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ART. I.—*An account of the Meteor which burst over Weston in Connecticut, in December, 1807, and of the falling of stones on that occasion;* by Professors SILLIMAN and KINGSLEY.\*

ON the 14th of December, 1807, about half past 6 o'clock, A. M., a meteor was seen moving through the atmosphere, with very great velocity, and was heard to explode over the town of Weston, in Connecticut, about 25 miles west of New Haven. Nathan Wheeler, Esq., of Weston, one of the justices of the court of common pleas for the county of Fairfield, a gentleman of great respectability, and of undoubted veracity, who seems to have been entirely uninfluenced by fear or imagination, was passing at the time through an inclosure adjoining his house, and had an opportunity of witnessing the whole phenomenon. From him the account of the appearance, progress, and explosion of the meteor, is principally derived. The morning was somewhat cloudy. The clouds were dispersed in unequal masses, being in some places thick and opaque, and in others fleecy and partially transparent. Numerous spots of unclouded sky were visible, and along the northern part of the horizon a space of ten or fifteen degrees was perfectly clear. The attention of Judge Wheeler was first drawn by a sudden flash of light, which illuminated every object. Looking up he discovered in the north a globe of fire, just then passing behind the cloud, which obscured, though it did not entirely hide the meteor. In this

\* No detailed account of the Weston Meteor has ever appeared in this Journal. It has been thought proper therefore to reproduce the following account from the Memoirs of the Connecticut Academy of Arts and Sciences. This is introductory to some considerations upon the path of the body.

situation its appearance was distinct, and well defined, like that of the sun seen through a mist. It rose from the north, and proceeded in a direction nearly perpendicular to the horizon, but inclining, by a very small angle, to the west, and deviating a little from the plane of a great circle, but in pretty large curves, sometimes on one side of the plane, and sometimes on the other, but never making an angle with it of more than 4 or 5 degrees. Its apparent diameter was about one-half or two-thirds the apparent diameter of the full moon. Its progress was not so rapid as that of common meteors and shooting stars. When it passed behind the thinner clouds, it appeared brighter than before ; and when it passed the spots of clear sky, it flashed with a vivid light, yet not so intense as the lightning in a thunder storm, but rather like what is commonly called *heat lightning*.

Where it was not too much obscured by thick clouds, a waving conical train of paler light was seen to attend it, in length about 10 or 12 diameters of the body. In the clear sky a brisk scintillation was observed about the body of the meteor, like that of a burning firebrand carried against the wind.

It disappeared about 15 degrees short of the zenith, and about the same number of degrees west of the meridian. It did not vanish instantaneously, but grew, pretty rapidly, fainter and fainter, as a red hot cannon-ball would do, if cooling in the dark, only with much more rapidity.

There was no peculiar smell in the atmosphere, nor were any luminous masses seen to separate from the body. The whole period between its first appearance and total extinction, was estimated at about thirty seconds.

About thirty or forty seconds after this, three loud and distinct reports, like those of a four-pounder, near at hand, were heard. They succeeded each other with as much rapidity as was consistent with distinctness, and, altogether, did not occupy three seconds. Then followed a rapid succession of reports less loud, and running into each other, so as to produce a continued rumbling, like that of a cannon-ball rolling over a floor, sometimes louder, and at other times fainter : some compared it to the noise of a wagon, running rapidly down a long and stony hill ; or, to a volley of musketry, protracted into what is called, in military language, a *running fire*. This noise continued about as long as the body was in rising, and died away apparently in the direction from which the meteor came.

The accounts of others corresponded substantially with this. Time was differently estimated by different people. Some augmented the number of loud reports, and terror and imagination seem, in various instances, to have magnified every circumstance of the phenomenon.

The only thing which seemed of any importance beyond this statement, was derived from Mr. Elihu Staples, who said, that when the meteor disappeared, there were apparently three successive efforts or leaps of the fire-ball, which grew more dim at every throe, and disappeared with the last.

The meteor was seen as far south as New York ; and the explosion was heard, and a tremulous motion of the earth perceived, between forty and fifty miles north of Weston. From the various accounts which we have received of the appearance of this body at different places, we are inclined to believe, that the time between the disappearance and report, as estimated by Judge Wheeler, is too little, and that a minute is the least time which could have intervened. Taking this, therefore, for the time, and the apparent diameter of the body as only half that of the full moon, its real diameter could not be much less than 300 feet.\*

We now proceed to detail the consequences which followed the explosion and apparent extinction of this luminary.

