COMET AND METEOR.

PHENOMENA WHICH MAY BE SEEN IN THE HEAVENS.

Comets, After Scurrying Through Space, Go to Pieces and Become Meteors—Difference Between Meteors and Meteorites.

THE history of a shooting star, meteor, meteorite, aerolite (air stone), or uranolith (heaven stone), as one prefers to call it, begins, according to the latest theory, with the history of some comet. Just what a comet is and where it comes from it is hard to say. Its origin is not known. But it is known that it is an object which comes into the solar system from space under attraction of the sun, which moves around the sun and then goes off into space, perhaps never to return. The question whether or not it will return depends upon the orbit in which it moves. If the orbit is an elipse it will surely come back; if it is a parabola or hyperbola it will not return. How is it now that comets differ so in their orbits? Why should some return and some not return?

When a comet comes into our system it is likely to pass near one of the larger planets. There is, then, another attracting force. If the motion of the comet is accelerated thereby the comet's orbit becomes surely hyperbolic, and it goes off never to return. But if the comet's motion is retarded, its orbit is eliptical and it will surely return. Each time a comet meets a planet under such conditions its orbit becomes smaller and the time of its return shorter. Comets, then, which would not ordinarily stay in the system are kept here by the attractive power of one of the planets. This is called the "capture" theory.

Each of the larger planets, Jupiter, Saturn, Uranus and Neptune, have a "family" of comets which they have attracted and whose orbits lie near their own. All the short-period comets, those having periods of from three to eight years, belong to Jupiter's family. There are sixteen of them including Biela's. The earth and the other lesser planets have no captured comets to their credit, but their attraction has changed the orbits of several. The periodic comets, then, are moving about the sun like the planets, except that their orbits are elliptical instead of circular or nearly so.

In bulk a comet is the largest of celestial objects, but its density is not great. This is shown by the fact that no comet has been known to alter the movement of any of the planets, even in the slightest degree, although its own course has been greatly changed by them. The comet exercises a certain attractive force, but its mass is so small that the effect upon the earth and other planets is not felt. Some one has said that a comet properly packed could be carried in a hat box. This, of course, is an exaggeration, but the idea holds.

The particles of a comet are supposed to be extremely small, some say not bigger than a pinhead on an average and the largest masses only a few feet in diameter. These particles are only loosely joined together and scattered over an immense territory. It is not hard to understand then that the fate of a comet is eventually to go to pieces, to spread its particles out so much that, no longer attracted by one another they do not act in unison, but each for itself pursues its way about the sun. The longer a comet has been in the system the more are its particles spread out. The comet eventually ceases to be a comet and becomes simply a swarm of meteors. A large proportion of comet and meteor swarms more in or near the plane of the planets, and hence it follows that the earth crosses or passes near the paths of these swarms every year in its journey around the sun, and there are at such times showers of shooting stars.

Only one comet has thus far been seen to break up—that discovered in 1826 by Biela, an Austrian officer. It had a period of 6.6 years and its orbit approached close to that of the earth. Indeed, at its return in 1832 a panic known as the "comet scare," was started in southern France by the announcement that it was going to come in collision with the earth. The earth passed the critical point about a month too soon for a collision, however. In 1839 the comet was not seen on account of its unfavorable position in the sky. In 1846 it appeared as usual, but soon afterward split in two parts, which travelled side by side. In 1852 both comets were seen traveling along together but a million and a half miles apart. Since then neither has been seen, although both ought to have returned six times. On the night of November 27, 1872, however, when the earth was crossing the track of the lost comet there was a wonderful meteoric shower. The same thing happened in 1885 when the earth once more crossed the comet's path, and there was no longer much doubt that the cometic origin of meteoric showers had been demonstrated. The meteors from this swarm are called Andromendas from the constellation in the sky from which they seem to radiate. There is a considerable display from them every year about November 27.

