XI. *A Meteorological Journal, principally relating to Atmospherical Electricity; kept at* Knightsbridge, *from the 9th of* May, 1790, *to the 8th of* May, 1791. *By Mr.* John Read; *communicated by* Richard Henry Alex. Bennet, *Esq. F. R. S.*

Read April 26, 1792.

A DESCRIPTION of the instruments for collecting atmospherical electricity, used in the following journal.

Fig. 1 and 2 (Tab. IV.) represent the apparatus. AA fig. 1, is a round deal rod, 20 feet long, two inches diameter at the lower, and one inch at the upper end: into the lower end of it is cemented a solid glass pillar B, 22 inches long; the lower end of this glass stands in a socket of wood C, which is screwed on the garret floor D, and supports the whole. About seven feet above the floor, is firmly fixed to the wall a strong arm of wood E, which holds perpendicularly a strong glass tube F, through which the rod is slided gently upwards, till the glass pillar B may be lowered into the socket C. It is thus fixed, and stands 12 inches from the wall. The tube F is of sufficient width to admit a case of cork, which is fastened in the inside of it, at the part where the tube is sustained by the arm of wood E, so that the rod, when bent by the wind, cannot touch the tube or break it. The upper extremity of the rod is terminated by several sharp-pointed wires G; two of them are of copper, each one-eighth of an inch thick; and, in order to stiffen the rod, as well as conduct more readily the

electric fluid, one of them is twisted round the rod to the right hand, and the other to the left, as low down as the brass collar H, to which they are soldered, in order to render their contact perfect. A little above the upper end of the glass pillar B, is placed a brace I I of solid glass sticks, to keep steady that part of the rod. K is a hollow cylinder of wood, 12 inches within, proceeding from the ceiling through the roof LL, above which there is a hollow tin cover M, 24 inches within, fixed to the rod; which serves to defend the open cylinder K from the weather. At a convenient distance from the foot of the rod is a hole bored through the floor and ceiling. This hole receives a glass tube covered with sealing-wax (as are all the other glasses in this apparatus), through which a strong brass wire proceeding from the rod is conveyed into the room below, wherein, at a convenient height from the floor, it terminates with a two-inch brass ball N. A strong ring of brass is made to move easy on the wire, and rests on the brass ball; into this ring is screwed a brass wire seven inches long, which keeps suspended at its extremity a pith-ball electrometer O.

At two inches distance of the above-mentioned brass ball N, a bell P is supported by a strong wire, which passing through a hole made in the wall, is made to communicate, by means of a good metallic continuation Q, with the moist ground adjoining to the house. A brass ball, three-tenths of an inch in diameter, is suspended between the bell P and ball N, by a silk thread fastened to a nail R. This ball serves for a clapper, by striking between the ball and bell, when the electrical charge of the rod is sufficiently strong. V gives nearly a front view of this part of the apparatus.

S is a small table fixed to the wall under the bell and ball, at a convenient height above the floor, upon which Leyden bottles and other apparatus are occasionally placed. Any person versed in the science of electricity, will easily understand that this apparatus is calculated to show the various degrees of intensity of atmospherical electricity; and at the same time to avoid the pernicious effects which may be occasioned by thunder-storms, or in short by any great quantity of electricity in the atmosphere.

The whole perpendicular height of both parts of this apparatus taken together, from the moist earth to the point at the top of the rod, is 61 feet. If the insulation could be constantly kept in due temperature, with respect to heat and cold, I imagine it would always be electrified. But I fear that cannot be done, without the aid of common fire; which in so large an apparatus would be very difficult, so that there might not be too much nor too little of it. I am inclined to this opinion, from the success I have had in a number of experiments, in which the aid of common fire was applied to improve the insulation, as well as to collect the electric fluid.