We allude to the fall of a number of masses of stone in several places, principally within the town of Weston. The places which had been well ascertained at the period of our investigation were six. The most remote were about 9 or 10 miles distant from each other, in a line differing little from the course of the meteor. It is therefore probable that the successive masses fell in this order, the most northerly first, and the most southerly last. We think we are able to point out three principal places where stones have fallen, corresponding with the three loud cannon-like reports, and with the three leaps of the meteor, observed by Mr. Staples. There were some circumstances common to all the cases. There was in every instance, immediately after the explosions had ceased, a loud whizzing or roaring noise in the air, observed at all the places, and so far as was ascertained, at the moment of the fall. It excited in some the idea of a tornado ; in others, of a large cannon-shot in rapid motion, and it filled all with astonishment and apprehension of some impending catastrophe. In every instance, immediately after this, was heard a sudden and abrupt noise, like that of a ponderous body

\* From subsequent information it appears that this meteor was seen in the eastern part of Connecticut, in New Jersey, in the interior of the state of New York, and as high up, at least, as Rutland, in Vermont.

It was stated by Professor Day, in a discourse before the Connecticut Academy, that a gentleman who was riding in Colchester in Connecticut, which is about 50 miles east of Weston, saw this meteor distinctly ; it was passing within 15 or 20 degrees of the moon, and appeared to him to be about one-half as large as that luminary. It was justly remarked by Mr. Day that, if at this distance, it had this apparent diameter, its real diameter must have been 1200 or 1300 feet, or, about a quarter of a mile ; but, as the apparent diameter was not taken with an instrument, but by estimation, it was not supposed that this conclusion was perfectly exact. It is evident, at least, that the meteor must have been much higher, when it exploded, than was at first supposed.

striking the ground in its fall. Excepting one, the stones were more or less broken. The most important circumstances of the particular cases were as follows :

I. The most northerly fall was within the limits of Huntington, on the border of Weston, about 40 or 50 rods east of the great road from Bridgeport to Newtown, in a cross road, and contiguous to the house of Mr. Edwin Burr. Mr. Burr was standing in the road, in front of his house, when the stone fell. The noise produced by its collision with a rock of granite was very loud. Mr. Burr was within 50 feet, and immediately searched for the body, but it being still dark, he did not find it till half an hour after. By the fall, some of it was reduced to powder, and the rest of it was broken into very small fragments, which were thrown around to the distance of 20 or 30 feet. The rock was stained at the place of contact with a deep lead color. The largest fragment which remained did not exceed the size of a goose egg, and this Mr. Burr found to be still warm to his hand. There was reason to conclude from all the circumstances, that this stone must have weighed about twenty or twenty-five pounds.

Mr. Burr had a strong impression that another stone fell in an adjoining field, and it was confidently believed that a large mass had fallen into a neighboring swamp, but neither of these had been found. It is probable that the stone, whose fall has now been described, together with any other masses, which may have fallen at the same time, was thrown from the meteor at the first explosion.

II. The masses, projected at the second explosion, seem to have fallen principally at and in the vicinity of Mr. William Prince's in Weston, distant about five miles, in a southerly direction, from Mr. Burr's. Mr. Prince and family were still in bed, when *they heard a noise like the fall of a very heavy body, immediately after the explosions.* They formed various unsatisfactory conjectures concerning the cause, nor did even a fresh hole made through the turf in the door yard, about 25 feet from the house, lead to any conception of the real cause.

They had indeed formed a vague conjecture that the hole might have been made by lightning, but would probably have paid no further attention to the circumstance, had they not heard, in the course of the day, that stones had fallen that morning in other parts of the town. This induced them, towards evening, to search the hole in the yard, where they found a stone buried in the loose earth which had fallen in upon it. It was two feet from the surface, the hole was about twelve inches in diameter, and as the earth was soft and nearly free from stones, the mass had sustained little injury, only a few small

fragments having been detached by the shock. The weight of this stone was about thirty-five pounds. From the descriptions which we have heard, it must have been a noble specimen, and men of science will not cease to deplore that so rare a treasure should have been immediately broken in pieces. All that remained unbroken of this mass, was a piece of twelve pounds weight, since purchased by Isaac Bronson, Esq., of Greenfield, with the liberal view of presenting it to some public institution.

