

The Comet That Is Coming and What May Be Expected if It Hits Us

A recent telegraphic announcement from one of the astronomical observatories situated in the Southern Hemisphere tells of the appearance of a large comet.

Ordinarily there is nothing startling in such announcements. It is a matter of every occurrence under the present advanced state of astronomical science for the observers to find a comet within the field of view of their telescopes, and only those of probable importance find mention in the newspapers. The one alluded to in the dispatch mentioned is the great comet of 1880, whose return is measured at the time of its last appearance over 150,000,000 miles in length.

Because the ordinary observer fails to perceive with the naked eye these wanderers of space, it must not be supposed that their number is limited. The best astronomers are agreed that the number of comets is very great. Arago estimated that there are at least 17,500,000 within the orbit of Neptune. Lambert points out where he thinks Arago neglected to investigate, and places the number at over 500,000,000. Kepler says: "Comets are scattered through the heavens with as much profusion as the fishes in the sea."

From the beginning of the Christian era to the close of the present century there is trustworthy record of about 1000, of which we are fairly satisfied that probably half a dozen have been returned. Probably at least five have been seen to each one recorded, so we may conclude that at least 5000 have appeared during that time. What has become of the immense number which apparently visited our system but once?

The theories put forward to account for the formation of comets are many. They are all ingenious, but unproven. Cole, a noted English observer, thinks it possible that there are other emanations from the sun and from the stars (which are other suns), besides that of light. If this be the case the comets in their passage from one system to the other may attract and collect the particles scattered in the immense regions of space. This would account for the very dense and extensive atmospheres observed to surround most comets.

Professor Young of Dartmouth College thinks that comets consist of matter ejected from our sun and from other suns.

On September 7, 1871, Professor Young witnessed an extraordinary explosion on the sun. The expelled matter was seen by him to ascend to a height of 200,000 miles above the sun's surface, traveling with a velocity of 166,000 miles per second. This would give an initial velocity of over 200,000 miles a second, and if there was no air resisting medium in space would be sufficient to carry the ejected matter beyond the sun's attraction. It is believed that there is a resisting medium in space.

The use of the spectroscopic has enabled us to learn something of the material of which comets are composed. Observations with it, and the fact that meteoric

falls in a few seconds. Perhaps some form of electrical energy is present creating the constant state of intense excitement.

The questions of greatest interest to the majority of people are: Do comets exercise any influence upon the earth? Is there any danger of a comet colliding with the earth; and if so, what would be the result?

A few comets have had their motions sufficiently well observed and computed to enable us to predict the length of time required by them to complete the tour of their orbits. One of these, known as "Encke's," is a small affair of short period. Another, known as Halley's, is a large

comets in 1819 and 1823. The face of the globe exhibits many very peculiar phenomena, extremely puzzling to the orthodox geologist, who is unable to satisfactorily account for the conditions by any theory known to him. The "drift" is one of these. On the supposition that the earth was struck by a comet of some size and mass the phenomena is rationally explainable.

The elements, i. e., the speed, direction and shape of orbit, of quite a number of comets have been studied and partial success attained in computing the times of their return. Yet, it has always been found that something has interfered to

negative the result. The one of 1832 was said to have a period of 129 years. It did return in 1861, but was absent in 1790. The velocity of movement of a comet varies, and we do not know exactly just when and where the variation comes in. The comet of 1472 had speed of over 3,000,000 miles in twenty-four hours. We are apt to think that our fast express trains, moving sixty miles an hour, are swift fires, yet here was an enormous mass speeding through space at the velocity of over 2083 miles per minute.

