PART 2, vol. iv. of the Indian Meteorological Memoirs contains a very lucid discussion of the disastrous storm which visited Orissa in September 1885, and whose centre was at False Point on the 22nd, drawn up by Prof. A. Pedler. This storm is of considerable meteorological interest from several points of view: viz. the rapidity of its formation; its smallness, the diameter at the part of greatest wind-force being only from 100 to 200 miles; its enormous fierceness; particularly as it approached the land; and the decided indraught towards the centre as opposed to the circular theory; the extraordinary low reading of the barometer, 27·135 inches, being recorded at False Point at 6h. 30m. a.m. of the 22nd. The reading at 8h. p.m. of the 21st was 29·622 inches, thus giving a fall of 2·487 inches in 10½ hours. This is the lowest pressure ever recorded in a storm in the Bay of Bengal, and in fact is the lowest on record for any part of the world.

THE Journal of the Scottish Meteorological Society for the year 1886 contains a large amount of useful information, and testifies to increased activity, both observational and experimental. Among the various papers, all of which are of the highest importance, may be specially mentioned, (1) an address by the Hon. R. Abercromby on the modern developments of cloud knowledge (see NATURE, vol. xxxv. p. 575); (2) discussions on the winds and rainfall of Ben Nevis, and on a peculiarity of the cyclonic winds of the mountain, which has an important bearing upon weather forecasting, viz. the outflow of the wind from the cyclone when the centre is north or east of Ben Nevis towards an anticyclone or area of high pressure somewhere in an opposite direction. The prevalent wind on the Ben is north, while south-east and west-south-west are secondary points of maxima. Compared with the winds of other stations in the north of Scotland and Ireland, the wind curve is quite different. The year divides about equally into cyclonic and non-cyclonic periods. The most frequent cyclonic wind is south-west; next to this comes north, apparently due to the cyclones passing to the north of Ben Nevis. The relative frequency of the winds in non-cyclonic periods is quite different: while north still retains its place as a maximum point, the most frequent wind is south-east. In the curve for the whole year tha west-south-west winds are chiefly due to cyclonic winds, south-east to non-cyclonic, and north to both systems. In both systems the north-west wind is wettest while it blows, and the east is driest. The south-east winds, which are generally west at low levels, are the driest on Ben Nevis, with the exception of the east winds. The total amount of precipitation for the year was nearly 108 inches; the wettest month was November, 14·6 inches; and the driest February, 2·8 inches. The journal also contains an interesting account of the biological work of the Scottish Marine Station, and the results of observations at the Northern Lighthouse Station, at the stations connected with the Medical Department, including observations in Iceland, Faroe, and Uruguay, and at fifty-five stations established by the Scottish Meteorological Society, and well distributed over the country.

GEMS AND ORNAMENTAL STONES OF THE UNITED STATES.

ON Saturday, October 22, an evening lecture on this subject was delivered by Dr. A. E. Foote, of Philadelphia, in the Trophy Hall of the American Exhibition. The speaker was introduced by Mr. F. W. Rudler, the President of the Geologists' Association.

Dr. Foote remarked that hitherto mining for gems in the United States had been of a very desultory character, being principally carried on in connection with mica and other mines. The emerald and Hiddenite mines of North Carolina and the tourmaline mines of Maine are the only ones which have been worked systematically. The gems peculiar to America are *chlorastrolite*, *zonochlorite*, and *Hiddenite*. Chlorastrolite, or green star-stone, was discovered by Prof. J. D. Whitney, of the United States Geological Survey, about forty years ago. The only place where it is found is Isle Royale, Lake Superior. The island, belonging to the State of Michigan, forty miles long and five miles wide, and about twenty miles from the mainland, is composed of amygdaloidal trap, in the almond-shaped cavities of which the gem principally occurs. This green stone has a radiating structure, and shows a beautiful *chatoyance* similar to cat's-eye and other fibrous minerals.

