brightly for a time and then periodically grow dim. One type of these, known as the Algol type, because the star Algol behaves in this manner, shows a rapid diminution of its light at regular intervals. It is believed such stars have a dark companion, or one of less luminosity--and this has been definitely proved in the case of Algol--and as the two revolve the darker of the two periodically eclipses the brighter.

But there is another type of variable star who's a regular fluctuations cannot be explained in

this manner. Some think they are dying sons, and that is a crust of thick vapor forms on the surface their light is shut off. Then at irregular intervals, the molten interior bursts through and they again appear very brilliant. Others believe that they are sons traveling in a region rich in dark nebulae, and that when they enter success of clouds of dust or strike swarms of meteors the friction of the impact is the source of the added the illumination.

Not only are there supposed to be many more dead and dark suns--suns that have cool beyond the light-emitting stage-- wandering about the heavens than there are luminous ones, but many new suns apparently are observed to be born. These are called novae. A region in space where her the two there has been no star, or only a faint one, within a space of a few days becomes illuminated by a star often ten thousand times as bright as our Sun. It was once thought that this meant a collision between two stars, but the more prevalent opinion now is that a dead or faint star has rushed into a region of diffuse nebulae and been partly vaporized by the friction. Either this is true, or the star suddenly lights up a dark nebula, for these new stars diminish in luminosity until after a few months they may scarcely be seen, but they are then observed to be surrounded completely by nebula.

The other stars of heaven of which our sun forms a member, fall into definite classes as to size and color.

The red stars are divided into two classes, well named Giants and Dwarfs. The Giants may be millions of times larger in volume than the Dwarfs, but the Dwarfs have about the same mass--contain about the same weight of matter--as the Giants. It is supposed that due to the mutual gravitational influence of its particles, perhaps accentuated by a more solid fragment of matter entering it from the outside and acting as a nucleus, condensation is set up in a nebula. The contraction generates heat, just as when one strikes a piece of iron with a hammer both the iron and the hammer become hot. When this heat is sufficient the mass emits a dull red glow, and appears in the sky as a Red Giant.

One of the most marvelous feats of modern science has been the measurement of the size of the Red Giants. This has become possible through the invention of the Interferometer by Professor Albert Michelson, of the University of Chicago. This instrument carries two small sliding mirrors adjusted across the upper end of a telescope tube in such a way as to reflect beams of light, from the star to be measured, to mirrors that again reflect it to the big mirror of the telescope. After being focused and reflected again they are examined with an objective glass of high magnifying power. In this process the rays of light are split up, and a mathematical calculation may be made based upon the distance between the known length of different light-waves and the distance between the little mirrors. Such is the precision of this instrument, it is said that were it not for the curvature of the earth and atmospheric resistance it would be possible from Los Angeles to measure the diameter of a golf ball at Denver, or to measure the diameter of an apple at Boston.

One of the first of the Red Giants to be measured with the Interferometer was the star Betelguese in the constellation Orion. It is found to be 215 million miles in diameter. The chief star in the constellation Bootes, Arcturus, is another Red Giant with a diameter of 21 million miles. The largest star yet measured is the Red Giant, Antares, in the heart of the constellation Scorpio. This stupendous ball has the unthinkable diameter of 400 million miles.

Means have been invented also for measuring the temperature of the stars at their surface, and the Red Giants are found to have a temperature of but about 3000 degrees Centigrade.

Orange stars on the average are smaller, and yellow ones like Capella, the chief star in the constellation Auriga, are smaller still, but have a temperature of about 6000 degrees

Centigrade.

It seems that as the stars condense they get hotter and hotter, which is as we might expect. Like an iron in a furnace they first become red, then orange, then yellow, then yellow-white, next white, and finally blue-white. The white stars like Sirius in the constellation Canis Major have a temperature of from 10,000 to 15,000 degrees Centigrade. The star Pollux, in the constellation Gemini, is orange. The star Procyon in the constellation Canis Minor is yellow-white, and the three stars in the belt of Orion are blue-white.

After a star reaches the blue-white stage it has attained its maximum temperature. It then begins to radiate heat faster than its continued condensation generates. It therefore, all the time growing smaller and smaller, passes through the same colors in the reverse order--like a white-hot bar of iron as it cools--white, yellow-white, yellow, orange, red and finally black and in the case of the star invisible. We are indebted to H.N. Russel for this theory, which is now quite generally accepted, and at least stars are to be seen every night showing these degrees of size, temperature and collar. Our Sun is of the Dwarf type, having reached that age and cooling in which its color is orange.

Because the suns, having been formed from condensing nebulae, are all the time giving off heat, old writers thought the universe must be gradually running down, and that finally all the stars would become inert and dead. But this is not the general opinion now. It would seem that while stars are being formed from nebulae in some places, in others intense light-pressure and other forces are causing the stars to disintegrate in the formation of nebulae.