As to the part played by comets in the complex machinery of the universe we

know nothing. One bold utterer has voiced his opinions thus: "Science seems to point to the finite duration of our system in its present form and to carry us back to the time when neither sun nor planet existed, save as a mass of glowing gas. How far back that was it cannot tell us with certainty, it can only say that the period is counted by millions of years, but probably not by hundreds of millions. It also points forward to the time when the sun and stars shall fade away, and nature shall be shrouded in darkness and death." So spoke Professor Newcomb. Science is made to bear very many burdens; this is one. No law of nature doth disclose the science of

pure water. The solution will remain clear for an indefinite period if the solution be undisturbed, but at each microscopic octahedral crystal of the salt to the finest filament and lower it into the solution. Instantly crystallization commences at the surface of the fluid and progresses with great rapidity until every atom of alum in the solution is visible. Now, the comet is simply a microscopic crystal crystallizing, i. e., changing the forms of radiant light and heat into other modes of motion, which, in the fullness of their functions, eventually return back to their originals.

Ever since comets have been observed a great deal of speculation has been indulged in as to what constituted the tail of the comet, and some very ingenious theories have been elaborated to account for the fact that the tail, while observed at a considerable angle with a line drawn to the sun, and even at right angles to it, constantly inclines toward the region from which the comet is moving—toward the sun. It is difficult to conceive how the tail of the comet of 1880, 150,000,000 miles in length, could in the space of time occupied by the comet-head in sweeping around the sun—a period of a few minutes of time—describe so tremendous an arc in space in so short a time. If the tail did actually sweep around the particles at its extremity must have traveled with a velocity utterly inconceivable to the human mind. No known law of nature can explain the sudden shift of position.

Generally the tail is curved, resembling a scimitar, but many have been observed of extremely fantastic appearance. One is recorded as having been seen at the time of Constantine the Great, shaped like a cross, and the imaginative superstition of that age discerned beneath it the legend: "In hoc signis vinces." In this case the comet did some good. Perhaps we may be able in coming years, when these matters are better understood, to use these wanderers as messengers to bear our communications to other spheres. Of one thing we may be morally certain—that if a great comet should appear before the close of this year, the disappointed political party will, beyond all doubt, charge their defeat to the comet.

F. M. CLOSE, D. Sc.



Six-Tailed Comet, 1764.



Halley's Comet, 1835.



Donati's Comet, 1858.



Head of Donati's Comet, 1858.

showers are intimately associated with cometary routes, lead to the opinion that comets are composed of a blazing nucleus and a mass of separated matter, such as metallic iron, clay dust and gas. The nucleus gives out intense heat and masses of burning gas which is luminous. It is probable that comets shine with both inherent and reflected light. That the comet is constantly undergoing great physical action is apparent to every careful observer. The appearance of the tail is constantly changing. Apparent vibrations or coronation begin at the head and traverse the enormous length of the

one completing its orbital revolution in about seventy-five years. Its first recorded appearance occurred in A. D. 1005, and that year was marked by a great famine in Europe. Its next appearance was in 1080 when a terrible earthquake took place. Its subsequent appearances, together with the attendant abnormal earth conditions, are as follows: 1155, excessive cold and great crop failures; 1280, inundation of Germany; 1304, intense cold and drought; 1380, awful pestilence; 1456, inundation and earthquake; 1831, great frosts; 1607, intense cold and drought; 1682, floods and big earthquake; 1759,

about the present site of New York were covered with noble trees and with a dense undergrowth of species for the most part different from those now living there, and that these were the homes and feeding grounds of many kinds of quadrupeds and birds which have long since become extinct. The broad plain which gently slopes seaward from the highlands must have been covered with a subtropical forest of giant trees and tangled vines teeming with animal life. The state of things doubtless continued through many thousands of years, but ultimately a change came over the fair face of nature more complete and terrible than we have language to describe.—*Popular Science Monthly.*

putrefaction would have decomposed them, and on the other hand this eternal frost could not have previously prevailed in the place where they died, for they could not have lived in such a temperature. It was, therefore, at the same instant when these animals perished that the country they inhabited was rendered glacial. These events must have been sudden, instantaneous and without gradation.—*Cuvier.*

"The most violent convulsions of the solid and liquid elements of the earth appear themselves only the effect due to a cause more powerful than the mere expansion."

It is admitted, then, by these authorities that it was a catastrophe which caused the sudden change of climate, and possibly it was a change of the axis of rotation. Much more in the same vein might be given, but the above seems sufficient.