The Leonids which radiate from the constellation here and fall about the 13th of November are also supposed to be from a disintegrated comet. This swarm furnished the finest meteoric shower ever witnessed in 1833. They seemed to be a huge umbrella. Fully 250,000 are estimated to have fallen within six hours.

A curious fact is that, with one exception, no miss has been known to reach the earth during a meteoric shower. On November 27, 1885, a piece of meteoric iron fell at Mazapil, in Northern Mexico, during the shower of Andromedas. This has been spoken of as a piece of Biela's comet, but it is generally regarded as a mere coincidence. The query why stones do not fall at such times leads to the discussion of the difference between meteors which are only seen and meteorites which are known to reach the earth.

The difference may be and probably is merely one of size and velocity. According to this view the cometic meteors are small and more swift; while the masses which reach the earth are much larger and moved independently and less rapidly. The meteor, or shooting star, is supposed to enter our atmosphere at an average rate of about twenty-five miles a second, appearing at an elevation of about seventy-five miles and traversing a distance of forty or fifty miles, becoming entirely consumed by the great heat generated. Most meteorites are also entirely consumed before they reach the earth, but they move only a few miles a second and usually penetrate close to the crust of the earth. The most remarkable which have fallen in this country during the present century and of which fragments have been found are those which fell at the following places: Weston, Conn., 1807; Bishopsville, S. C., 1843; Cabarrus County, N. C., 1849; New Concord, Ohio, 1860; Amana, Iowa, 1875, and Emmett County, Iowa, 1863. In several cases hundreds of fragments fell ranging in size from half an ounce to 500 pounds. There is no record of any one being killed or of any great damage done by a meteorite.—New York Tribune.

Swallowing Abilities of Snakes.

The jaws of the chicken snake are hung on hinges that can be taken apart or displaced for the time being as the case may be, and an entire Texas cottontail rabbit can be persuaded to enter head and all with little effort, and the body being made of an India-rubber-like material and very stretchable, the kicking little animal soon finds a lodgement in the stomach. His snakeship then carefully resets his jaws so that his mouth assumes its normal size and blissfully reposes for the succeeding six hours. The powerful gastric juice does the balance, and no Texan can testify that he ever heard of a chicken snake suffering from indigestion or chronic dyspepsia. The capture and digestion of chickens, song birds, turkey eggs, and rats constitute simple pastime to the snake, and does not call for a six-hour lay-off in feeding time.

The rattler's jaws can also unhinge when he has to tuck away an exceptional morsel of food like a grown rabbit, and, like his harmless competitor in the consumption of food, his body can expand to four times the regular size. An old-time cowboy Texas, who has spent a lifetime in roaming over the fertile prairies and along the creek bottoms of Calhoun County, which are covered with brush and timber, informed the reporter that he had seen a monster rattler conceal a jack rabbit with two vigorous gulps. When killed the deadly reptile was found to have eighteen rattles, and the jack rabbit was found to be kicking for dear life.

The chicken snake has important advantages over the rattler. He can move about over the country faster and is more cunning, and in times when food is scarce he is always better fed and more satisfied with life.

How Tissues Are Renewed.

Life consists of a series of changes of tissue, and the human economy is simply, as far as its material part is concerned, a machine, and primarily depends on food as the most important factor in keeping it in working order. When it is said that we commence to die as soon as we are born, it, of course, means that certain parts of the body immediately begin to perish; their existence is ephemeral; they come, go, are replenished and decay. They are the dying parts of that system of life which may last a little while but which must eventually yield to the inexorable laws of nature. The nails, the hair, etc., are observable as an instance of decay. The same rule applies to every other organ and tissue of the body, though it is not palpable to the naked eye. The skin is always peeling. The food that is taken in the one hour nourishes the system, and ejects what was taken the hour before.—New York Advertiser.

Weather in a Coffee.