"The stars of Orion are of the same type, intensely hot, luminous and massive bodies. At one time they were believed to be the youngest of stars, but it is now known that they are at the height of their revolution and their nebulous surroundings are the product of such stars rather than their source. The intense light-pressure that exists within these tremendously hot and massive stars drives off from their surfaces the minute particles of which their nebular surroundings consist. Most of these nebulous clouds are dark, but when electrically excited by the nearby stars they become luminous."(5)

In connection with the temporary stars, or novae, previously mentioned, it is estimated that on an average of fifteen of the brighter novae appear every year. This would mean 1500 per century. And, as a most conservative estimate, if we consider that life has existed on the earth 100 million years, in that time there would have been 15 billion novae. If such novae were produced by collisions between stars, it seems unlikely that our Sun should have escaped and life have been permitted to continue on the earth, for 15 billion are several times the number of stars estimated to be in our universe. It is thought, however, that there are collisions between stars and nebulae, and that while there are numerous nebulae in the direction of Sagittarius, toward the center of our universe, that nebulae are comparatively rare in that region of the universe occupied by our Sun. It would seem then, from what astronomers know, that the universe is not running down, and that the chances of our solar system suffering a cataclysmic disturbance sufficient to wipe out life on the earth is extremely remote.

Astronomers are well agreed that the sun was formed from condensing nebulae but as to the precise manner in which the Earth was formed there is not such close harmony. They nebular hypothesis as first postulated by Laplace has broken down under critical analysis. In its stead it is quite generally thought in scientific circles that a tidal disruption of the sun, due to some other star passing relatively close to it, is responsible for both the formation of the planets and the rotation of the sun. Even now the sun is occasionally observed to shoot huge streams of gas to a height of almost 300,000 miles with a velocity as high as 300 miles per second. Now if this material, which well might condense to form a planet, were shot out with a

velocity of 400 miles per second, or if due to the influence of some passing star the gravitational power of the sun upon the material so expelled were lessened, even if the velocity were no more than 300 miles per second--in either case, the power of the sun would not be sufficient to draw the material back to the sun.

A portion, or all of the material so expelled may not have had a velocity sufficient to carry it entirely beyond the influence of the sun, and after reaching a certain distance this would fall back toward the sun. But, much as water from a spray is blown to one side by the wind, the material shot up from the sun would be drawn to one side by the gravitational pull of the passing star, and in falling back it would fall to one side of the sun and its particles would tend to move thus around the Sun in elliptical orbits. Thus a spiral nebula revolving in a plane about the sun would be established.

When we reflect that the planet Jupiter is larger than all the other planets combined, and that the sun is over a thousand times larger than Jupiter, we will perceive that the amount of material required to form the planets would be comparable to the water splashed from a bucket by carelessly dashing one's fingers through the surface. It is believed in the splash from the sun that there were four small knots that did not get very far from the sun, and that these formed the centers of attraction that gathered the surrounding particles and formed Mercury, Venus, the Earth and Mars. Next farther out there was no knot of matter, and as a consequence no strong center of attraction, and thus the nebulae and fragments did not condense to a single center, and there remains a ring of planetoids between Mars and Jupiter. Outside of this there were supposed to have been for large blobs from the splash, and about these their formed the planets Jupiter, Saturn, Uranus, and Neptune.

These knots, as they revolved, due to the gravitational pull gradually gathered up the millions of fragments and dust particles either side of them that were also revolving about the sun. And here's where two schools of thought diverge, for one holds that the earth grew very gradually by attracting to its early and small liquid or solid core planetessimal matter much of which was in dust like form. According to this theory, after it's early and very small stage, the earth was never fluid or even viscous, but grew from small size to its present dimensions through the accretion of matter in much such a state as we now find it.

The other school of thought, the one now gaining in following, polls that the growth of the earth was more rapid, and that the impact of the falling fragments, which both schools hold would have cooled rapidly to solid form after leaving the sun due to their small size, generated heat enough to make of the earth a molten globe.