If, then, to axis of the earth has undergone a change there must have been a former equator, and if so where was it and what evidence have we that it existed?

We know that today the most intensely active volcanoes are in the tropics, where associate phenomena of earthquakes are most frequent.

We know that this should be the case upon a revolving sphere like the earth, where the tendency of a fluid interior to force an exit would be greatest, and where the greatest strains upon the crust would be produced.

It will be admitted by any student in physics that the cracking of the earth's crust, permitting the pouring out of molten material, would probably occur along the equatorial belt, if at all.

On the earth volcanoes are distributed in groups, or along extensive lines, as if connected with a fissure of the earth's crust. The most remarkable linear series of volcanoes in the world is that which belts the Pacific Coast, as Professor Le Conte of Berkeley has pointed out. Commencing with the Fuegian volcanoes, it runs along the whole extent of the Andes, then along the Cordilleras of Mexico, the Rocky Mountains, then along the Alutian chain of islands, Kamchatka, the Kurile Islands, Japan Islands, Philippines, Sumatra, St. Paul, Kerguelin to the Antarctic volcanoes, Mount Erebus and Terror, thence back by Deception Island to Fuzea again, thus completely encircling the globe.

As might be expected, along such a line of fissures the volcanic activity is on a general scale, and it is likely to be manifested in several localities at the same time. This was observed as early as 1835 by the great naturalist Darwin. Within 100 miles of Tacoma are not less than 200 volcanic peaks, the largest of which—Mount Tacoma—is 15,000 feet high. Alaskan volcanoes are frequently active, and the eastern coast of Asia has an established reputation for seismic disturbances. "In the physical formation of North and South America there is a remarkable resemblance, which would naturally result from the fact that they were formerly on the same latitudes and governed by similar conditions of climate," says the Encyclopaedia.

When the earth's axis was perpendicular to the plane of the ecliptic, the north pole was somewhere in the vicinity of the Mediterranean and possessed a delightful and perpetual spring climate. This fact calls to mind the biblical Garden of Eden, Plato's Atlantis and the Garden of the Hesperides, and concerning these interesting times we find the history and traditions of the older nations replete.

Concerning the tradition of the Hindus, Sir Charles Lyell states that "we can by no means look upon them as a pure effect of the unassisted imagination, or believe them to have been composed without regard to opinions or theories founded on the observation of nature."

Lenormant says:

In all the legends of India the origin of mankind is placed on Mount Meru, the residence of the gods, which unites the sky to the earth. * * * Meru than is at once the highest part of the terrestrial world, and the central point of the visible heavens. * * * It is also at one and the same time the north pole and the center of the habitable globe.

The "Secret Doctrine" says:

The Egyptian priests taught the fact to Plato, who expounds the theory or fact as a sudden catastrophe. Dr. Croft combats the axis theory, saying that such attractions and change of climate—can be accounted for by the mutation and precession of the equinoxes; "but there are other men of science, such as Sir H. James and Sir John Lubbock, who feel more inclined to accept the idea that they are due to a change in the axis of rotation."

There is one point of importance that should be noticed. Of course, if the poles have changed there has resulted a corresponding change in the cardinal points. Do we find any evidence of such a change, and if we do is it not worthy of special note?

Terrien de Lacouperie writes:

The names of the four cardinal points, and what is very remarkable, the hieroglyphic signs by which they are expressed, are in a certain measure the same in the Akkadian and Chinese cultures. * * * The south, which was so termed in the cuneiform tablets, corresponds in Chinese to the east, the north to the west, the east to the south, making thus a displacement of a quarter of a circle. It would be interesting in an examination of the Akkadian and Chinese names we could find that they in their turn denoted an early displacement of which only traces remain to us."—*Early History of Chinese Civilization.*

Frederick Kieserling pronounces it remarkable that the Scandinavian mythology forms us that before the establishment of the present order of the world the sun, which now rises in the east, "rose in the south."

