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I.—*Contributions towards a History of British Meteorites.*

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As the rare descent of Meteorites or Aërolites affords us the only real tangible evidence we possess respecting the mineral constituents which exist beyond the limits of our own globe, a great degree of interest must always be attached to these stray visitors; and although much has been written on the subject at different times, it has hitherto taken the form either of a bare catalogue of the date and place of occurrence; or of scattered notices dealing only with individual cases. My desire is to collect these various records as far as they relate to each meteoric stone which has been known, or has been said to have fallen in Great Britain, and to endeavour to give as complete an account as possible of every instance; including not only the historical facts, but also notices of mineralogical observations and references to authorities.

In collecting the evidence as to the fall of a meteoric stone, it is highly important to obtain the following particulars:—

1. The exact date and place of the occurrence.
2. The number and weight of the stones.
3. External appearance.
4. Chemical composition and specific gravity.
5. In what Museum or private collection the stone or stones have been deposited.
6. References to any published accounts.

Though an answer to all the above questions would be sufficient for mineralogical purposes, there are many other facts bearing upon the subject

which unfortunately are frequently overlooked in published descriptions. For example, it would be interesting to ascertain to what depth the stone penetrated, and in what soil. Whether hot when found. Whether it descended in a cloudless sky, or during a storm; and if a meteor was seen, to note its direction, and whether it exploded before reaching the earth. The accompanying noise, if any, should also be described.

In no single instance have I been able to obtain satisfactory answers to all these particulars; and in some cases, indeed, only the bare fact seems to have been recorded that a stone fell on such a date, and at such a place. Of the stones themselves some have been irrecoverably lost, others have found their way into foreign museums, and some are in the possession of private individuals.

In dealing with long periods of time, and a large area of country, anyone who has attempted to collect evidence regarding an event which took place even a few years ago, must be aware how exceedingly difficult is the task of separating truth from error. My purpose, as I have said before, is to collect everything that is known on the subject of British Meteorites; to establish by means of copious references every fact relative to each recorded fall; and to inquire into all doubtful instances, so as to ascertain, if possible, whether their authenticity can be proved, and to expunge them from the list if they can be shewn to be the results of errors.

The doubtful instances of meteoric falls may be classed under four general heads:—

1st. A meteor has been seen apparently to fall, and a search has been made where it seemed to descend. The results of these searches have included nodules of pyrite, fragments of scoriæ, hematite, and ordinary pebbles, all distinctly terrestial, but which have been described as "Meteorites."

2nd. A mistake for ball lightning; the popular opinion being that a thunderbolt is a red hot stone, capable of setting fire to houses or barns, instead of a simple discharge of electric fluid. For this reason any instance of a meteorite alleged to have fallen during a thunderstorm, should perhaps be looked upon with an extra amount of suspicion.

3rd. The historical and typographical errors, common to all writers and printers.

4th. Hoaxes. These, I regret to say, have been perpetrated on two or three occasions recently, and the knowledge of the extreme importance and interest attached to the descent of a meteorite has prompted some unscrupulous persons to send to the newspapers accounts carefully compiled, and bearing every mark of authenticity, which on enquiry have been proved to be without a vestige of foundation.

The authorities I have had occasion to consult in the preparation of the following list have necessarily been numerous; though in the case of well established stonefalls, in which there appears no discrepancy in the various references, I have thought it necessary to insert only one or two of the most important. The catalogues of Chladni and the many continental writers have already been collated and incorporated by Mr. R. P. Greg, F.G.S., in his very extensive catalogue of meteors and fireballs, from A.D. 2 to 1860, published in the Report of the British Association for 1860.* A supplementary list containing numerous additions and corrections of errors, appeared in the Report for 1867, under the title of a catalogue of Luminous Meteors and Aërolites.† Those who have had occasion to consult these two catalogues will, I am sure, unite in bearing testimony to the great care and accuracy with which they have been compiled, and when we remember that they include observations ranging through nearly nineteen centuries, and collected from every part of the world, the laborious nature of Mr. Greg's work must be apparent. Almost all the British meteorites will be found recorded in one or other of these two catalogues; though the adoption of a tabular arrangement necessary prevented the insertion of more details than a statement of the date of the event and place of occurrence, with the size and direction of the meteor when known. The column for remarks distinguishes the entries as meteors, stone-falls, iron-falls, bolides, fire-balls, &c.

A list of 20 British meteoric stones was published in 1858, in Greg and Lettsom's "Manual of the Mineralogy of Great Britain and Ireland."‡ Also a summary by myself in the *Popular Science Review*, 1866, vol. V, pp. 414, 415. Neither of these, however, contained any details beyond a simple record of the date and place of the fall.

To the Reports of the British Association I am further indebted for many notes and references included in the "Annual Observations on Luminous Meteors," commenced by the Rev. Professor Baden Powell, in 1848, and continued since his death in 1860 by a committee. In many cases I have been unable to verify, as I should have wished, some of the earlier references contained in such works as Poggendorff; Annales de Chemie, &c., but wherever necessity has obliged me to quote them second-hand, I have appended my authority for so doing.

