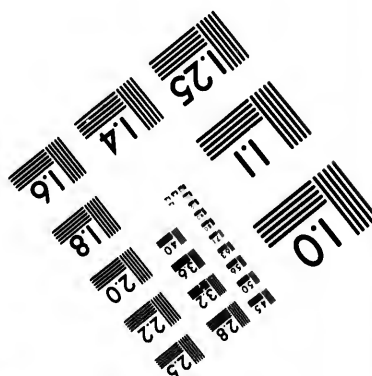
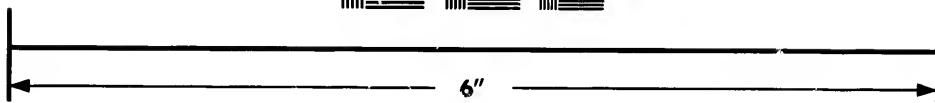
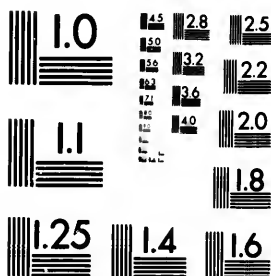


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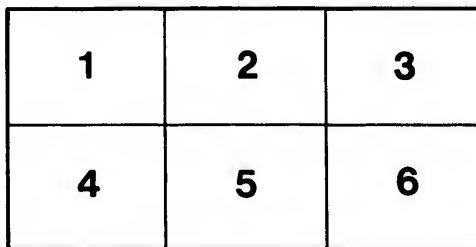
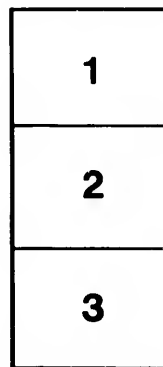
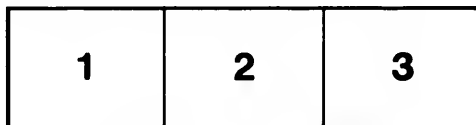
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## MESSENGERS FROM THE SKIES.

*Read before the Hamilton Association, February 25th, 1892.*

BY H. B. SMALL.

There is an old Norse legend, still retained in parts of Europe, that when a child is born, the Goddess of Destiny spins a thread and hangs a star thereon, which continues to shine whilst life lasts, but at the approach of death the thread of destiny breaks, and the stars fall headlong to the earth, and is extinguished. To this legend may be traced the not uncommon remark amongst the country folk of the Mother country at the present day when they see a fallen star, that "A life is going out."

All sorts of superstitions have been attached to meteors in by-gone days, and they have been regarded as omens of some great event or some dire calamity. We find in the Scriptures, associated with the calamities that were to befall Jerusalem, the expression, "The stars shall fall from heaven," and in Revelations, amidst all the tearful events described, are "The stars of heaven fell upon the earth," and "There fell a great star from heaven, burning, as it were a lamp."

In an old Latin chronicle, by Baldric, occurs the following passage, quoted in the Journal of the French Academy of Science, as adding testimony to the superstition regarding them. Baldric says, "Already, before the Council of Claremount, the stars had announced the progress of Christianity, for innumerable eyes in France saw them fall from Heaven, as thick as hail, on the 25th of April, 1095."

Ignorance is always the parent of superstition, and we have all probably read of the extreme terror the great November meteor shower of 1833 created amongst the Negroes of the South, who were convinced that it heralded the end of the world.

Virgil alluded to meteors as indicating storm, the passage translated by Dryden being as follows :—

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"Oft shall thou see, 'ere brooding storms arise,  
 Star after star glide headlong down the skies;  
 And where they shot, long trails of lingering light  
 Sweep far behind, and gild the shades of night."

To this day we often hear it said, that the wind will blow to-morrow from a certain quarter, as the stars fall in that direction.

In some old volumes of the "Gentleman's Magazine," especially those of 1793 and 1776, are some curious notions respecting shooting stars, and quite a controversy on a gelatinous or jelly-like substance they were supposed to deposit on the grass or trees, where they fell, called by the writers "star shot" or "star jelly," and explained by Withering as "tramezza nostoc."

One other anecdote of ignorance in this direction. The great November meteoric shower of 1833 was witnessed by a female servant, a new arrival from Erin, in South Carolina. Rising early to fodder cattle, she saw thousands of these meteors, till daylight stopped the display, but thought nothing remarkable of it, stating when talked to afterwards about it, that she paid no heed to it, as she thought that was perhaps the way the stars were put out every morning in this country."