The North Pole and the Magnetic Pole Parted Company 12,000 Years Ago

It is a well-known scientific fact that the magnetic pole of the earth is not coincident with the pole of revolution, but is located about 70 degrees north latitude, near King William Land. The magnetic pole is not a fixed point, but varies continually, though slowly, pursuing a path about the true pole, its shifting periods estimated at 640 years.

One would naturally suppose that if the axis of the earth since the beginning had held a constant position on inclination, the two poles, that is—the magnetic and the revolutionary poles—would be coincident, especially so when we remember that, as the magnetic pole is constantly moving at an appreciable rate, it should by this time certainly have found its center of influence. If it is assumed, as it is by eminent philosophers if not by geologists, that at one time the magnetic pole was coincident with the revolutionary pole (about 12,000 years ago), then the solution is apparent, and since the change of axis of the magnetic pole is moving in a spiral, its center will again eventually coincide with the present revolutionary pole.

Astronomy has pointed out that the axis of the earth is still "wobbling." In fact, it is a very suspicious wobble—a wobble within a wobble, if you please—the greater wobble having a period of 428 days. It is supposed, too, that the greater wobbling motion is but an epicycle of a still greater wobble, which will account for the poor orientation of the pyramid of Ghizeh, as well as the fact that at the sun, when in Cancer, at Athens, does not come so far north by a degree as it did 2000 years ago.

This leads to the statement asserted with confidence and defended with assiduity, that the revolutionary axis of the earth is shifted periodically. And if this be true it is of the utmost importance to scientists, too, explaining many events which have been too much in the dark. Colonel Fred G. Plummer, formerly State Geologist of Washington, has recently published an excellent treatise upon this subject, entitled "The Last Chance of the Earth's Axis." Mr. Plummer is deserving of

much credit, for not only collecting and collating the valuable information, but for the fearless and original way in which he presents the matter.

It is by the kindness of Mr. Plummer, whose little book is protected by copyright, that permission has been granted THE CALL to introduce the facts and theories advanced.

It is claimed that the shifting of the axis, that is, the revolutionary axis, will explain the reason of the flood, the sinking of continents, more especially Atlantis, the presence of drift deposits, the birth of Niagara, the position of the magnetic pole, the frozen mammoth in Alaska, the reindeer in Europe and many of the myths and traditions of all ancient nations.

It has been stated as a fact by some philosophers that upon several occasions vast areas upon the earth have been suddenly changed, even in a single night, from tropical and semi-tropical countries into the bleak and howling wildernesses of a frigid zone. And this effect may readily be accounted for by a shifting of the axis, which movement controls the different climates experienced with the earth to a large extent.

In his book Mr. Plummer says:

The fact that the flora and fauna of the earth are found in zones, and that the fossils, or former evidences of life, are not found in zones coincident with our present lines of latitude, are enough to force the conclusion upon every thoughtful mind, that there have been vast changes of climate upon the earth. How, in the sea, were found the remains of beeches, oaks, pines, poplars, maples, walnuts, magnolias, limes and vines. The remains of similar plants were found in Spitzbergen, in latitude 75 degrees 56 minutes.—*American Antiquarian.*

It is not to be presumed that the flora was carried into the polar regions. It must have been overwhelmed by the "great winter." What caused the great winter? If astronomy is to be believed the sun has not cooled materially since oaks, pines and poplars came to grace the earth. The fact that the

remains of the mammoth, a tropical animal, are found so perfectly preserved has forced upon the scientific world the belief that a catastrophe occurred at the time of their death. "It is remarkable that nowhere in the great plains of Siberia do any traces of glacial action appear to have been observed. Consequently

we find the great river deposits with their mammalian remains, which tell of a milder climate than now obtains in those high latitudes, still lying undisturbed at the surface."—*The Great Ice Age.*

If they had not been frozen as soon as killed



Outline Map of the Northern or Land Hemisphere Before the Change of the Earth's Axis Took Place, Showing Portions of Lemuria and Atlantis, as Drawn by Colonel Fred Plummer, Geologist.