In each of the several instances comprised in the following pages, the meteoric stone has been described in some published account to have been actually found; and the first question will be, whether this fact can be clearly proved in every case by sufficient evidence. I have omitted all

* Op. cit. pp. 48 to 118.

† id. pp. 414 to 430.

‡ Art. Iron." p. 246.

mention of the very large number of meteors recorded in the lists of the British Association, as having been seen apparently within a short distance of the earth, and which have been known to burst over some part of Great Britain. Though there can be but little doubt that from many of these stones must have fallen, they have not been found; and, considering what thinly inhabited districts may be met with between the Land's End and Johnny Groat's house, their non-discovery cannot be a matter of surprise. Those which belonged to the class of the aërosiderites or iron meteorites may perhaps be dug up by chance at some future period, and their identity recognized; but those included under the ordinary designation of meteoric stones, and whose chemical composition consists chiefly of silicates, unfortunately bear too great a resemblance to terrestial products to admit of their origin being even suspected by those who may find them.

In closing these prefatory remarks, I should add that the following notes must not be regarded in any way as a complete synopsis, but I hope they will be the means of eliciting from some kind helpers many a fact and many a reference which has escaped my notice, and which I shall be most thankful to receive and incorporate in a supplement, together with any corrections. It would also materially increase the value of the list to ascertain the present location of each stone, and to state in what Museums specimens may be seen.

ENGLAND.

1360.—*Yorkshire.*—

"Stonefall." The earliest recorded British meteorite is thus briefly noticed in Rep. Brit. Assoc., 1860, p. 52. It would be interesting to obtain a few particulars and references to authorities.

1622.—January 10.—*Cornwall.*

"Stonefall, at Tregony. N.B.—not Devonshire." Rep. Brit. Assoc., 1860, p. 53. This entry will be noticed in a subsequent page, under the date 1723.

1623.—January 10.—*Stretchleigh, near Ermington, Devon.*

The fall of this meteorite is described by several of the old county Historians. Risdon, who was engaged between the years 1605 and 1630 in collecting materials for his Chorographical Survey of Devon, gives the following account:—Stretchleigh.—"In this siginory, A.D. 1623, there fell from above a stone of twenty-three pounds weight, which in falling, made a fearful noise, first like the rumbling of a piece of ordnance, which, in descending lower, lessened, and ended, when upon the ground, no louder than the report of a petronel. It was composed of matter like a stone singed or half burnt for lime*"

* Op. cit., p. 186.

Westcote, writing about the same period, related the occurrence in almost the same words. "In some part of this manor (Strechley) there fell from above, 1625*—I cannot say from heaven—a stone of twenty-three pounds weight, with a great and fearful noise in falling, first it was heard like unto thunder, or rather to be thought the report of some great ordnance, cannon, or culverin; and as it descended so did the noise lessen, at last, when it came to the earth, to the height of the report of a peternel, or pistol. It was for matter like unto a stone singed, or half burnt for lime; but being larger described by a richer wit, I will forbear to enlarge on it."†

The "richer wit" here alluded to was, in all probability, the author of a pamphlet published at the time, which further describes this aërolite as having fallen on January 10th, 1623, in an orchard, near some men who were planting trees. It was buried in the ground three feet deep, and its dimensions were three feet and a half in length, two feet and a half in breadth, and one foot and a half in thickness. The pamphlet states that pieces broken from off it were in the possession of many of the neighbouring gentry. Lysons‡ adds that this pamphlet (which I have unfortunately never been able to obtain) also describes three suns seen at Tregony, in Cornwall, in 1622, and this circumstance is important, as throwing some light upon two doubtful entries referred to under the dates 1622 and 1723. In 1869 I called especial attention to the Ermington meteorite in the Transactions of the Devonshire Association§ in the hope of obtaining some clue as to the subsequent history of any of these portions, but so far, my enquiries have been unsuccessful. From the description it is highly improbable that it could have been an iron meteorite, and from comparing the weight with the size it would appear that either the latter must have been very much exaggerated by the writer of the pamphlet, or that Risdon and Westcote must have been mistaken in the weight.

1628.—April 9.—*Hatford, &c., Berkshire.*‖

This fall took place about 5 or 6 o'clock in the afternoon, and by a comparison of various accounts, seems to have spread over a large area. Mr. T. W. Webb¶ directs attention to a letter preserved in Wallington's *Historical Notices*, i, 13, which was written in 1628, by Mr. John

* A probable misprint for 1623.

† A view of Devonshire in 1630, by Thomas Westcote, gent., Oliver's Ed. Exeter, 1845, pp. 391, 392.

‡ Lysons' Magna Britannia. vol. vi, pt. 2; Devon, pp. 175, 176.