When I find that the moisture in the air has so much injured the insulation of my high pointed rod, that it will not retain a weak electricity, in that case I make use of my hand exploring rod, which is about the length and thickness of a common fishing-rod, with plenty of small wire twined round it from end to end. The method of using it is simple and easy. A representation of it may be distinctly seen in fig. 2. Having first *warmed* the glass legs of the stool, I place myself upon it, and raise the rod into a vertical position, keeping it so for a minute or two; I then with a finger

of the other hand touch a sensible electrometer, and if the threads open, it is sufficient. But should the electrical state of the atmosphere be too weak to produce that effect, which seldom happens, then in that case I add to the rod a *lighted torch* T, and place it as remote from my hand as the strength of the rod will bear, and repeat the experiment; thus circumstanced, it has never yet failed me.

It will be necessary just to mention the method I have pursued in forming the journal of atmospherical electricity. This has been principally by means of the signs exhibited by the pith balls O, connected with the rod. When I find these closed, and attracted on the approach of my finger, yet not sufficiently charged to repel each other, I write weak signs of electricity. When I find the balls open, and, on the approach of excited glass, the balls close, I write they are electrified positively; but, if the balls open wider, I write they are electrified negatively; and the reverse when I use sealing-wax. When the balls diverge one inch and upwards, visible sparks may be drawn at the brass ball N. When sparks are said to have been perceived in any observation, I have generally on that account omitted to note the variable quantities of divergency in the pith balls. Their utmost limit of regular divergency seems to be about five or near six inches; above that they are unsteady and disorderly. The pith balls are near two-tenths of an inch in diameter, suspended by very fine flaxen threads (in the state it is in from the heckle) five inches long. When I mention the distance of the balls in tenths of an inch, it is to be understood as nearly so as my eye can determine.

This apparatus requires a constant attention, especially

during a disturbed state of the atmosphere. From the room in which the apparatus is placed I am seldom absent one hour, excepting the time of sleep; but, when I leave it, the last thing I do at night is to examine the state of the electricity, and, if I find the rod unelectrified, I then place the Leyden bottle on the table S, with its knob nearly in contact with the ball N. The next morning, if I find this bottle charged, I write the kind of electricity it is charged with against the day in the journal, and add, *by the night bottle.*

It is presumed, that the table is sufficiently obvious. The two columns for positive and negative electricity are used only for the first observation of each day. I use FAHRENHEIT's thermometer, suspended on the north outside of a bow-window. The time of making the observation with it, and the barometer, and also of the direction of the wind, has usually been nine o'clock in the morning.

Lastly, it may be useful to observe, that I have always found, when the rod is highly electrified, the lower though *uninsulated* part of the apparatus (*viz.* the metallic connection of the bell P with the moist earth) to be in a contrary state of electricity to the upper and insulated part. See the 20th of May.

Having made a memorandum of the several thunder-storms which have happened in divers parts of this island, according to information by letters, and from newspapers, I thought it useful to insert them in this journal, in order to show whether some contemporaneous appearances in my apparatus might not be attributed to them.

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	May 9, 1790.
		Inches.	o				
May 9	N	29.14	67	strong	pos.	—	A clear fine morning. One o'clock P.M. a sudden shower of rain fell; the pith balls O, connected with the lower end of the rod, were now charged negatively, and increased in strength as the rain came on; in a short time the electricity changed to positive. Five o'clock, the electricity changed again to negative, I then heard some distant rumbling of thunder. This day there was some lightning at Hertford.
10	NE	29.18	66	o	—	neg.	A.M. sky very cloudy, and some small rain falls.
11	E	30. 5	64	o	pos.	—	Strong gales of wind; and a weak electricity.
12	E	29.14	70	o	pos.	—	
13	E	29. 6	72	o	pos.	—	
14	NE	30. 9	72	o	pos.	—	
15	N	29. 5	65	o	pos.	—	A.M. weather serene.
16	NE	29. 2	57	o	pos.	—	A.M. a clear sky. Some lightning at Bishop-Stortford.
17	S	29. 8	58	strong	pos.	—	Half after nine o'clock A.M. fell a little rain; as it increased so did the electric charge in the rod, insomuch that it streamed forth from the brass ball N for a short time.
18	SW	29.90	59	small	pos.	—	Six o'clock A.M. One o'clock P.M. a low black sky, by which the charge in the rod became negative, with sparks; after continuing so one hour, the electricity changed again to positive. The rod has been in charge 16 hours this day; how much more I cannot say.
19	S	29.20	65	strong	—	neg.	A.M. At four o'clock P.M. fell a mild rain, void of the electric fluid. At five o'clock the rain fell more copiously, and it was strongly charged with negative electricity.
20	S	29.14	64	small	—	neg.	Early this morning I found the humidity of the air electrified negatively. At ten o'clock, the electricity became more intense, so as to emit small sparks: in half an hour's time there were four beautiful gradual changes of electricity. Afterwards the rod remained negative two hours. Three o'clock P.M. the electricity changed, and continued near three hours positive. After this a low black cloud passed over the rod, and let fall a few drops of rain mixed with