Zonochlorite is a green-banded stone, similar to chlorastrolite in composition, discovered by Dr. Foote at Neepigon Bay on the north shore of Lake Superior. The full description was published in the Transactions of the American Association for the Advancement of Science in 1872. Its hardness is about 7; it takes a very high polish, and if it could be found in sufficient quantities would undoubtedly be extensively used.

Hiddenite is a green variety of the well-known species spodumene. A yellow variety from Brazil has been cut as a gem for many years. The green variety has been known for about seven years, and is fully as beautiful, and valued as highly, as the diamond. It occurs in connection with emeralds in North Carolina. Of *gold quartz* about £28,000 worth is sold annually. Most of this comes from California, where it is not only used as a gem, but in the manufacture of various ornaments.

Although the flexible sandstone, the reputed gangue of the diamond in Brazil, is found in mountain masses in North Carolina and other States, no very large diamonds have as yet been discovered. Many small ones are recorded from California, North Carolina, Virginia, and elsewhere. The largest was found at Manchester, near Richmond, Virginia, and weighed 23¾ carats in the rough and 11⅛ carats cut. Prof. Whitney states that the largest found in California was 7¼ carats. Rubies and sapphires have been found in the rock in the corundum mines of North Carolina, and Mr. C. S. Bement has an uncut green one in his collection that would give 80 to 100 carats' worth of good stones, one of which would probably weigh 20 carats. The largest red and blue crystal weighs 312 pounds, and belongs to Amherst College. The best sapphires are found in the placer mines of Montana. Asteriated corundums are found in Pennsylvania and elsewhere.

About £2200 worth of quartz or rock crystal is mined annually. The best localities are Hot Springs (Arkansas), North Carolina, New York, and Virginia. A portion of a mass that must have weighed over 40 pounds was recently received from Alaska, that cut a hand-glass 3 inches by 5. Rock crystal is frequently dug up in the prehistoric mounds, and was used by the medicine-men and others for telling future events. Amethysts are found in very fine specimens in Pennsylvania, Georgia, Texas, and the Lake Superior region. From the latter region they are very remarkably lined, some specimens showing "phantom crystals" equal to the Hungarian. Near the Yellowstone National Park and in the chalcedony forests of Arizona are tree-trunks, some of which are 100 feet long, mineralized by the action of silicated waters. Some of these trees are still standing upright, others, having fallen, bridge deep chasms. The once hollow cavities of some are lined with amethyst, others with agate. The Arizona agatized or jasperized wood shows the most beautiful variety of colours of any petrified wood in the world. Probably the most remarkable locality anywhere for smoky quartz, or cairngorm stone, is Pike's Peak, Colorado. Here it is found in a graphic granite associated with Amazon stone, which also makes a very beautiful green ornamental stone. The rutilated quartz, or Cupid's arrows, is found in remarkably fine specimens in North Carolina. Perhaps the most remarkable mass is one 7 inches by 3½, now in the collection of the Academy of Natural Sciences of Philadelphia. The crystals of rutile are about the size of knitting-needles. Some of the North Carolina rutile has been cut, furnishing brilliant gems, closely resembling carbonado. The rutile, geniculated till it forms a perfect circle or rosette, from Magnet Cove, Arkansas, is often mounted and worn as a gem. While opals are found at many places in the United States, they do not rival those of Queretaro in Mexico. Here are found not only the "milky opals that gleam like sullen fires in a pallid mist," but fire opals and almost every other variety known. Rhodonite, in specimens suitable for polishing, is found in Massachusetts and New Jersey. At the latter locality were obtained the finest crystals ever seen. The garnets from New Mexico and Arizona are superior to the "Cape rubies" from South Africa; and from Alaska the most beautiful crystals ever seen, in a setting of gray mica schist, have recently been obtained.

The New Mexican turquoise is mined to the value of about £700 annually. It has recently been described very fully by Prof. Clarke, Curator of the Mineralogical Department of the National Museum, and is especially interesting as being the material from which the "chalchihuitls," or most sacred images of the Aztecs, were made. The Indians still regard it as a lucky stone.