§ Op. cit., vol. III, pp. 75, 78.

‖ Erroneously described in Greg and Lettsom's Mineralogy, p. 246, as August 9 Hatfield.

¶ Nature, July 14, 1870.

Hoskins, dwelling at Wantage, to his son-in-law Mr. Dawson, a gunsmith, dwelling in the Minories without Aldgate, relating to the fall of these meteorites. Describing the explosion, Hoskins says:—"It began as followeth: First, as it were, one piece of ordnance went off alone. Then, after that, a little distance, two more, and then they went as thick as ever I heard a volley of shot in all my life; and after that, as it were the sound of a drum . . . . . .Yet this was not all; but as it is reported, there fell divers stones, but two is certain in our knowledge. The one fell at Chalows, half-a-mile off (from Wantage), and the other at Barking five miles off. Your mother was at the place where one of them fell knee-deep, till it came to the very rock, and when it came at the hard rock it broke, and being weighed, all the pieces together, they weighed six and twenty pound. The other that was taken up at the other place weighed half a tod, 14 pound."*

The weight of the stone which fell at Hatford was 24 lbs. according to the entry in the Rep. Brit. Assoc., 1860, p. 54. These three points Hatford, Challow, and Barking (Balking or Baulking?) give some idea of the size of the space over which the meteoric fragments were dispersed. As measured on the map, it forms a triangle, Balking and Hatford being the base, about three miles in length; and each point being distant from Challow about four miles.

1642.—August 4.—*Near Woodbridge, Suffolk.*

This stone fell at 4.30 in the afternoon, and weighed 4 lbs. Noticed in Gentleman's Magazine, 1796, p. 1007; Rep. Brit. Assoc., 1860, p. 54.

1680.—May 18.—*London.*

Several meteoric stones are said to have fallen on this occasion; some being near Gresham College—Rep. Brit. Assoc., 1860, p. 55. The fall is noticed by Chladni, Annales de Chimie, 1826, p. 257 (Phipson).

1723.—*Cornwall, England.*

"Stonefall (not in 1622 as in Cat. No. 1)" Rep. Brit. Assoc., 1867, p. 414. This entry has caused me much perplexity, and I believe it to be only the result of an involved series of mistakes. The original entry in the first catalogue, of which this is a correction, gives as already mentioned under date 1622, January 10. "Cornwall, England.—Stonefall at Tregony. N.B.—Not Devonshire." It is a curious circumstance that in the corrected entry the year only is given, the month and day being omitted. Also that the next succeeding entry relating to a meteorite at Halstead, Essex, in 1731, is dated Jan. 10, instead of March 12, which according to all other authorities was the true date of this descent.

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* W. Flight, Geol. Mag., Ser. 2, Vol. II. p. 266.

I cannot but think, in spite of the fact that Ermington in Devon and Tregony in Cornwall are some 42 miles apart, the whole of the entries refer to the same event. The Ermington or rather Strechley meteorite, so well established by the evidence of several contemporaneous writers, is omitted in both the Brit. Assoc. Catalogues, and the date Jan. 10, 1623, has been altered by Chladni, and in Greg and Lettsom's Mineralogy, to Jan. 10, 1622. This, however, is easily explained, as at that time the civil year terminated on March 25th, and an occurrence taking place in January would be indifferently entered as belonging either to 1622 or 1623.

If the entry in the second catalogue be correct, the coincidence of two stone-falls in adjoining counties, with the exact interval of one hundred years between them would be a very remarkable one; but I believe the most probable explanation is, that the meteor which fell at Strechley, on Jan. 10, 1622 or 3, came in a westerly direction at a somewhat low angle, and was seen to pass over Tregony, though by some slight error in the date, the two occurrences, which in fact were separated from each other only by distance, have also become separated by a greater or less interval of time.

1725.—July 3.—*Mixbury, Oxfordshire.*

Stonefall; weight 20 lbs. Rep. Brit. Assoc., 1860, p. 56. Greg and Lettsom's Manual of the Mineralogy of Great Britain and Ireland places the occurrence under the same date, at Mixburg, Northamptonshire: but this is clearly a mistake.

1731.—March 12.—*Halstead, Essex.*

"Stonefall and fireball." Rep. Brit. Assoc., 1860, p. 56. In the supplementary catalogue the entry stands thus:—"1731, Jan. 10, Halstead, Essex; detonating meteor; Stonefall doubtful, Cat. No. 1." As stated in the preceding page, I am inclined to think that the date Jan. 10 has been printed in error, and belongs to another event.

1780.—April 1.—*Beeston, Northamptonshire.*

Stonefall at 9 p.m., April 11? Ironfall? Rep. Brit. Assoc., 1860, p. 60.