The phenomenon of shooting or falling stars, or meteors, as they are more generally styled, is now acknowledged to have existed since the formation of the solar system, long anterior to the existence of man. On any clear evening, it is estimated a watchful observer may see on an average two shooting stars every five minutes, and at certain periods of the year in such abundance as to have obtained the name of "meteoric showers." These apparently emanate from a certain constellation, or from a point of space known as a "radiant" represented by some certain constellation, whilst single meteors appear to come from no particular point, but move in all directions, and from every part of the sky. These are styled "sporadic." In their normal condition these wandering bodies, before they reach our vision, are known as "meteoroids," and in their own proper orbit are never visible from the earth. They are then regular circumsolar bodies, obeying the laws of motion and gravitation as rigidly as the planets. Striking, or rather entering, our atmosphere at a speed of 48 miles per second, they at once become self-luminous from the heat engendered by friction with the atmospheric medium, and the arrested motion producing a sudden

compression of the air. To illustrate this, I may mention that there is a little instrument called an air match, consisting of a piston and cylinder, somewhat like a syringe, in which a light can be struck by suddenly forcing down the piston upon the air below in the cylinder. As the air cannot escape it is suddenly compressed, and gives out a spark sufficient to ignite a piece of tinder at the bottom of the cylinder. Some idea from this may be formed of the heat evolved by the motion of a large body in the atmosphere with the velocity of a meteor. A combustible body, under such circumstances, would be speedily ignited, but could not burn freely till reaching air of greater density; thus, on entering the lower portion of the atmosphere, it would burn with great rapidity, and, accordance to its distance, be more or less, or entirely consumed before reaching the earth. It has been estimated that by the time they have traversed a space of 50 miles, the meteoroid, or meteor, as it has then become, is heated, melted, evaporated and extinguished in a period of not less than a second of time. The height from us at which they become heated to visibility is sometimes as much as 200 miles, but the average has been put down at 75 miles, and extinction about 50 miles above the earth. The length of the arc or course they describe in their visible path varies greatly, owing to the position of the observer. One may flash up, increasing in size and brilliancy, and disappear without seemingly describing any arc. The course of such a one is directly towards the observer, but to another person 300 or more miles apart, it would exhibit an arc of several degrees in length.

Different and varied views are held by philosophers as to the origin of meteoroids. One theory is, that they are fragments of an exploded or shattered planet filling interplanetary space, most of which, through holding orbits round the sun, will ultimately fall into that body, and serve as fuel for that central orb. To illustrate this, supposing our earth, through some gigantic convulsion became disintegrated, and burst into numerous portions, these would continue to move on becoming more or less erratic in their movements; the smaller portions would first feel the influence of disturbing agencies larger than the earth, and moving inward, would become entangled, as it were, in the resisting medium in space which is now acknowledged to exist. This resistance would change their orbits, and the lighter particles would form a more erratic orbit than the

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heavier or denser ones. They would gravitate towards Venus, which lies inside our orbit, and be the first to fall on it, whilst the denser fragments, metalloids and metals, would be the last.

Dr. Brewster favors the theory of meteoroids being fragments of a large planet similarly as the asteroids, the previous existence of which was long ago suggested by the vast chasm between Mars and Jupiter, where only asteroids have as yet been observed. Dr. Olbers, the discoverer of three of the known asteroids, held the same idea, and that the lesser fragments, coming within the attractive power of a planet would fall towards it, and when entering its atmosphere would go through all the conditions referred to, fusion, luminosity, etc. Sir John Herschel, however, differs from this theory. The diameter of Jupiter, the largest known body in our planetary system, is 80,000 miles, whilst that of Clio, one of the smallest, is only 16 miles. Chladin, a philosopher, at the end of the last century, thought that bodies might exist as much smaller in comparison as Clio to Jupiter, having only 16 feet diameter, and in the same ratio we come down to 1-25th of an inch, mere cosmic dust. To this cosmic dust has been attributed that peculiar fleecy brightness known as the Zodiacal light. Any observer of the western sky at this season of the year (the early spring) for about an hour after sunset, may see a soft, faint cone-shaped glow light extending about 40 degrees, following nearly the sun's path in the heavens. Near the equator, where the elliptic rises high above the horizon, it can be seen nearly all the year round, and in a very clear atmosphere in the tropics has been traced all the way across the heavens from east to west, forming a complete ring. The theory that now prevails is that the light from the sun when below our horizon reflected on the cosmical atoms of floating star-dust and meteoroids, is the cause of the soft celestial glow that now lingers evening after evening in our western sky. An illustration of this is offered by a ray of light which finds its way into a darkened room through a small orifice, revealing as motes dancing in the sunbeam the particles of dust floating in the air of the room, but visible only where the entering ray of light falls athwart them.