Labradorite, lately so popular for gems and ornamental stones, is found in many localities. The tourmalines of Maine are

probably the finest in the world. Here are found the Oriental sapphire, ruby, and emerald, in perfection.

Topaz has recently been found at Pike's Peak, Colorado, in large quantity. Some masses weighed 2 pounds each ; and very fine clear white stones have been cut, weighing from 125 to 193 carats.

Among ornamental stones should be mentioned a very beautiful variety of serpentine from Maryland, called verd antique, which is being largely used in the interior decorations of the Philadelphia Court House. Another variety, resembling jade, is the green williamsite from Pennsylvania. Alabaster of various colours abounds in many localities ; and marbles, some as beautiful as the Mexican onyx, are found in nearly every State. The malachite and azurite, jet, and many other gems of minor importance were briefly described.

THE OCTOBER METEOR-SHOWER OF 1887.

THE display of Orionids has been recently observed at this station with greater success than has attended my efforts in any previous year. This shower has not, perhaps, exhibited such richness as it did in 1877, but the present occasion has been more favourable as regards the conditions ; the moon being absent from the morning sky, and a period of tolerably clear weather occurring just at the important time.

In all, I numbered ninety Orionids between October 11 and 24, and the radiant-point during this period exhibited a stationary position amongst the stars. The shower has this year met with rather a formidable rival in a bright display of forty-five meteors from a radiant at 40° + 20° close to ϵ Arietis. I have witnessed the latter stream in several preceding years, though not in such conspicuous strength, and have particularly referred to it in the *Monthly Notices*, vol. xliv., pp. 24–26, as furnishing many bright fireballs at this season.

It will be convenient to arrange my new observations in a tabular form :—

Date 1887 Oct.	Period of Observation. h.	h.	Real Duration.	Meteors seen.	Orionids.	Arietids.	Radiant of Orionids.	
11	7½ to	12½	4½	30	1	2		
12	8½ ,,	12½	4	31	2	1	91°	+ 17°
13	10 ,,	12	2	16	1	1		
14	9½ ,,	16¾	7	75	1	10		
15	7 ,,	8½	7½	86	17	7	91°	+ 16°
	10½ ,,	17						
17	8 ,,	12½	4½	29	3	3	90°	+ 15°
19	13 ,,	15	1½	19	10	—	90½°	+ 15½°
20	10 ,,	15½	5¼	61	22	9	90°	+ 14½°
21	9 ,,	16	6¼	76	23	7	92°	+ 14°
23	12½ ,,	14	1½	13	1	3	—	—
24	12 ,,	14½	2¼	23	9	2	91°	+ 16°
11 nights			46¼	459	90	45	91°	+ 15°

The 16th and 22nd were overcast, and on the 19th and 23rd the observations were much obstructed by clouds. It is noteworthy that I only recorded one Orionid on October 14 during a watch of seven hours, though on the following night this shower supplied seventeen meteors.

The radiant-point of the October meteors has long been accurately known. Prof. A. S. Herschel observed it with great precision on October 18, 1864, and October 20, 1865, and found the centre at 90° + 16°, and 90° + 15° respectively, in those years. All the best of later determinations have agreed closely with these results, and it will be noticed that my value for the present year, as given above, is nearly identical with them. In further confirmation I may mention that Mr. David Booth, of Leeds, observed more than sixty shooting-stars during a watch of five hours, from 10½h. to 15½h. on the night of October 20 last, and saw twenty-four Orionids which gave a sharply-defined radiant at 90° + 16°.