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				hail; the rod was now highly charged positively, the bell rang briskly, but soon stopped, while the electricity changed to a strong negative; then it began to ring again, for about ten minutes, after which all signs of electricity ceased in the rod for a few minutes. Afterwards the rod became rather strongly charged for two hours, and changed once in that time. During this high charge of the rod, the bell (which is connected by metal with the moist ground) was in a contrary state of electricity to that of the insulated part of the apparatus; and also the air in the room, the window-shutter nearest the bell, and even the bricks in the wall, were all electrified sufficiently to indicate the kind.
May 21	SW	29.98	58	strong	pos.	—	A.M. by the night bottle, which had been charged while I slept. Four o'clock P.M. a low cloud approached the rod, and dropped a little rain, by which it became electrified strongly negative. This electrification of the rod lasted near four hours, and changed three times in kind.
22	E	29.10	56	o	pos.	—	A.M. One o'clock P.M. wind S, a small rain fell, and the air being very moist, has lessened considerably the insulation of the rod.
23	S	29.90	56	o	pos.	—	The air is dry to-day, but the clouds are very high.
24	NE	29.10	69	strong	—	neg.	Six o'clock A.M. Nine o'clock some rain fell, which increased the negative charge in the rod. The rain now falls more copiously, and the balls close and open gradually with positive electricity, which was rather strong for a short time. The balls again gradually close and open, without change of kind. The rod has been electrified near 14 hours this day. In the morning of to-day, at Lewes in Sussex, much lightning and thunder.
25	NE	29. 4	70	o	—	neg.	A.M. A moist air, and wet morning.
26	E	29.95	62	strong	pos.	—	A dark cloudy morning. Three o'clock P.M. on the approach of a heavy dark cloud, a few drops of rain fell, by which

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				the rod was electrified positively; the pith balls soon opened full four inches, and by and by the bell began to ring slowly. Two gentlemen fortunately being present, and much delighted with the sight, by my desire joined hands with me to make the circuit between the bell and brass ball N, and on taking a spark at the brass ball, we all received a smart shock through our arms and breasts. The wind is now S. with a heavy fall of rain; the bell (as usual) now ceases to ring while the electricity changes to negative: then rings again briskly. The electricity gradually changed twice after this, and ended negative. These several phænomena took up one hour.
May 27	N	29.98	69	o	—	neg.	A.M. A small rain. In the afternoon positive. Near midnight London was visited by vivid darts of lightning, and repeated explosions of thunder, extremely awful and terrific at that time of night. I was in bed, and awaked out of sleep by it.
28	NE	30.	61	small	—	neg.	By the night bottle. A heavy thick air. Seven o'clock P.M. positive with small sparks. Nine o'clock, fell a heavy shower of rain; its electricity was negative.
29	SE	30.	69	o	pos.	—	A.M. and P.M.
30	SW	30. 6	63	strong	pos.	—	At seven o'clock A.M. the weather showery, and the electricity rather strong, but often changing in kind. Seven o'clock P.M. one uniform black cloud darkens the air (yet the sun shines in the west); by and by a heavy rain fell, by which the rod became very strongly electrified positively, the bell rings briskly, and the pith balls are agitated with sudden jerks; the rain abates, and the electricity becomes negative. These operations of nature lasted only 34 minutes; during that time, the electricity was four times positive, and five times negative; and these several changes were all gradual.
31	N	30.	58	strong	—	neg.	The weather, and the electricity of the atmosphere have been this day nearly the same as on the preceding one.