The Queen Lily and the Wheat Belong to One Tribe

OF THE many who admire the queen lily now blooming in the park conservatory, few perhaps remember that its magnificence is the outcome of a process of change prolonged through countless ages, during which environments favorable to size and beauty were predominant, and that each portion of its structure is traceable to some corresponding portion, foundation or possibility in the structure of the unpretentious ancestor of the lily family.

To the mind of the botanist who can discern kindred traits in the most seemingly diverse species, and can trace the family tie between the giant of the forest and the scant herbage of the mountain peak, the lily tribe unfolds a marvelous retrospect of evolutionary adjustment to conditions. According to a noted authority the first flower botanically entitled to be called a lily, though now extinct, is fairly represented by the simple marsh lily, the gagea depicted in the illustration.

Many of the tribe blend with these triple formations developments of their own in the direction of growth, of beauty, or both, while others lose some of the lily traits, but, retaining the foundation, diverge into a less ornamental form, just as a modern storehouse may be constructed from the ruined walls of a castle. Of the first class the Victoria lily is the climax, though it also numbers in its ranks such exquisite developments as the aspidodel, the tulip and the orchid. Conspicuous in the second class is the grass tribe in its thousand varieties, including the familiar stalk of cultivated wheat.

The gap between the latter and the night-blooming lily, resting its large blossoms and leaves on the deep water and sensitively clinging its color with the hours of day, seems a wide one, but it has been bridged over by several plants that probably represent the chief stages of transition.

The large species of white water lily, the Egyptian lotus and the prickly leaved eurgale of East India suggest the route of

divergence from the ancestral lily or simple gagea to the exuberance acquired in the waters of the South American tropics. The trail of divergence from the gagea to the ear of wheat has been more definitely traced. First comes the common rush family, whose small dingy blossoms in a group are seen when magnified to be the true lily type, though botanically classed as merely of the lily tribe. Another link is a marsh plant known as the wood-rush. As shown in the illustration, its



The Yellow Gagea.

THOSE SPOTS ON THE SUN

from five to fifteen miles in diameter. The entwined aspect it had at first was modified, as probably the spots farthest from the solar equator failed to keep pace with those nearest to that line. Its average position is 8 deg. north solar latitude, and on account of its length it will probably remain visible until the 22d of this month unless the disturbance dies out before then. Being

DURING the past days a dark streak extending in an east and west direction might have been discerned on the disk of the sun even without the aid of magnifying power. It was a large group of small sunspots, and the peculiarities of the disturbance have especial interest now within two years of the period of comparative solar quietude, when the disk will be unspotted for weeks and months in succession. The number and size of these phenomena have been decreasing since 1894, and the solar cycle, which includes a maximum and a minimum of disturbance five and a half years apart, will not be completed until about the fourth year of the next century, when the spots may be expected to appear again in great numbers in 1892-93. As the cause of this eleven-year cycle is still unknown and that of the spots also somewhat unsettled, an accumulation of details as to the position, form and duration of solar disturbance is always of value in the study of solar physics. On September 9, when three small groups were distributed over the disk, this group appeared on the east limb, thus showing a stream of successive disturbances across from east to west. As it advanced it was seen to be composed of about ten small black spots in a straight line curiously entwined with a curving line of six or seven small spots, all connected with an encircling penumbra area, which in the foreshortened view seemed to be a group of unusual length. As it approached the central portion of the disk, where dimensions are best seen, it proved to be more than 100,000 miles in length and from twenty to thirty in width, while the size of the spots was

MUCH interest is manifested by the public in regard to the statement of Dr. Stephen H. Emmons that he has discovered a means of turning silver into gold. It is quite possible that he has done so, though there is some question whether he will produce gold in such quantities as to cause any fluctuation in the value of the precious metal.

Alchemy is something more than the dream of the visionary and weak-minded. If one will free his mind from prejudice and make a review of authentic records he will find that the transmutation of metals is an accomplished fact.

All minerals are but differentiations from a common base, and if one could find the steps of differentiation—and they have been discovered—then the problem would resolve itself merely into a question of mechanical skill.