1795.—December 13.—*Wold Cottage, Thwing, East Riding of Yorkshire.*

This celebrated meteorite fell on a Sunday, at 3 o'clock in the afternoon, in the grounds of Major Topham. It penetrated into nineteen inches of soil and hard chalk, and weighed 56 lbs. The stone was transferred by Major Topham to Mr. Sowerby, and was subsequently purchased by the British Museum for £250.* According to the official catalogue the present weight is 47 lbs. 9 ozs. 53 grains.† The Imperial cabinet at

* Sowerby's Mineralogy, p. 222.

† The latest catalogue gives the weight as 45 lbs. 8 ozs.

Vienna also possesses a small specimen. The specific gravity as given in Rep. Brit. Assoc., 1860, p. 61, is 3·70. In 1796 the stone was exhibited in London, and in the same year an account of the fall was published in the Gentleman's Magazine. The chemical composition was investigated by Luke Howard, and compared with that of Meteorites from Portugal, Sienna, and Benares. The results were published in the Philosophical Transactions for 1802, under the title of "Experiments and Observations on certain Stony Substances, which at different times, are said to have fallen on the Earth." According to Phipson* this paper is remarkable as containing the first chemical analysis of an aërolite that was ever made.

1803.—July 4.—*East Norton, near Leicester.*

"Stonefall? meteor and detonation; struck a building; electrical?" Rep. Brit. Assoc., 1860, p. 62. A note refers to an account in the Encylopædia Britannica. It is described as being more like an electric ball, and yet a vitrified stone was found, containing nickeliferous iron. This should, perhaps, be included amongst the doubtful instances.

1806.—May 17.—*Basingstoke, Hampshire.*

"Stonefall after a detonating meteor," weight 2½ lbs. Rep. Brit. Assoc., 1860, p. 63.

1813.—August or September.—*Malpas, Cheshire.*

Dr. T. Thomson, in his *Annals of Philosophy* for November, 1813,† states that he received some weeks previously a letter from Chester, dated the 15th of September, containing the following information, which the writer says was first communicated to the public in a provincial newspaper. He does not give the date; but merely quotes the following passage from the newspaper, in the words of the anonymous writer of that article.—"Last week having occasion to go to Malpas (a village 15 miles from Chester), I witnessed a very singular phenomenon. About one o'clock in the day, from the great heat and calmness of the air, I apprehended a thunder storm, and supposed my apprehensions were going to be realized, when I beheld a bright cloud, out of which fell some large stones, which were soft and intensely hot at first, but afterwards acquired considerable hardness." Dr. Thomson adds:—"I am not aware that any of the stones in question have been brought to London. These phenomena have been of rare occurrence in Great Britain of late; but five or six examples of similar falls on the continent, during the years 1811 and 1812 have been recorded, and the stones subjected to chemical analysis."

1816.—August or July.—*Glastonbury, Somerset.*

"Stonefall." Rep. Brit. Assoc., 1860, p. 65.

* Meteors, aerolites, and falling stars, p. 5.

† Vol. II, pp. 396, 397.

1825 ?—May 12.—*Bayden, Wiltshire.**

"Ironfall" (Poggendorff, VIII, 1826.) "According to P. A. Kesselmeyer, of Frankfort, the piece of iron which fell is in possession of Mr. Schwickard, in Mexico, who bought it from a mineral dealer in London. Prof. Nöggerath, of Bonn, is said to have seen it; it looked like meteoric iron, and the magnetic needle was greatly affected by it. Possibly the same as the large meteor seen in Gloucestershire, May 12, 1826," and which according to Baumhauer was aërolitic, and visible in Wiltshire. Rep. Brit. Assoc., 1860, p. 71.

1827 or 1828 ?—August or September.—*Allport, Derbyshire.*

At 3 p.m. a meteoric light traversed the sky, followed by an explosion. "The meteorite picked up, supposed to have fallen on this occasion, now in Dr. R. A. Smith's possession, of Manchester, appears to Mr. Greg to be a more than doubtful substance; more like a kind of compact charcoal, with particles of sulphur and iron pyrites imbedded; nevertheless peculiar; pieces are stated to have fallen after the explosion occurred." Specific gravity 2·0. Rep. Brit. Assoc., 1860, p. 72.

1830.—Februry 15.—*Launton, near Bicester, Oxfordshire.*

A stone weighing 2½ lbs. fell at 7 p.m. with noise and light. Specific gravity 3·625. Rep. Brit. Assoc., 1860, p. 72, According to the same authority, it was in the possession of Dr. Lee, F.R.A.S. See Buck's Gazette, April 10, 1830.†

1835.—August 4.—*Aldsworth, near Cirencester, Gloucestershire.*

This meteorite fell at 4.15 p.m., and originally weighed 2 lbs. Specific gravity 3·4. The weight of the portion in the British Museum is given in the catalogue as 1lb. 2ozs. 128g. According to Rep. Brit. Assoc., 1860, p. 75, a great concussion high up in the air was heard at the same time in South Herefordshire, and probably resulted from the bursting of this meteor.