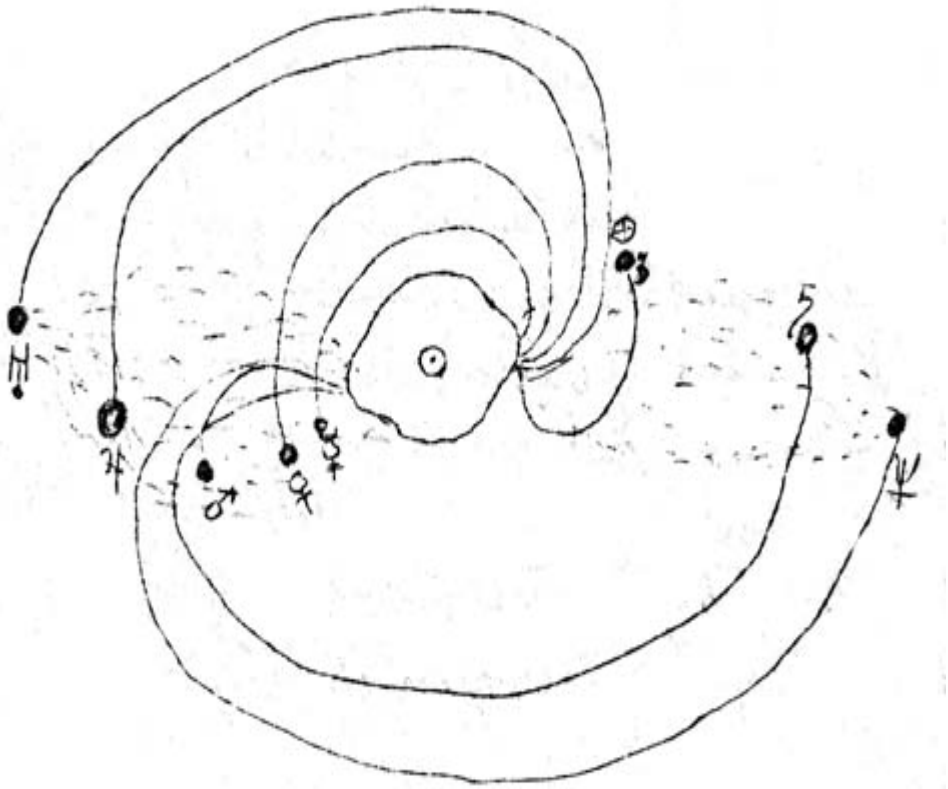
The formation of the Moon is also another point not definitely settled. One group of scientists believe that the original knot of planetessimal matter, about which the Earth formed through clearing up the zone on either side of once abundant fragments, was a double one, and that the Moon formed about one of these knots.

Other scientists, who seem to be gaining ground, believe that the moon was at one time a portion of the earth. Undoubtedly, the earth revolved much faster than it does now, and all know that there is a critical speed beyond which a flywheel, for instance, may not be made to revolve without danger of it flying to pieces. It may be that the centrifugal force, played an important part in separating the moan from the earth. Sir George Darwin advanced the theory that the Moon broke off at a time when the earth had a period of rotation of between three and four hours--"the cause being that the solar tidal force synchronized with a free period of natural vibration of the earth, owing to resonance the tidal deformation of the earth continually increased until rupture occurred."(5).

According to those who hold to this view, title strains cause the earth to bolt until the Moon

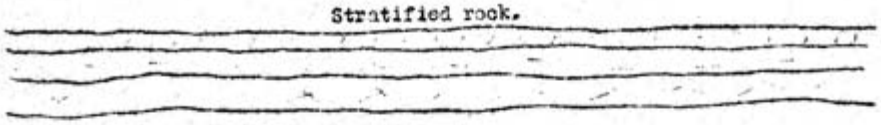
broke off, and bend it back-reaction of the lunar tides cause the Moon gradually to recede, and the solar and lunar tides, acting like break-shoes against the Earth's rotation, cause the earth to slow down. The rate of slowing down according to the records of eclipse is preserved by the ancients indicates that at present the day is lengthening about one 1000th second per century, or a minute in 6 million years. This might mean that the Moon broke off 10 billion years ago, or if all possible allowances be made for greater tidal retardation when the moon was closer, the date can not be less than one billion years ago.(6).

(1) Scientific American, November 1923.
(2) Scientific American, April 1923.
(3) Isabel M. Lewis, U.S. Naval Observatory, in "Nature Magazine", for December 1923.
(4) The Outline of Science, by Professor J. Arthur Thompson, Vol I, p.36.
(5) Isabel M. Lewis, U.S. Naval Observatory, in "Nature Magazine", for January 1924.
(6) See Scientific American, June 1923, reporting Lecture by A.S. Eddington, before Geological Society of London, November 21, 1922.

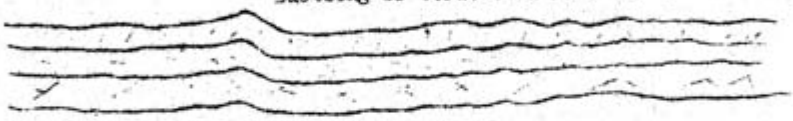


Tidal Disruption of Sun.

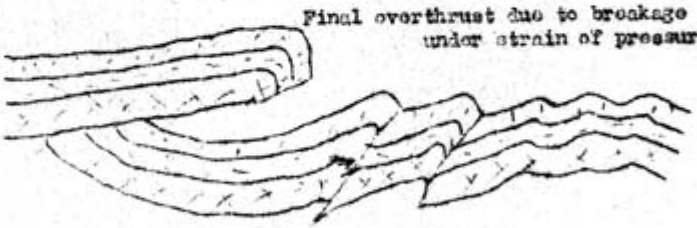
Stratified rock.



Buckling of stratified rock due to lateral pressure.



Final overthrust due to breakage under strain of pressure.

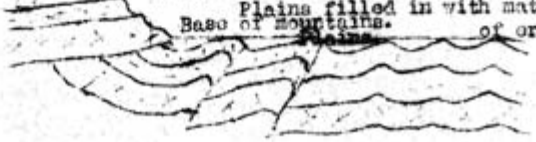


Mountains.

Much of overthrust eroded away.

Plains filled in with material of erosion.

Base of mountains.



The making of mountains.