To discover the weather secrets of the coming six hours or so, all you have to do is to drop two lumps of "best loaf" exactly into the centre of a cup filled with coffee and milk, in just proportions, and then to watch the surface of that refreshing beverage. Gaseous bubbles will presently arise and gather together in a group or groups. If they make a sudden rush to the side of the cup "much rain" will be the order of the day. Should their eccentric movement be performed with stately deliberation, "showery" will be the word. If, however, they retain their central station, slowly rotating until they burst, the barometer that does not indicate "set fair," may be assumed not to know its business.—New York World.

IN THE CRUCIBLES.

SEPARATING PURE GOLD AND SILVER FROM DROSS.

The Interesting Work Done by the Government Assayers—A Delicate Operation, Where Mistakes Are Expensive.

OUR Government receives through the Assay Office shipments of silver and gold of various degrees of fineness from the mines as bullion, besides foreign coin, old silver plate, jewelry and masses of precious metals in all forms and quantities; this is weighed out in bulk just as it comes, and is credited to the one shipping it to the office at the correct weight of the unrefined gold or silver. After the value has been determined by assay the gold is paid for with gold bars or coin, at the option of the owner, and the silver with silver bars only, no value being fixed upon the latter, owing to the constant changes in the market price of silver. No deposits are received of less than $100 in value; and if a quantity comes in of less amount the balance must be made up in current gold or silver coin or bullion. Each deposit is first melted by itself, and, when its value has been ascertained, goes with the rest through the melting and refining process. There is almost always considerable silver and baser metals in the deposits classed as gold; but deposits are classed as gold or silver according as the fineness of either metal predominates, no assays being made except for gold and silver.

The great value of the goods requires very correct weights. The great balance in the receiving office has a capacity of 10,000 ounces, and at the same time is adjusted so delicately that one one-hundredth of an ounce will be indicated by the swaying of the ponderous balance, which rests on a knife-edge above. From this room all deposits are taken to the melting room across the central hall of the building. Around this room are furnaces arranged for the melting of the metal; the gold is here melted together in pots or crucibles of black lead set into furnaces heated by gas jets.

The silver is melted in larger furnaces heated with coal. After the metal deposit has been thoroughly melted and become one homogeneous mass by stirring and fluxing it is taken out and cast in bricks of varying sizes, according to the amount in each deposit. When cooled, if it is all in one brick, a sample is cut by a heavy machine from each of the diagonally opposite corners. If there are several bricks in the deposit a sample is taken from the first and last bricks cast. Thus these samples are as far removed from each other as possible and consequently are as unlike as any that could be obtained from the mass.

These bricks are stamped with the proper stamp and initials and placed in the vaults. The samples, with tickets bearing corresponding numbers, are taken to two different men for assaying, and the exact value of the metal found in a percentage of gold or silver in 1000 parts. If the results differ by the one-thousandth part the melting is repeated, as it indicates an inequality in the deposit or imperfect work somewhere in the operation.

These samples are rolled out, and a tray containing several compartments, with as many specimens, are taken to to one assayer, and another tray of duplicates is taken to another assayer. The work which these men have to do is very interesting.

They sit at a long table on which are delicate, glass-inclosed balances. The assayer takes a fragment of the thin sample strip of metal, and estimates with practised hand and eye the percentage of gold and alloy; then carefully weighing out a required proportion of this metal, he rolls up a small sheet of lead foil into a cornucopia, and placing inside the metal weighed out, adds some minute disks of pure silver, already prepared, of different fixed weights, so proportioning the pure silver and the estimated silver alloy in the metal being assayed that, combined, it shall be nearly equal to twice the weight of gold therein.

After this mixture of one part gold and two parts silver, besides base metal alloys, has been wrapped in the lead foil a trayful of these prepared specimens is taken to the cupel furnace, each bearing its own assay number.