Six days after, another mass was discovered, half a mile northwest from Mr. Prince's. The search was induced by the confident persuasion of the neighbors that they heard it fall near the spot, where it was actually found buried in the earth, weighing from seven to ten pounds. It was found by Gideon Hall and Isaac Fairchild. It was in small fragments, having fallen on a globular detached mass of gneiss rock, which it split in two, and by which it was itself shivered to pieces.

The same men informed us, that they suspected another stone had fallen in the vicinity, as the report had been distinctly heard, and could be referred to a particular region somewhat to the east. Returning to the place after an excursion of a few hours to another part of the town, we were gratified to find the conjecture verified, by the actual discovery of a mass of thirteen pounds weight, which had fallen half a mile to the northeast of Mr. Prince's. Having fallen in a ploughed field, without coming into contact with a rock, it was broken only into two principal pieces, one of which, possessing all the characters of the stone in a remarkable degree, we purchased ; for it had now become an article of sale.

Two miles southeast from Mr. Prince's, at the foot of Tashowa Hill, a fifth mass fell. Its fall was distinctly heard by Mr. Ephraim Porter and his family, who live within forty rods of the place, and in full view. They saw a smoke rise from the spot, as they did also from the hill, where they are positive that another stone struck, as they heard it distinctly. At the time of the fall, having never heard of any such thing, they supposed that lightning had struck the ground, but after three or four days, hearing of the stones which had been found in their vicinity, they were induced to search, and the result was the discovery of a mass of stone in the road, at the place where they supposed the lightning had struck. It penetrated the ground to the depth of two feet in the deepest place ; the hole was about twenty inches in diameter, and its margin was colored blue from the powder of the stone, struck off in its fall. It was broken into fragments of moderate size, and from the best calculations might have weighed 20 or 25 pounds.

The hole exhibited marks of much violence, the turf being very much torn, and thrown about to some distance.

We searched several hours for the stone, which was heard to fall on the hill, but without success. Since that time, however, it has been discovered. It is unbroken, and exactly corresponds in appearance with the other specimens. It weighs  $36\frac{1}{2}$  pounds.\* It is probable that the five stones last described were all projected at the second explosion.

III. At the third explosion a mass of stone far exceeding the united weight of all we have hitherto described, fell in a field belonging to Mr. Elijah Seeley, and within thirty rods of his house. Mr. Seeley's is at the distance of about four miles from Mr. Prince's. Mr. Elihu Staples lives on the hill, at the bottom of which this body fell, and carefully observed the whole phenomenon.

After the last explosion, he says, a rending noise like that of a whirlwind passed along to the east of his house and immediately over his orchard, which is on the declivity of the hill. At the same instant a streak of light passed over the orchard in a large curve, and seemed to pierce the ground. A shock was felt, and a report heard like that of a heavy body falling to the earth; but no conception being entertained of the real cause (for no one in this vicinity, with whom we have conversed, appeared to have ever heard of the fall of stones from the skies), it was supposed that lightning had struck the ground. Three or four hours after the event, Mr. Seely went into his field to look after his cattle. He found that some of them had leaped into the adjoining inclosure, and all exhibited strong indications of terror. Passing on, he was struck with surprise at seeing a spot of ground which he knew to have been recently turfed over, all torn up, and the earth looking fresh, as if from recent violence. Coming to the place, he found a great mass of fragments of a strange looking stone, and immediately called for his wife, who was second on the ground.

Here were exhibited the most striking proofs of violent collision. A ridge of micaceous schistus lying nearly even with the ground, and somewhat inclining like the hill to the southeast, was shivered to pieces, to a certain extent, by the impulse of the stone, which thus received a still more oblique direction, and forced itself into the earth to the depth of three feet, tearing a hole of five feet in length and four and a half feet in breadth, and throwing large masses of turf and fragments of

\* It has been purchased by Mr. Gibbs, of Newport, Rhode-Island, who has thus enriched his splendid collection of minerals with the finest meteoric stone which is probably extant. This specimen abounds so much in iron, that it might almost be denominated an iron ore; some of the pieces of iron visible on the surface are more than an inch long.

stone and earth to the distance of 50 and 100 feet. Had there been no meteor, no explosions, and no witnesses of the light and shock, it would have been impossible for any person contemplating the scene to doubt, that a large and heavy body had really fallen from the skies with tremendous momentum.