Various writers give the steps necessary in the transmutation of base metal into gold, excepting that one of the substances used is so wrapped about with mysterious veils that many require a lifetime for one to do the middle unless he is so fortunate as to meet some one already in possession of it. This mysterious substance is a red powder, mystically termed the "red dragon," and it is indispensable in the operations of the alchemist.

Among the authentic accounts of the transmutation of metals are some experiments made in 1782 in the laboratory of James Price, M.D., F.R.S., of England, in the presence of twelve or fourteen spectators.

A number of experiments were made. Half an ounce of mercury was placed in a small crucible, together with a small quantity of powdered charcoal and niter. Then half a grain of powder of a dark red color was added by Mr. Price, and the crucible was placed on a fire of moderate red heat. In about a quarter of an hour the company noticed that the mercury, though in a red-hot crucible, showed no signs of evaporation or even boiling. The fire was gradually raised to a white heat, when a small dip was taken on the point of a clean iron rod. When the scoria cooled it was found full of small globules of a whitish colored metal, which Mr. Price explained was an intermediate metal between mercury and a more perfect metal. A small quantity of borax was then added and the heat again increased. At the end of another quarter of an hour the crucible was taken out and gradually cooled. On



The Woodrush.

so largely composed of a penumbra area, it is less conspicuous than some smaller group in which the umbra was large, but it may be still seen with colored or smoked glass by those who are possessed of keen sight. On account of the intensity of sunlight, noon is not the best time to take such an observation, the morning or afternoon hours being more favorable for distinctness. ROSE O'HALLORAN.

Only One Secret Necessary to Turn Silver into Gold

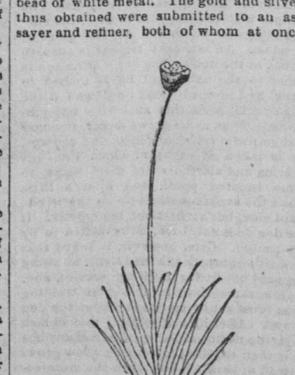
breaking it a globe of yellow metal was found in the bottom, and in the scoria were smaller ones, all together weighing ten grains. Thorough tests were made with the yellow metal and it was proven to be pure gold.

Similar experiments were then made, except that a white powder was added, instead of the red, the result being a large head of white metal. The gold and silver thus obtained were submitted to an assayer and refiner, both of whom at once

Vienna there is a historical medalion, containing portraits of twelve noblemen around the edges. It was originally of pure silver; but to-day the upper portion is gold and the lower part silver, a result of having passed through the hands of an alchemist and magician. It is, because of its present constitution, one of the rarest curios in the world, and should, of itself, even if there were no other evidence, be ample proof of the alchemist's art.

An interesting story of alchemy comes from one of the middle States of Germany. The tale dates from the middle ages. A traveler sought shelter at the castle of a Baron one stormy winter night. The lord of the manor was away, but the Baroness supplied him with food and lodging. Before the stranger departed the next morning he sought the lady of the castle and expressed his thanks for her hospitality. He said he had no money, but perhaps he could repay her in another way. She replied that she desired nothing in return, but he asked her if she did not have some silver in the house she would like to have turned into gold. A cunningly all the silver plate was brought forth and transmuted.

When the Baron returned home and saw the gold he immediately laid claim to it under a law which gave the owner of land all treasure found upon it. His wife resisted the demand, and the noble couple resorted to the courts for a settlement of the ownership. The Judge rendered a decision (which may be found in the German archives) to the effect that the gold was the sole property of the Baroness, for the reason that the treasure had not been "found" on the Baron's lands, but had been "manufactured" for the Baroness at her request and as a personal gift to her. The Baron might have formerly had some claim on the silver plate belonging to the castle, but the comparative value of that was overshadowed by the great value of the gold, and he was entitled to recover nothing from the Baroness beyond the value of the silver that had disappeared. RAM SINGH.



The Eriocaulon, or Pipewort.