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				
June 1	S	30.12	58	o	pos.	—	Serene fine weather.
2	N	30.16	69	o	pos.	—	
3	SW	30.12	66	o	pos.	—	
4	N	30. 8	61	o	pos.	—	
5	N	30.18	58	o	pos.	—	
6	N	30.16	62	o	pos.	—	A.M. Two o'clock P.M. the sky still clear; the electricity of the rod was now negative, and continued so two hours. During this time, the rod was only electrified with its own electricity, or what has been termed influentially electrified; for I found by trying both extremities of the rod, that they were in contrary states of electricity.
7	W	30.	62	o	pos.	—	A.M. A warm moist air.
8	SW	29.91	66	o	pos.	—	A.M. Some mizzling rain.
9	S	29.65	64	o	pos.	—	A.M.
10	SW	26.60	65	strong	pos.	—	A cloudy morning. Half after one o'clock P.M. the electric charge in the rod became negative. In a short time after, some rain fell, and the electricity again became positive, and very strong; the bell now rang slowly, and soon stopped; the pith balls closed and opened negative, and continued so a full hour: the balls exhibited one sudden jerk during that time. This charge of the rod lasted two hours. During the passage of a cloud over the rod, in the morning of to-day, I found it influentially electrified.
11	N	29.90	65	o	pos.	—	The weather serene and clear. The electricity varying between nothing and the balls seven-tenths of an inch open.
12	N	30.	59	o	pos.	—	
13	NE	30.29	60	o	pos.	—	
14	NE	30.30	64	o	pos.	—	
15	NE	30.30	69	o	pos.	—	
16	N	30.23	54	o	pos.	—	
17	E	30.10	61	strong	—	neg.	After a course of clear serene weather, this day has been dark, and hazy. Nine o'clock P.M. wind S, a prodigious large cloud approached the rod, and a little rain fell, yet there were no signs of electricity in the rod. In a few minutes after this, I was surprised by hearing the bell ring; I ran to the apparatus, and found it highly charged negatively. When the main bulk of the cloud arrived over the rod, its electricity changed to a strong positive;

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				and in a quarter of an hour, the rain and electricity all ceased together. This day, in the evening, at Wolverhampton, fell a heavy rain, accompanied with lightning and thunder.
June 18	NW	29.91	63	o	pos.	—	A.M. and P.M.
19	S	30.	68	o	—	neg.	A dark cloudy morning. The electricity positive at five o'clock P.M.
20	SW	30.21	74	o	pos.	—	} Weather very hot, and a weak electri-
21	SW	30.35	76	o	pos.	—	} city.
22	E	30.20	79	o	pos.	—	A.M. Serene hot weather. Near sunset the wind W, when heavy black clouds were forming, their upper border about 25 degrees above the horizon. The lightning flashed among these clouds from nine to eleven o'clock. But there being neither clouds nor low vapour near the rod, it was not affected thereby. In the evening of this day at Salisbury, a very severe storm of hail, rain, lightning, and thunder.
23	SW	30.	78	o	pos.	—	A.M.
24	W	30.	68	o	pos.	—	A.M. The sky has been overcast all day, and two or three times fell a little rain, driven by a strong wind, but nearly void of electricity.
25	W	29.90	68	strong	pos.	—	At six o'clock A.M. Near eleven o'clock, a shower of rain fell, strongly negative. At the same time, in a *lower stratum* of air, the hand exploring rod was electrified *positively*. Abundance of small white clouds passed over the rod, which kept the pith balls continually closing and opening, with negative electricity. Eight o'clock P.M. some heavy drops of rain fell; the rod now became very strongly electrified; the bell rang slowly, and soon stopped, while the electricity changed to a strong positive, then rang again more briskly for a longer time. After this there were two more gradual changes.
26	NW	29.90	63	strong	pos.	—	The weather, and atmospheric electricity, have been this day nearly the same as on the preceding one; only the operations in the rod have been more powerful. For in one charge of the rod today, I counted about forty dense sparks, which spontaneously struck between