The cupels are small, porous, burnt-bone cups, or crucibles, manufactured in the building by pressing the pure, white, moist bone dust into a mold and then allowing the cups to dry for two months. Each dainty package of metal is placed in a cupel, and a small, gas furnace, heated to an intense heat, receives a large number of these, arranged in systematic order, covering the bottom of the oven. Being melted, the lead sinks into the porous substance of the cup, carrying with it the base metals and leaving a mass of pure silver and gold. On removing the cupels this metal quickly solidifies into a brigut, round button at the bottom.

It is then removed, tapped lightly with a hammer to free it from any outside matter, and after being weighed again, is rolled out into a thin strip, coiled up on a stick, and a basket-like platinum case with many small receptacles is filled with these small specimens and boiled for ten minutes in nitric acid; this combines chemically with the silver, leaving the gold in a spongy mass, very pure, but dark and unrecognizable in color. This pure gold is then weighed by the assayer, and the ratio between this and the weight of samples used in the test shows the proportion of gold and silver in the metal deposited. This process is for ascertaining the proportion of gold and silver in a gold deposit.

The value of silver is determined by chemical action, called the "wet process." The value of the deposit being thus carefully estimated by separate assays, the depositor is paid for the gold in gold coin or bars and in silver bars only for the silver deposited, because of the fluctuations in the price of silver in the markets, the legal charges being deducted for the operation of parting, refining, etc. The deposits then become the property of the Government, and are taken to the large six-story refinery in the rear of the Assay Office. All the deposits are weighed again when brought into this department, and the calculated amount of the gold and silver, determined by the assay, credited to the receiving department. After passing through the refinery the pure gold and silver returned as the results of the process must equal very nearly this amount.

The process of refining begins with the mixture of the different deposits of gold and silver in more or less pure state, so that the silver shall be about double the weight of the gold, this proportion being the most effective in the chemical processes to follow. The metals are then combined by melting them together, and when this alloy is cooled to a moderate heat, the experienced workman pours the metal from a ladle in a fine steady stream into cold water. The effect of this is to produce a very flaky deposit of granulations, which present the largest possible surface to the boiling sulphuric acid in the large iron boilers to which it is taken.

The silver here combines with the sulphur of the acid, forming a sulphate of silver and leaving only the gold in the granulations. These gold granulations are treated seven times to this process. The sulphate of silver in the liquid solution is turned in baths or vats lined with lead containing sheets of copper. Here another chemical action takes place. Being heated, the sulphur unites with the copper, and the silver is left in a powder at the bottom.

These finely-powdered deposits of gold and silver in no way appear valuable to the unpracticed eye, looking like a mass of ashes as much as anything. After being repeatedly washed in water they are pressed into cheese-shaped cakes in a hydraulic and hydrostatic press of 300 tons pressure. After being thoroughly dried in an oven the cakes are ready for the melting pots and brick molds. Now, having reached a nearly pure state, the bricks are returned to the storage vaults, stamped with the official mark of the Assay Office, and are ready for payment to depositors or for coinage at the mint, if required.

Great precaution is taken to prevent any losses. The employes are tried and true men, many of them having been here since the establishment of the office nearly thirty-eight years ago. All the clothing is changed and baths taken before leaving the refinery, three men preparing for home at the same time, thus preventing any yielding to temptation. The base products of the refinery are sold. The refuse, dirt, etc., is disposed of at auction once in three months to refiners, who use it as a flux in their own establishments.—New York Mail and Express.

The Growth of Berlin.

Berlin is enlarging its boundaries, and suburban towns are to be taken into the city within a short time which will give it a population of more than 3,000,000. This will make it the second city of the world, for Paris has less than 2,500,000 and New York and Brooklyn together counted up by the last census only 2,250,000. Berlin has grown like a green bay tree since the Franco-Prussian war, and there is no city in the United States which has increased so fast in population. In 1860 she had less than 500,000 people, and before she went to war with France she had only 750,000. After the war the people flocked in from all parts of Germany, new houses were built everywhere and, and, on the basis of the $1,000,000,000 which Germany was to receive from France, the capital had a great boom. It had a panic in 1873, but it recovered from this and it has been growing steadily from that time to this. It now covers the area of twenty-five 640-acre farms and the Spree Valley, upon which it is built, is as flat a floor. It is built on a sort of sandy plain and the Spree River runs through it, and there are canals and arms of this which cut up the city and which are covered with beautiful bridges. There is no place in the world where you find such uniformity of good buildings. The houses are of vast size, and you can drive for miles through broad, well-paved streets which are walled with three, four and five-story houses, all looking clean and neat. The most of these houses are of brick, covered with stucco, and it is only in the old parts of the city that you find any monstrosities in architecture.—Chicago Herald.