In this connection, the recent deep sea soundings of the "Challenger" have brought to light a curious fact. Sir Wyville Thomson found that beds of sediment were being slowly formed on the deepest ocean floors, but so slow was the rate of deposition



that it has been compared to a fall of dust in an unoccupied room. No better proof of this can be given than that an examination of the abyssal mud disclosed the presence of an appreciable proportion of meteoric iron, the product of those falling stars which dissipate themselves on entering our atmosphere. Professor Geikie says, in a recent geological lecture in Scotland:—"To learn that mud gathers there so slowly that the very star-dust forms an appreciable part of it brings home to us as hardly anything else could do, the idea of undisturbed and slow accumulation."

An interesting memoir by M. Tschermak, of the University of Wissenschaften, was published in 1875, on the source of meteoroids, and a paper on his memoir was, a few years ago, read before the Royal Irish Academy by Mr. Robert Ball. Tschermak claims a volcanic source in some celestial body. Mr. Ball follows the theory further, and by able reasoning shows that, if ejected from the planets or asteroids, there would only be a chance of one in 50,000 of them falling on the earth. In the early stage of our own earth's history, long anterior to life, when mighty convulsions were rending it, colossal volcanoes may have existed with explosive energy enough to drive missiles upwards with a velocity which would carry them far enough from the earth to a point where they would continue to move in orbits round the sun, crossing at each revolution the point of the earth's track from which they were originally discharged. If this were the case, there are now doubtless myriads of those projectiles moving through the solar system, the only common feature of whose orbit is that they all intersect the track of the earth, and it and they now and then meeting, the point of intersection would be marked by the descent of a meteorite. This theory was hinted at by Dr. Phipson, in a work published by him in 1866, and Mr. Lawrence Smith, another later writer on the subject, inclines to the same view. No volcano now exists with explosive energy enough to eject fragments that could constitute future meteoroids, and if such ever did exist, it could only be in the early stages of the earth's history.

Another, and an ingenious theory advanced by Professor Newton, of Yale College, and one meeting with general acceptance is, that meteoroids are fragments of or attendants on a comet, and in a lecture of his in 1879, he scientifically endeavors to prove this. Speaking of the recurring November meteoric showers which

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manifest themselves at their maximum every 33 years, he says: "Vast masses of these small bodies move in a long thin stream around the sun, and the earth at stated times plunges through them, taking with its atmosphere each time scores of millions of them. Their orbit is described in 33.14th years. They go out a little further than the planet Uranus, or about 20 times as far as the earth is from the sun. While they all describe the same orbit they are not collected in one compact group, but taking four to five years to pass a given point in the orbit, they may be likened to a train several hundred of millions of miles long, but only a few thousands in thickness. Along with this train travels a comet." Every August, about the 10th of the month, there is another star sprinkle, or slighter display of meteors (known among the common people as St. Lawrence's tears), and a comet, whose period is 125 years, moves in the plane with these meteors, and in a like orbit. Again, early in December there are star showers, the meteoroids composing them travelling in the orbit of Bielas' comet. In April slight showers again occur, connected with another comet's orbit. The sporadic meteors of nightly occurrence are but outlying stragglers of a number of meteoroid streams, and the leading problem of meteor science to-day is to find these streams and their attendant comet. Professor Newton says the known comets have been apparently growing smaller with their successive returns. Halley's comet was much brighter in its earlier than in its later recurrences. Bielas' comet has divided into two, if not more parts, and has perhaps gone altogether to pieces, as it could not be found in 1872, where it should have appeared. The question naturally arises, what causes a comet to break up? This is yet only a matter of speculation, but this much is known, that comets surely come from stellar space, in whose unimaginable degree of cold a condensing mass furnished heat for the making of a meteoroid. In cooling, or by some internal convulsion, the mass may break and enter the solar system, either as a mass of pebbles or as one huge body. Nearing the sun, new and strong forces act on it. The same heat and repulsion that develop and drive off from a comet in one direction a tail 100,000,000 miles long, may have worked off and scattered in another direction solid fragments to wander in their own orbit round the sun—an infinitesimal comet for millions of years—till entering the earth's atmosphere,

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one by one they crash through it either to fall on the ground or to be annihilated by friction before reaching it.