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				the bell and brass ball N in quick succession. These sparks were about two inches long.
June 27	N	29.96	61	strong	pos.	—	A.M. Four o'clock P.M. I saw heavy clouds forming; and as they came nearer and nearer, the rod became more powerfully electrified with negative electricity. It now began to rain, by which the rod became intensely electrified indeed. Many dense sparks now struck through the air, between the bell and brass ball N, with a loud report for so small an opening of two inches only. There were six changes of electricity in two hours.
28	W	30. 5	57	o	pos.	—	Mild foggy weather; moderately electrified.
29	N	30.	70	o	pos.	—	
30	SW	30.	67	o	pos.	—	
July 1	W	29.83	66	small	pos.	—	A.M. Negative P.M. with small sparks.
2	W	29.77	63	strong	pos.	—	A.M. Half after twelve o'clock P.M. a sudden gust of wind sprung up, followed by a shower of rain, which electrified the rod positively, and sufficient to emit small sparks; which soon afterwards became negative. Near four o'clock P.M. a very large black cloud passed over the rod, and let fall a little rain mixed with hail, by which the rod became highly electrified negatively: the bell now rang briskly, till a flash of lightning and instant crack of thunder happened, which occasioned a sudden change in the electricity to positive: then the bell struck up again as brisk as before. The rod has been charged ten hours without intermission this day.
3	NW	29.72	70	o	pos.	—	A.M. A cloudy atmosphere, but fair.
4	SW	29.66	69	o	pos.	—	A.M. Dull heavy weather.
5	SW	29.40	64	strong	—	neg.	This day has been showery and sunshine by turns. The rod has been rather strongly electrified, and there have been four gradual changes of electricity. The bell rang briskly a long time. This charge lasted full five hours.
6	N	29.70	65	o	—	neg.	A strong gale of wind with rain, and a weak electricity.
7	N	30.10	63	o	—	neg.	
8	SW	30.	63	o	pos.	—	A.M.
9	SW	29.86	67	o	—	neg.	A.M. A thick moist air.
10	SW	29.90	61	strong	pos.	—	A.M. Near five o'clock P.M. there was

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				a fine shower of rain, by which the rod first became electrified negatively, and afterwards positively, with sparks. This charge lasted five hours.
July 11	NW	29.60	61	strong	—	neg.	Half after ten o'clock A.M. large dark clouds frequently passed over the rod, by which it became electrified negatively. When they passed somewhat nearer, and dismissed some large drops of rain, the rod then became highly charged, and the bell rang briskly, and continued its ringing near half an hour. The pith balls were very much agitated, sometimes with a pendulous motion, then started closer or wider asunder several times. But the most extraordinary phænomenon of to-day is, that the rod continued ten hours electrified negatively, without change of kind: during that time the pith balls never closed.
12	N	29.70	63	strong	—	neg.	The operations in the rod to-day and yesterday, when compared, appear to have but little resemblance. This day the electricity has changed four times, and the bell rang briskly for a minute or two between each change of electricity.
13	W	29.62	64	strong	pos.	—	Two o'clock P.M. the wind S. A sudden shower of rain fell, by which the rod became electrified positively, but soon changed to negative. The bell now rang weakly one minute, and then stopped while the electricity changed to positive, which soon changed again to negative. The electricity and the weather have been much varied to-day. At New-Mills, in Scotland, some lightning and thunder.
14	NW	29.57	57	strong	—	neg.	The weather this day has been rather more varied than yesterday, with a continued succession of showers and sunshine: and the atmospheric electricity has been considerably more intense, and constant. There have been five gradual changes of electricity; between four of those changes, the bell rang briskly. The pith balls also exhibited some of their curious agitations; one jerk in