1842 ?—August 5.—*Harrowgate, Yorkshire.*

5 p.m., Stonefall (Kämtz). "A hot stone like basalt, accompanied by whistling in the air, and lightning and thunder, said to have fallen; resembling a stone that fell some years before at Cardiff, further particulars of which latter not obtainable at present (see Poggendorff, Supp. IV, 1854, p. 366; also, l'Institut, No. 457.) The Harrowgate stone is described also as containing silver-white metallic looking particles. N.B.—A very doubtful fall.". Rep. Brit. Assoc., 1860, p. 80.

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* Baydon, near Hungerford ?

† I believe this meteorite was in the Oxford University Museum, in 1863, but my note with reference to it is unfortunately mislaid.

1876.—April 20.—*Rowton, Wellington, Shropshire.*

With the exception of the somewhat doubtful iron meteorite already noticed in 1825, at Baydon, Wilts, this is probably the only recorded instance of the fall of an aërosiderite in the British Isles. An account published in the *Times* of April 26, 1876, gives as the exact locality, a turf field near the Wellington and Market Drayton Railway, about a mile north of the Gradgington Station. It is stated that about ten minutes to 4 on Thursday afternoon, within a seven mile's radius of the Wrekin, the villages were alarmed by an unusual rumbling noise in the atmosphere, followed immediately by an explosion, resembling the discharge of heavy artillery. Rain was falling heavily throughout the afternoon, but there was neither lightning or thunder. About an hour after the report, a Mr. G. Brooks went into a meadow in the occupation of his stepfather, Mr. Bailey, and noticed that a hole had been cut in the ground. He probed it and found that what was apparently a hard stone had buried itself in the ground to a depth of 18 inches, passing through four inches of soil and 14 of clay. It rested on the gravel beneath these, and was quite hot, although nearly an hour had elapsed from the time of the explosion being heard. The stone was dug up and removed to Wolverhampton, where it was found to be a mass of meteoric iron. The hole was almost perpendicular, and the meteorite is assumed to have fallen in a south-easterly direction.

The meteorite was in the possession of Mr. Gibbons of Wolverhampton, and was first exhibited at a Bazaar in aid of St. Peter's Church, and afterwards at a Meeting of the Birmingham Natural History Society. Subsequently, with the consent of the Duke of Cleveland, in whose property it fell, it was presented to the British Museum. The Report of the British Association Committee on 'Luminous Meteors' (1876, p. 166), gives some additional particulars from a communication by Professor Maskelyne* It is described as weighing 7¾ lbs.† and being a mass of "metallic iron irregularly angular, although all its edges appear to have been rounded by fusion in its transit through the air, and, except at the point where it first struck the ground, it is covered by a thin black pellicle of the magnetic oxide of iron. The surface is somewhat pitted or marked with slight depressions, one of which occurring in a fissure of the mass, affords some instructive evidence of the causes of their formation. The exposed metallic part of the surface exhibits crystalline structure very clearly when it is etched.....It is only the seventh aërosiderite or meteoric iron of which the fall has been witnessed, although upwards of a hundred iron

* "Nature," July 27, 1876, vol. XIV, p. 472.

† The exact weight of the specimen in the British Museum, as given in the last catalogue, is 7 lbs. 11 ozs.

masses have been discovered in different parts of the globe, which are undoubtedly meteoric, and two such have been found in Great Britain.*"

ISLE OF MAN.

1813 to 1819.—*Pulrose.*

"Stonefall; light and scoriaceous." Rep. Brit. Assoc., 1860, p. 67.

SCOTLAND.

1676.—*Orkneys.*

"Stonefall; fell into a boat." Rep. Brit. Assoc., 1860, p. 55.

1802 ?—September 15.—*Loch Tay.*

"Stonefall; doubtful." See Monthly Magazine, October, 1802, p. 290. Rep. Brit. Assoc., 1860, p. 62. In Greg and Lettsom's Mineralogy a meteorite is stated to have fallen in Scotland, in October, 1802. This probably refers to the same occurrence: the date of publication being mistaken for that of the actual fall.

1804.—April 5.—*High Possil, Glasgow.*

According to Phipson† this stone fell with a loud hissing noise, preceded by explosions. The Rep. Brit. Assoc., 1860, p. 62, adds that it took place in the day time, and gives the specific gravity of the stone as 3·53, a portion weighing 3 oz. 95 grains is in the British Museum, and another in the Imperial Cabinet at Vienna.

1830.—May 17.—*Perth.*

Catalogue British Museum; the weight of the specimen is under 1 oz.

Of meteoric iron not seen to fall, two instances have been discovered in Scotland, the first is described by Greg and Lettsom‡ as being "a small angular and rounded mass, with a closely crystalline texture, is extremely hard, and where cut and polished, shows numerous small triangular figures, more brilliant than the rest of the surface, as in most meteoric irons. It was found a good many years back by Da Costa at Leadhills, and is now in Mr. Greg's collection." A small fragment under 1 oz. in weight is in the British Museum, the catalogue of which fixes the date of discovery between the years 1820 and 1830.