One of the principal objects of my late observations was to ascertain whether the radiant centre of this stream showed any displacement of position on successive nights, and similar to that affecting the Perseids of August—a peculiarity which I first pointed out in NATURE, vol. xvi. p. 362. But the radiant of the Orionids has (when the small, unavoidable errors of observation are allowed for) quite failed to exhibit any change of place relatively to the contiguous stars. It appeared to maintain an absolutely persistent position 1° north of the star ξ Orionis. My observation on October 15 placed it at 91° + 16°, and nine nights later, viz. on October 24, I found the meteors were radiating from exactly the same focus. In 1877 and 1879, October 15, I derived the radiant at 92° + 15° and 93° + 17°, and in 1878, October 22, I fixed it at 92° + 14°. A comparison of all these values renders it sufficiently obvious that there is no visible displacement in the position of the Orionid radiant during its active display from October 11 to October 24. And there is a high degree of probability that the point is stationary during the whole period of the shower's sustenance from about October 9 to October 29 ; but I have never secured many paths and been enabled to get a good radiant near the limiting epochs of its display, when it is extremely feeble.

Mr. Booth, at Leeds, has been carefully observing numbers of meteors during the past few months, and a searching comparison of his results with those obtained at Bristol during the progress of the Orionid shower has shown that several of the same meteors were observed at both stations. Three of these are typical members of the October display, whilst three others had their origin in the minor systems which are so plentifully distributed over the sky at this season of the year. The computed heights and paths of these six meteors are :—

Date 1887 Oct.	Hour G.M.T. h. m.	Mag.	Height at appearance.	Height at disappearance.	Length of real path.	Radiant point.	Inclination to horizon.
						° °	°
13	10 25	1–2	69	50	26	73+61	48
13	11 25	2–4	70	42	37	127+83	49
14	12 5½	4–5	64	40	26	355+36	67½
15	14 48½	1½–3	89	61	39	87+15	46
20	11 45	4–4	106	90	34	87+21	28½
20	12 55	1–1½	92	53	70½	87+13½	33½

The three last in the list were Orionids, and they appear to have been observed at somewhat greater elevations in the atmosphere than is usual. The 4th magnitude meteor of October 20, 11h. 45m., was no less than 106 miles high at its first appearance, over a point near Eversham, Kent, and the two observations are in perfect agreement in indicating these figures. The mean of the three Orionids gives 96 miles for the beginning points and 68 for the ending, and the average radiant comes out at 87°+ 16°, which is 3° or 4° west of the usual position. But the average values deduced from so small a number of instances cannot have much weight as indicating accurately either the heights or radiant of the general body of the meteors forming this notable group.

The Arietids, which have developed into an important shower this year, traverse their paths with medium speed, and are rather conspicuous meteors, without trains or streaks except in exceptional cases. As to the Orionids, they move swiftly, and are accompanied in almost every instance with streaks. The latter will sometimes brighten up considerably after the nuclei of the meteors have died away. The more brilliant Orionids are fine flashing meteors, leaving streaks which are occasionally very durable.

The contemporary showers of the October epoch, though extremely abundant, are not marked by special activity, except perhaps in the case of the Arietids, already referred to. This year the following have been the best of the minor streams :—

Date.	Radiant.	Meteors.	Appearance.
	° °		
October 14–15	25+44	10	Slow, faint.
,, 14–21	54+71	12	Swift.
,, 14–21	105+22	12	Very swift, streaks.
,, 20–21	125+43	7	Very swift, streaks
,, 14–23	135+68	11	Swift.
,, 12–20	312+77	8	Swift.

Of these the most pronounced is at 105° + 22°, near δ Geminorum, which I also observed in 1877 and 1879. It has also been recorded as a prominent stream by Zezioli and others, and is identical with the Gemellids of Mr. Greg's catalogue (1876) It is chiefly a morning shower ; its meteors are often brilliant, and regularly display the phosphorescent streaks which form so characteristic a feature of the Perseids, Orionids, and Leonids. The shower in the head of Ursa Major at 135° + 68° is also an active one at this epoch ; I saw it in 1877 at 133° + 68°, October 2–19, and these appear to be the only two observations of it obtained hitherto. W. F. DENNING.