From the best information which we could obtain of the quantity of fragments of this last stone, compared with its specific gravity, we concluded that its weight could not have fallen much short of 200 pounds. All the stones, when first found, were friable, being easily broken between the fingers; this was especially the case, where they had been buried in the moist earth; but by exposure to the air, they gradually hardened.

This stone was all in fragments, none of which exceeded the size of a man's fist, and was rapidly dispersed by numerous visitors, who carried it away at pleasure. Indeed we found it difficult to obtain a sufficient supply of specimens of the various stones, an object, which was at length accomplished, principally by importunity and purchase.

The specimens obtained from the different places are perfectly similar. The most superficial observer would instantly pronounce them portions of a common mass. Few of the specimens weigh one pound, most of them less than half a pound, and from that to the fraction of an ounce.

The piece lately found on Tashowa Hill is the largest with which we are acquainted. Mr. Bronson's is the next in size. The largest specimen in our possession weighs six pounds, and is very perfect in its characteristic marks. Of smaller pieces we have a good collection. They possess every variety of form, which might be supposed to arise from fracture with violent force. On many of them, and chiefly on the large specimens, may be distinctly perceived portions of the external part of the meteor. It is everywhere covered with a thin black crust, destitute of splendor, and bounded by portions of the large irregular curve, which seems to have enclosed the meteoric mass. This curve is far from being uniform. It is sometimes depressed with concavities, such as might be produced by pressing a soft and yielding substance. The surface of the crust feels harsh, like the prepared fish skin, or shagreen. It gives sparks with the steel. There are certain portions of the stone covered with the black crust, which appear not to have formed a part of the outside of the meteor; but to have received this coating in the interior parts, in consequence of fissures or cracks, produced probably by the intense heat, to which the body seems to have been subjected. These portions are very uneven, being full of little protuberances. The specific gravity of the stone is 3.6,

water being one. The specific gravity of different pieces varies a little ; this is the mean of three.

The color of the mass of the stone is mainly dark ash, or, more properly, a leaden color. It is interspersed with distinct masses, from the size of a pin's head to the diameter of one or two inches, which are almost white, resembling in many instances, the crystals of feldspar in some varieties of granite. The texture of the stone is granular and coarse, resembling some pieces of grit stone. It cannot be broken by the fingers, but gives a rough and irregular fracture with the hammer, to which it readily yields. On inspecting the mass, five distinct kinds of matter may be perceived by the eye.

1. The stone is thickly interspersed with black or grey globular masses, most of them spherical, but some are oblong. Some of them are of the size of a pigeon shot, and even of a pea, but generally they are much smaller. They can be detached by any pointed iron instrument, and leave a concavity in the stone. They are not attractable by the magnet, and can be broken by the hammer. If any of them appear to be affected by the magnet, it will be found to be owing to the adherence of a portion of metallic iron.

2. Masses of yellow pyrites may be observed. Some of them are of a brilliant golden color, and are readily distinguishable by the eye. Some are reddish and some are whitish. The pyrites appear most abundant in the light colored spots, where they exhibit very numerous and brilliant points, which are very conspicuous through a lens.

3. The whole stone is interspersed with malleable iron, alloyed with nickel. These masses of malleable iron are very various in size, from mere points to the diameter of half an inch. They may be made very conspicuous by drawing a file across the stone.

4. The lead-colored mass has been described already, and constitutes by far the greater part of the stone. After being wet and exposed to the air, the stone becomes covered with numerous reddish spots, which do not appear in a fresh fracture, and arise manifestly from the rusting of the iron.

5. There are a few instances of matter dispersed irregularly through the stone, which are considered as intermediate between pyrites and malleable iron. They are sometimes in masses apparently crystalline, but usually irregular. They are black, and commonly destitute of splendor, but exposed by a recent fracture, they appear like a glossy superficial coating. They are sometimes attractable by the magnet, and sometimes not.