Juvenile Royalty on Its Dignity.

It is related that the great Spanish leader Canovas visited the youthful King of Spain during his recent illness and, greeting him familiarly, said: "How is Alfansito (Little Alfonso)?" The juvenile royalty glowered darkly at his visitor for a moment, and then stiffly replied: "To mamma I am Alfonsito; to thee I am the King."—Picayune.

Fruit for Food.

Fruit culture should be quite as closely associated with family use as with market. I have eaten apples all my life, but never learned how to make the best use of them till last winter; it is worth living half a century to find out the real value of the fruit. Now we eat apples half an hour before our meals instead of afterward. We eat all we want before breakfast and before dinner. The result has been so decidedly in favor of the fruit diet that we have very largely dropped meat. The action of the acid is then admirable in aiding digestion, while if eaten after meals the apple is likely to prove a burden. We follow the same line in using grapes, pears, cherries and berries.

If disturbed by a headache or dyspepsia in summer, I climb a cherry tree and eat all I can reach and relish. In order to have cherries all summer I cover a dozen trees with mosquito netting to keep off the birds. Currants and gooseberries I find very wholesome eaten raw from the bushes before going to the dining table. Nature has prepared a large amount of food already cooked, exactly fitted for all demands of the human system. Our kitchen cooking never equals nature's. I am by no means a vegetarian or a fruitarian, but I am convinced that we have not yet measured the value of fruit as a diet with milk, eggs and vegetables. Some one being told that such fruit would not give a workman muscular strength, pointed to his adviser's oxen, saying, "Yet these oxen eat no meat."—American Gardening.

In the chapter on "Brain and Nerve Foods," contained in his recent work on "Nerve Waste," Dr. H. C. Sawyer gives the following unsolicited testimony to the value of Walter Baker & Co.'s Cocoa: "Baker's Breakfast Cocoa is a light preparation which can be heartily recommended; it contains only so much fat as can be digested by almost anyone, and is peculiar in not cloying or palling after a time, as so many cocoa preparations do. Such a beverage is far more wholesome and more agreeable, after one becomes used to it, than tea, which is much over-used. It is especially useful for children; our little boy has drunk it since he was a year and a half old, has become inordinately fond of it, and has kept as 'fat as a pig,' as we say."

A new folding baby carriage is one that can be folded up to go in a trunk.

Seconding the motion—Taking the time of a sprinter.—Truth.

Rider Haggard thinks Egypt the most interesting and least explored country in the world.

Crocodile eggs are much sought after by the natives of Madagascar.

The Value of a Good Cat.

It only needs a wet season, as the early part of 1892 was, to enormously increase the mice pest, and make every farmer, especially one who is a fruit grower, appreciate the value of a good mouser. The story of Whittington and his cat might be repeated on many a modern farm if cats were not thought so common as to have no appreciable value. The most ordinary dog is valued highly by his owner, but there are few who will say a good word for the cat, whose service to man is fully as valuable.—Boston Cultivator.

THE LUCKY MAN.

Courtleigh—See here, Marigold, you don't keep your word. When we were both after Miss Gotrox it was agreed between us that the lucky man should pay the other $10,000.

Marigold—Well?

Courtleigh—Well, you married her.

Marigold—Exactly. But upon consideration I think you owe me the ten thousand.—[New York Herald.