The other example was found at Newstead in Roxburgshire, and is dated 1861 in the same catalogue, the weight being 18 lbs. 1 oz.‖

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* Leadhills, and Newstead in Scotland.

† Meteors, Aërolites, and Falling Stars, p. 40.

‡ Manual of the Mineralogy of Great Britain and Ireland, 1858, p. 245.

‖ The latest Catalogue gives the date 1827.

IRELAND.

1771 ?—Locality ?

Stones said to have fallen. Rep. Brit. Assoc., 1860, p. 59. A stone like a grey siliceous pebble. Annales de Chemie, vol. lxxxv, p. 278, 1813. Possibly same as 1779 at Pettiswood.

1779.—*Pettiswood, County Westmeath.*

Weight 5 oz. Gentleman's Magazine, Sept. 1796. Rep. Brit. Assoc., 1860, p. 60.

1810.—August.—*Mooresfort, County Tipperary.*

According to the entry in Rep. Brit. Assoc., 1860, p. 64, this meteorite fell at 11.30 a.m. on August 10. Specific gravity, 3·67. Two portions are preserved in the Museum of the Royal Dublin Society, and are thus described in the catalogue :—" Meteorolithe of an ash-grey colour, coarse grains, with imbedded particles of malleable iron, iron pyrites, minute globules of a soft greyish-brown substance, and grey mica. It fell near Mooresfort, County Tipperary, in the month of August, 1810. It weighed seven pounds and three quarters, and was of a somewhat cubical shape."

Five specimens in the British Museum weigh 12 ozs., one of which was described in an old catalogue as containing quartz globules of a greenish colour, owing to oxide of nickel. The Imperial Cabinet of minerals at Vienna also possesses two specimens.

1813.—September 10.—*Adare, &c., County Limerick.*

This is a very important stonefall, as it consisted like that in Berkshire in 1628, of many distinct portions spread over a large area. In the Rep. Brit. Assoc., 1860, p. 65., the weights of three are stated at 15 lbs., 65 lbs., and 24 lbs., with a specific gravity of 3·64. According to the same authority the fall took place at 9 o'clock in the morning.

The following localities are given :—

Limerick, neighbourhood of (Cat. Roy. Dub. Soc.)
Patrick's Well, Limerick (Cat. Mus. Trin. Coll. Dub.)
Adare (Cat. Trin. Coll. Dublin : Brit. Mus., Vienna, &c.)
Faha (Cat. Brit. Mus.)
Scagh (Rep. Brit. Assoc., 1860, p. 65.)
Brasky (Phillips's Mineralogy by Brooke and Miller.)

The mineralogical description of three specimens in the Museum, Trinity College, Dublin, is thus given in the catalogue. (1) " Exterior coating of a dark brown colour, and exhibiting the appearance of semi-fusion. Fracture surface granular, gray, and presenting a few metallic points of a light colour and metallic lustre. Adare.—(2) " Ash-gray

colour, and coarse granular fracture, with some yellowish-brown spots and numerous imbedded particles of meteoric iron; external crust brown and glazed. Limerick.—(3) Fracture surface of a granular structure and gray colour, with yellowish spots and numerous shining imbedded particles of meteoric iron. Patrick's Well."

The Royal Dublin Society's collection possesses two "meteorolithes of a bluish-grey colour; with metallic grains, partly covered with a brownish-black glazed crust, which fell with others in the neighbourhood of Limerick." These no doubt belong to the same descent. The Imperial Cabinet at Vienna has three specimens from Adare. The British Museum specimen weighs 3 ozs. 105 grains.

The chemical constituents of this meteorite, originally investigated by Professor J. Apjohn* has recently been examined by R. Apjohn,† who finds that it contains a trace of Vanadium; but the date which he assigns to the fall of this stone (1810) appears to be that of another Irish meteorite which fell at Mooresfort, Tipperary. The nickel-iron has the composition:—Iron, 85·120; Nickel, 14·275; Cobalt, 0·602; Phosphorus, trace=99·997; and the result of the treatment with acid:—

	SiO_2	Al_2O_3	FeO	MnO	CaO	MgO	Na_2O	K_2O	P_2O_5	
Soluble	42·91	2·35	16·93	6·26	5·34	24·32	0·29	0.02	—	=98·42
Insoluble	59·48	3·24	7·94	8·84	4·62	13·17	1·86	0·30	trace	=99·45

The mineralogical composition of the stone is stated to be—

Nickel-iron	19·07
Chromite	1·75
Magnetic-pyrites	6·54
Soluble Silicate	35·44
Insoluble Silicate	37·07
	99·87

1844.—April 29.—*Killeter, near Castle Derg, County Tyrone.*

This fall is entered in the Rep. Brit. Assoc., 1860, p. 82, as occurring at 3·30 p.m., and is thus described:—"specific gravity 3·76. Stonefall. No meteor; many small ones; musical sounds in the air." I have obtained no further information than this. A specimen in the British Museum weighs under 1 oz.