Professor Schiaparelli, an Italian authority on these questions, regards meteoroids as original inmates or portions of one of what he styles star drifts, and of whose existence decided proofs are given by Proctor, and composing with other stars of the same vast eddy attendant bodies accompanying in its journey through space the general drift or star family of which the sun forms part. On this assumption they are bodies from some more distant space than the star family of the sun, wanderers from more distant star drifts

The conflagration of a star through contact with meteoroid bodies is not an unknown occurrence. The first on record took place 2,000 years ago, and is described by Hipparchus. It was seen blazing in full daylight. A similar event is recorded in 945, in 1264 and in 1572. In 1596 Fabricius observed a similar occurrence, followed by another in 1604. In 1673 another made its appearance, remaining visible for two years, whilst as recently as 1848, a similar event was noticed, and a few years ago another appeared, which was ably written upon by Proctor in an article of his in 'Belgravia.' At the present time a burning star is apparent in the constellation Auriga, which is being watched with great interest. In 1859 two meteoric masses are recorded as having fallen into the sun and affected the whole frame of the earth. Vivid auroras were seen where they had never before been seen, accompanied by electro-magnetic disturbances all over the world. In many parts the telegraph lines refused to work, signal men received severe shocks, and at Boston and elsewhere, a flame of fire followed the pen of Baios' telegraph. This was the effect of two comparatively small meteors. What would be the effect of a comet, bearing in its flight many millions of these, falling into the sun, can hardly be understood. It would be only temporary, but no student of science would be left to record it. Proctor, however, reassures us by saying that all but one of the known star conflagrations have occurred in the zone of the Milky Way, and that one, in a region connected with the Milky Way by a stream of stars; and if among the comets in attendance on our sun there is one whose orbit intersects the sun's globe, it must already have struck it long before the era of man.

An interesting question has recently been put forward by the 'Lancet,' the well-known English medical publication, respecting

the possible earth. Proving by means of bodies, and bands produced the 'Lancet' perspired through doubt that the air we breathe, the composition, and the spaces, and tuted, the various forms of do not contain ingredients that the scope find exert a considerable Speculation but, it seems from the 'Lancet' other attent

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the possible influence of meteoric matter on the animal life of the earth. Professor Herschel has succeeded in examining and analyzing by means of the spectroscope, the light of seventeen of these bodies, and he has succeeded in detecting the well-known yellow bands produced by sodium in combustion. "It is strange," says the 'Lancet,' "to consider what becomes of all the sodium thus dispersed throughout the upper regions of the air, as there can be no doubt that in some form or other it reaches the earth. The very air we breathe must at all times contain, in however minute proportion, the cosmical dust thus brought to us from the interplanetary spaces, and as the different meteoric systems are differently constituted, the air we breathe is constantly being impregnated with various forms of metallic dust. It is not certain that deleterious results do not occasionally flow from an excess of some of the elements contained in meteors. Professor Roscoe goes so far as to conjecture that the soda, which all accustomed to work with the spectroscope find present everywhere, may by its antiseptic properties, exert a considerable influence in maintaining the public health." Speculations and hypotheses of this kind are no doubt interesting, but, it seems to me, barren of utility till proved, and I merely quote from the 'Lancet' to show that the study of meteors is attracting other attention than that of astronomers.

Atmospheric electricity is now also being attributed to meteoric influence, and Professor Gavi, in 1878, leans to the idea that a certain amount of heat is introduced into our atmosphere by the meteors that enter it, and Professor Everett attributes the sudden variations of the needle of the electrometer from no apparent assignable external cause, to the same influence. He adds, our great want at present is balloon observations, and says that he "feels convinced that friction of the air or of the solid particles contained in it is one cause of the generation of electricity in the air."

Scientific theories necessarily lack finality. Sufficient to-day to explain all the known facts, to-morrow discoveries may show their inadequacy, and lead to their modification or abandonment.