1860?—June 8 or 9.—*Raphoe, County Donegal.*

Stonefall at 2 p.m., during a storm of thunder and hail. Rep. Brit. Assoc., 1860, p. 107, refers to the *Londonderry Sentinel* of June 15, 1860: "It does not appear there was any fire-ball; the stone resembled friable

* J. Apjohn, Trans. Royal Irish Acad., xviii, 17.

† R. Apjohn, Journ., Chem. Soc., Ser., 2, vol. XII, p. 104 (see Rep. Brit. Assoc., 187 p. 246, and Geol. Mag. Ser. 2, vol II, p. 367).

sandstone; it was seen to fall near Raphoe, and was about as large as a duck's egg. It had neither outside crust, nor shining metallic particles; was quite cold and moist when picked up. The fragments of this stone have been mislaid or lost, unfortunately."

1865.—August 12.—*Dundrum, County Tipperary.*

Meteor not seen. At 7 p.m., a report like a cannon-shot and buzzing noise was heard, and the stone fell into the ground, where it lay, half-buried in the earth, milk-warm; weight 4 lbs. 14 ozs.; specific gravity 3·07 to 3·57 in different parts of the stone, which has the form of a three-sided pyramid; the base freshly broken; the faces vitrified and separated from each other by sharp edges of the crust, as distinctly as if ruled with a ruler. Of the earthy portion of the meteorite, that which is soluble in muriatic acid is nearly pure olivine; the insoluble portion is a highly siliceous mineral.

The proportions are:—

Nickel-iron (Chladnite) ..	20·60 (Fe 19·57; Ni 1·03)
Protosulphuret of Iron (Troilite)	4·05
Chrome Iron-ore	1·50
Mineral soluble in Muriatic Acid	33·08 (FeO 5·89; MgO 14·81)
Mineral insoluble in do.	40·77
	100·00*

A fragment in the British Museum weighs under 1 oz.

APPENDIX.

DOUBTFUL OR FICTITIOUS STONE-FALLS.

1594.—*Leominster, Herefordshire.*

Among the municipal records of the town of Ludlow is preserved a vellum roll, with a list of Bailiffs in the time of Queen Elizabeth. Under the above date occurs the following entry:—

"A greate barne in Lempster fired by a commett, and burned 15 dayes." (Rep. Brit. Assoc., 1865, p. 128.)

1640.—Whit-Sunday.—*Antony, near Plymouth.*

A tract by the Rev. Arthur Bache bears the following title:—"The Voyce of the Lord in the Temple; or a most strange and wonderfull Relation of God's great Power, Providence, and Mercy, in sending very strange sounds, fires, and a Fiery Ball into the Church of Anthony neere Plimmouth, in Cornwall, on Whit-Sunday last 1640. To the scorching

* Rep. Brit. Assoc., 1866, p. 131. (From Scientific Papers Royal Irish Academy Proc., vol. I, p. 230.)

and astonishment of fourteen severall persons who were smitten, and likelikewise to the great Terrour of all the other people then present, being about 200." (Bibliotheca Cornubiensis.)

1668 (about).—*Wethersfield, Essex.*

In a letter dated 14th Feb., 1868, the late Rev. R. Kirwan, F.S.A., informed me "that in the old registers of the Parish of Wethersfield there is a notice in Latin of two meteorites that appeared about 200 years ago."

1791—October 20.—*Menabilly, near Fowey, Cornwall.*

Included in the list of Meteoric Stones by Chladni, and in Greg and Lettsom's Mineralogy. The Rep. Brit. Assoc., 1860, describes it as a fall of hail-stones.

1844 or 1845.—*Lymington, Hampshire.*

A supposed aërolite said to have fallen.

1846.—August 10.—*County Down, Ireland.*

"An iron said to have fallen and been picked up, but either the whole story is a hoax, or the iron itself purely artificial." (Rep. Brit. Assoc., 1860, pp. 84, 85.)

1852.—December 17.—*Dover, Kent.*

A meteor probably aërolitic, appeared to fall partly in the sea, about half a mile from land, and partly on the beach. The stones said to have been found after the explosion, proved to be nodular concretions of pyrite, identical in all respects with those so common in the neighbouring cliffs. (See also Phipson's Meteors, pp. 54, 55).

1858.—May 4.—*Aylesbury, Buckinghamshire.*

An ignited globe, exploding with noise, set fire to a straw-yard. "Hit a cow; smell of sulphur; no stone found; probably electrical." Rep. Brit. Assoc., 1860, p. 95.

1858.—June 12.—*Birmingham.*

See subsequent notice, 1868, May 29.

1860.—July 29.—*Little Bridy, Dorsetshire.*

"? A dark substance fell with noise and light on reaching ground." Rep. Brit. Assoc., 1867, p. 418.