I will now devote a few minutes to meteorites and the historical records of some of the more celebrated that have fallen from time to time, on the earth.

Amongst all people, and in almost all ages, a general tradition has prevailed of the fall of solid bodies from the sky, under various

denominations, and the meteorite has no doubt given rise to the miscalled thunderbolt.

In barbarous times, when *omne ignotum pro mirifico* prevailed, *i. e.*, when all that was unaccountable was looked on as a miracle, these missiles were ascribed to the anger of an offended Deity, and antiquarians even attribute to them the origin of the religious deference paid to the worship of stones amongst the nations of early days. The image of Diana mentioned in the Acts of the Apostles, as believed by the Ephesians to have fallen down from Jupiter, and the Palladium or sacred statue of Minerva, said to have fallen from heaven, and to have been preserved in Troy as a treasure, on the safety of which that of the city depended, had each, no doubt, this origin. It is only of late years that the attention of scientists has been given to ascertaining the origin of these falling bodies, philosophers having, up to 1802, regarded the idea of solid bodies being precipitated to the earth as entertained by the ancients, a vulgar error. In that year Mr. Howard submitted to the Royal Society a paper containing an accurate examination of testimony connected with such events, and a minute analysis of several of these substances which were said to have fallen in different parts of the globe. This excited an animated discussion, and led to a more careful study of the subject which in the last three or four years has had more light thrown on it than in all previous time, and there is now scarcely any scientific periodical which does not contain allusion more or less pointed, to meteors and meteorites.

Meteorites are divided into three groups, of which the distinguishing feature lies in the relative amounts and arrangement of the iron and stony material, or silicates, which they contain. All contain iron, almost invariably associated with nickel and cobalt. The three divisions are *aeorolites*, *aerosiderites*, and *aerosiderolites*. An *aeorolite* is a meteorite composed chiefly of stony material, but containing nodules of nickeliferous iron. An *aerosiderite* is composed of solid nickeliferous iron, with little or no stony matter adhering, and an *aerosiderolite* is an intermediate variety of very rare occurrence in which the iron forming a skeleton is honey-combed in every direction by the stony portion. Meteorites are not found to contain any new elements, or rather, no elements not common to our earth are held by them; this leads to the conclusion that throughout the

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universe there is unity of design in physical constitution as well as in mechanical arrangement.

By the combined rotation and revolution of the earth, that portion of it where it is sunset moves from its zenith, whilst that portion where it is sunrise moves towards its zenith, or rather towards that portion of the zodiac nearest its zenith, and thus the latter has more chance of coming in contact with isolated flying masses. Those falling at sunset must overtake the earth in its course, and thus show by their velocity that it is other force than planetary attraction which propelled them. In this connection Proctor puts forward the idea that the destruction of Sodom and Gomorrah was occasioned by a meteoric down-fall, and this ingenious theory has been followed by Mr. E. L. Garbett, a well-known architect. Tempel's comet, in whose track the November meteors travel, is shown to have passed very near the earth about the time to which tradition assigns the destruction of these cities. Supposing that the meteors, composing or accompanying this comet, broke through the air, they would, if strewn with proportionate density, fall in a compact shower on whatever part of the earth's surface happened to be most fully exposed to them. Now it is distinctly stated, "The sun was risen upon the earth before Lot entered Zoar. *Then* the Lord rained brimstone and fire out of heaven;" so that at that time the destroyed cities lay almost centrally on that disk of the earth which was turned toward the radiant of the November meteors. Thus the earth at its full speed of 1100 miles a minute, or 18 miles a second, meeting the November meteors, which travel at a speed of from 24 to 40 miles, would cause just such a catastrophe. As a still further corroboration of this, we know that the whole plain, the site of these cities, is impregnated with salt, of which sodium is the chief component, and which has, as before shown, been detected by Sir Wm. Herschel in spectroscopic analysis in the yellow bands of meteoric light.

The discomfiture of the Amorites, mentioned in the Book of Joshua, may have been from a similar cause, the account furnished being that "the Lord cast down great stones from heaven upon them."

In the Acts of the Apostles, where the town clerk of Ephesus spoke of the image which fell down from Jupiter, the word "image" is not in the original, the reading there being "that which" fell down.

Amongst the earliest records of meteorites may be mentioned one spoken of by Herodotus, which fell in Thrace, 467 B. C., and was still in existence in his time. This he describes as about the size of a wagon. The earliest records go back 644 B. C. to 333 A. D. Anaxagoras, Democritus and Plutarch, all agreed on meteorites, and though ignorant of the comet-lore of to-day, believed they were always rotating invisible to us. A large meteoric stone is recorded at Lucania 54 B. C. In Saxony (*Annales Fuldenses*) a great shower of stones in 823 A. D., destroyed men and cattle, and fired 35 villages; 921, 1010, 1164 and 1304, were remarkable for them. In 1492, one fell in Alsace weighing 260 lbs., and is still shown in the church at Ensisheim. In 1501, at Padua, 1200 stones fell, one weighing 160 lbs. and another 60 lbs. In 1511 a heavy fall occurred in Crema. In 1676 a large one burst over Leghorn, and the fragments fell into the sea. In 1790 a shower of stones fell at Aden. Later records are more detailed than earlier ones, where superstitious awe seems to have retarded investigation or description. In 1803, at L'Aigle, in France, a cloud appeared, out of which, during explosions lasting five or six minutes, and described as terrific thunder, a large number of stones fell. In 1807 an aerolite of 140 lbs. fell at Smolensk, in Russia, and in 1808, in Moravia, between 200 and 300 fell. At Brandenburg and Potsdam, and in England, a deposit of dust was noticed on the water, buildings, etc., after meteoric displays in 1818 and 1822, and in 1856 the decks of a vessel 240 miles off land, in the Indian Ocean, were covered with a fall of stones the size of shot, which microscopical examination proved were of true cosmical origin, and not volcanic, as was first suspected. In 1783 a bright meteor was seen from Greenwich Observatory, and noticed all over England, the diameter of which was estimated at one mile, and its speed at 1000 miles a minute. No fragments of it were known to have been found, but after its explosion the sound took ten minutes reaching the earth.

Speaking of the sound, I have no doubt that the "thunder in a cloudless sky" spoken of in the earliest records of Latium, and deemed such an ill omen by soothsayers, must have originated from meteoric concussion.

In 1807 a large shower of meteoric stones fell at Weston, in Connecticut, of which a full account was published by Professors Silliman and Kingsley, of Yale College. In the British Museum

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there are a very large number of specimens of meteoric stones, and the National Museum at Washington is not deficient in such specimens. In the Royal Academy at Stockholm are exhibited several, the largest weighing 25 tons, which were brought from Greenland by a Swedish Expedition of 1870, these being part of the "iron stones," of the existence of which the Esquimaux of Baffin's Bay had informed Captain Ross, the Arctic navigator.

To come down to recent years, in April, 1875, and May, 1879, two meteors of great size and brilliancy were observed in the Western States, illuminating the whole of Iowa, and parts of Missouri, Illinois and Wisconsin. Singularly enough both exploded over Iowa, scattering fragments of their mass over areas embracing six counties, accompanied with a noise like thunder. A full account is given in the Iowa State records, where it is stated that their chemical constitution differed from all meteorites analyzed elsewhere, these containing 7 per cent. of iron, a tenth of 1 per cent. of nickel, 17 per cent. of calcium, 47 per cent. of silica and 27 per cent. of ferrous oxide. The fragments of the meteor of 1879 fell chiefly in Emmett County, one of which, weighing 470 lbs., was sent to the British Museum, and another of 170 lbs. was sent to the State Museum of Minneapolis. At the time of its fall, some boys were herding cattle near a small lake five or six miles south-west of where the large masses fell, and they reported that just after the fireball passed over they saw and heard what seemed like a shower of hail-stones falling on the water. Two large fragments of this meteor fell by the roadside, and a lawsuit was undertaken to decide whether they were the property of the finder, as wild game, or of the owner of the land, as being real estate; and it was decided in favor of the latter.

In 1878, near Covington, Indiana, a Mr. Grover, of Newton Fountain County, was killed in his bed by what was supposed to be lightning, but which further examination showed was a meteoric stone of pyramidal shape, weighing 20 lbs. This was unearthed in the cellar, some feet under the ground, traced there by the rent torn through floors and everything in its passage. The corpse was mangled as if by a cannon shot.