1861.—August 1.—*Chorley, near Lancaster.*

A letter in the *Times* with the above date and address, gave a most circumstantial account of the fall of an aërolite 83½ lbs. in weight. It was described as an irregular ellipse, the major axis being 11¾ inches; the minor axis 7⅝ inches. It fell into a road, and buried itself nearly 6 feet in the ground. I made several inquiries at the time, but failed in ascertaining that there was any truth in the narrative.

1868.—May 29.—*Birmingham.*

The *Birmingham Daily Post* for May 30, 1868, contains a letter signed Thomas L. Plant, F.M.S., describing a violent thunderstorm on the previous morning. The concluding paragraph of the letter is as follows :—"There was an extraordinary phenomenon during the deluge of rain. From nine to ten, meteoric stones fell in immense quantities in various parts of the town. The size of these stones varied from about $\frac{1}{8}$th of an inch to $\frac{3}{8}$ths of an inch in length, and about half those dimensions in thickness. They resembled in shape broken pieces of Rowley ragstone. A similar phenomenon visited Birmingham ten years ago. On the 12th of June, 1858, during a severe thunderstorm, there fell a great quantity of meteoric stones, in every respect like those discharged this morning."

As another alleged meteoric storm took place in the same neighbourhood, and at an interval of less than a year, it may be interesting to compare the two accounts.

1869.—May 25 —*Wolverhampton.*

The following extract from the *Birmingham Gazette* appeared as a reprint in Symons's Monthly Meteorological Magazine *—"At the conclusion of the thunderstorm at Wolverhampton, on Tuesday evening, several persons noticed a large number of small dark stones lying upon the streets and roads, the drive of the London and North Western Railway Station, Queen Street, Queen Square, and Waterloo Road being especially strewed with them. From the peculiar character of the stones, bearing resemblance to nothing with which the roads are paved, or any stones found in the district, it was concluded even by the uninitiated, that they were meteoric stones, and must have fallen during the heaviest and most alarming period of the storm. A considerable number was gathered that night, and more the next morning. Our correspondent has some in his possession, and has shewn them to several gentlemen, one of whom saw the last shower of meteoric stones that fell at Birmingham in June last, and stated that those that have fallen at Wolverhampton were precisely of the same character. They appear, however, to have been a little larger ....those at Birmingham being from $\frac{1}{8}$th to $\frac{3}{8}$ths of an inch,....while some of those picked up in Wolverhampton were $\frac{3}{4}$ of an inch in length, and $\frac{5}{8}$ths of an inch in thickness. Like the stones in Birmingham, too, they have something like the appearance of Rowley rag, but on breaking them up the difference of character is at once apparent. A chemist in the town found that, by judging from mere surface examination, they resembled iron pyrites. The matter is exciting a very general attention,

* Op. cit., vol. IV, pp. 137, 138.

and there are a great many searchers gathering up the remains of this strange shower from the heavens."

Immediately on seeing in the newspapers the account of the supposed fall at Birmingham, I made numerous inquiries by letter, and endeavoured, but without success, to obtain a single fragment of the stone said to have fallen in such quantities. An editorial note appended to the extract in the Meteorological Magazine invited further particulars regarding the Wolverhampton shower, but was only met by a letter containing a general denial of the truth of the statements. Taking the whole of the evidence, I think it must be conceded that in both cases fragments of stone did actually fall during the thunderstorms; but the meteoric origin of the fragments by no means follows as a matter of course. Instances of dust and small stones being taken up from the ground, and carried along for a considerable distance by a storm, are not unknown, if uncommon, and in the absence of any analysis or other reliable data, it may be suggested that the showers at Birmingham and Wolverhampton were due to this cause.

1869.—November 6.—*Fawley, near Southampton.*

The *Standard* described two meteors seen about 7 p m., and a "meteorite" weighing more than 1 lb., which was discovered four days later. "It had not penetrated the ground more than half an inch." From the account it would appear to have been a nodule of iron pyrites, washed out of the soil by heavy rain. (See W. Flight, Geol. Mag., Ser. 2, vol. II, p. 26.

1874.—August 1.—*Hexham, Northumberland.*

In the *English Mechanic* for Aug. 21st, a letter signed "Ralph Lowdon," of Gateshead, describes a massive ball of intense light accompanied by other pear-shaped balls of fire, seen to drop towards the earth.

The aërolite which is alleged to have fallen in an orchard on the bank of the North Tyne, at no great distance from Hexham is stated to have been found the following day at 9 a.m., at a depth of 14 inches in the soil, still quite warm, and to have weighed 301½ lbs. Enquiries made by Dr. W. Flight, F.G.S., resulted in the return of his letters by the Post-Office authorities, and a reply from the Rector of Hexham that he cannot find even the slighest foundation for the statements.*

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* Rep. Brit. Assoc., 1875, p. 240; and Geol. Mag., Ser. 2, vol. ii, p. 263.