In 1879 near Bucyrus, Ohio, a similar death occurred, the victim being a Mr. Meisenthaler, of Whitestone Township, a well-known cattle raiser of that district. As he was driving his cattle at



daylight, he was struck by a meteorite and killed. This missile is reported as having apparently come from the west, at an angle of about 60 degrees, its obliquity being ascertained by its having in its passage cut through the limbs of a tall maple tree like a cannon ball. He was struck on or under the shoulder, whence it passed through him to above the left hip, and buried itself two feet in the soft black ground. The greater part of his body was crushed into the earth beneath the stone, which was described as of a rough, round form, and resembling iron pyrites. No doubt many similar deaths have occurred but are unrecorded. I could cite numerous instances, which I have in my note-books, of meteorites falling close by parties who observed them, which are authenticated as reliable.

On December 15th, 1884, at 3 a. m., a large meteor passed over Quebec, and fell on the farm of Mr. LeFrancois, near Chateau Richer, 15 miles distant, burying itself to a depth of 5 or 6 feet, and measured, when excavated, five feet in circumference.

On January 27th, 1885, a large meteor passed over the Island of Guernsey, terrifying the inhabitants, and was seen by the crew of a steamer off the island, to fall into the sea, to the west.

On September 13th, 1885, a rumbling sound awakened the residents of Akron, Ohio, at 4 a. m., caused by a large meteor passing over the place, which illuminated the country for a great distance and was supposed to have struck the ground near the eastern part of that city.

In June, 1886, a large meteor fell into Spring Pond, near St. Regis Falls, New York State, scattering mud in every direction and killing numbers of fish.

On June 12th, 1887, a large meteoric stone fell near St. Joseph, Indiana, burying itself some 12 feet in the earth, and was estimated, before it broke, to have weighed nearly two tons.

On July 1st, 1888, a large meteor was seen passing over Montreal, and was noticed also during daylight at Appleton, Wisconsin, rivalling the sun in brightness. It was visible for half a minute, but was attended with no noise.

On February 4th, 1890, a large meteor fell near Granbury, Texas, striking the peak of one of the Comanche mountains, and knocking huge boulders into the valley, barely missing in their descent Major Torres' house.

On April 15th, 1890, a brilliant meteor passed over Glencoe,

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Illinois, about 10 p.m. with a loud report, and exploded a short distance east of the town. During the night the moon and stars were faintly obscured by a fine rain of ashes and minute cinders, sifting away to a light dust or gray powder.

On the same date a ball of fire passed over Levis, P. Q., at midnight, with a loud report, but no trace could be found on the ground.

On May 4th, 1890, a meteor was seen over Hancock, Kossuth, Palo Alto, Clay, Dickinson and Emmett counties, Iowa. It appeared like a large ball of fire at Angora, separating into two over that point, and then bursting into fragments, the sound of the explosion being heard three minutes afterwards. Buildings were shaken, windows broken, and a quaking of the earth was felt. A column of smoke rose, of dense appearance, as far as the eye could reach towards the zenith.

On February 24th, 1891, a large meteor passed over Portland, Maine, and was supposed to have fallen in Franklin County.

The London "Standard" of November 22nd, 1882, describing a large meteor which a few days previously passed over the northern sky, says an aurora was unusually bright at the time this strange torpedo-shaped luminous body passed majestically from east to west. It was described as resembling the glow produced by an electric current passing through a vacuum. Coincident with its appearance there was a magnetic storm of remarkable intensity. So violently were the telegraph and telephone wires deranged by the strong earth currents that their working was rendered impossible. American electricians equally experienced this interruption, and it was at the moment when the magnetic storm reached its intensity that the luminous body sailed across the sky. At Sidmouth the aurora was of an exquisite rose pink color. During the passage of the meteor the block signalling apparatus was greatly affected, two separate sections working at the same time, and the needle of the speaking instrument, instead of being read at vertical was obliged to be read at an angle of 45°. The block bells continued to ring during the passage of the object and for some seconds after its disappearance, and the signals were generally disarranged. At the same period very large spots existed on the sun's surface.

I believe the largest aerolite in any collection is in Brazil, weighing 14,000 lbs.

But time will not allow me to delay longer. I have been unable to hear of any meteoric stones existing in this section, and should be very glad to gain information of any such, if existing. It may be a new object for our Hamilton naturalists to look out for in their rambles, and of peculiar interest as leading to the study of a branch of physics only recently attracting attention.