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				particular was so very quick and powerful, that the balls were near striking each other. In a few minutes after this, I heard distant thunder. At Burwash, in Sussex, this day a heavy tempest of rain, lightning, and thunder.
July 15	NW	29.78	60	o	pos.	—	The weather these 19 days has been generally moderate; and the electricity of the atmosphere has been only what is common for serene weather, at no time sufficiently strong to afford visible sparks.
16	NW	29.95	63	o	pos.	—	
17	SW	30.13	69	o	pos.	—	
18	W	30.10	66	o	pos.	—	
19	SW	30. 5	65	o	pos.	—	
20	SW	29.75	66	o	pos.	—	
21	W	29.78	63	o	pos.	—	
22	NW	30. 5	61	o	pos.	—	
23	SW	30.	64	o	pos.	—	
24	W	30.	66	o	pos.	—	
25	SW	30.12	69	o	pos.	—	
26	SW	30.15	66	o	pos.	—	
27	W	30.11	67	o	pos.	—	
28	S	30.10	63	o	pos.	—	
29	N	29.65	57	o	pos.	—	
30	NW	29.65	60	o	pos.	—	
31	SW	29.55	63	o	pos.	—	
Aug. 1	NW	29.92	59	o	pos.	—	
2	SW	29.95	61	o	pos.	—	
3	SW	29.77	63	strong	pos.	—	A heavy cloudy morning, but fair. Half after one o'clock P.M. a smart shower of rain fell, by which the rod became highly charged with negative electricity; when the cloud was fully over the rod, the electricity changed to positive; and when it had passed the zenith, the electricity changed again to negative.
4	NW	29.83	62	o	pos.	—	Serene weather, and a weak electricity.
5	SW	30.	67	o	pos.	—	
6	SW	29.93	67	o	pos.	—	
7	SW	30.	72	o	pos.	—	
8	W	29.92	67	o	pos.	—	A heavy cloudy morning, but fair. The electricity of the atmosphere has been so weak to-day, that none could be obtained till after sunset.
9	W	30.	63	o	pos.	—	A.M.
10	SW	30. 5	63	o	pos.	—	Serene weather: the pith balls varying between nothing and three-quarters of an inch open.
11	W	30.10	66	o	pos.	—	
12	SW	30.10	72	o	pos.	—	
13	SW	30. 5	69	o	pos.	—	
14	N	30.10	64	o	pos.	—	
15	S	30. 3	72	o	pos.	—	
16	SW	29.90	73	o	pos.	—	There have been several small showers of

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				rain this day, some of them not sensibly electrified, others were weakly positive, but which I could not distinguish from the common electricity of serene weather, which has prevailed a long time.
Aug. 17	W	30.	66	o	pos.	—	Serene weather; divergency of the pith balls from one to seven-tenths of an inch.
18	N	30.10	66	o	pos.	—	
19	SW	30. 1	66	o	pos.	—	
20	NW	30. 4	76	o	pos.	—	
21	S	29.75	77	strong	pos.	—	A.M. Five o'clock P.M. fell some large drops of rain, by which the rod was highly charged positively; the bell rang briskly about five minutes, then stopped, and the electricity of the rod became negative. The rain now ceased, the sky cleared up, and the electric charge in the rod decreased considerably, and ended as it begun, positive.
22	W	30. 4	62	o	pos.	—	Dark cloudy weather, and a very moist air, attended with a weak electricity.
23	SW	29.95	67	o	—	neg.	
24	W	30.	63	o	pos.	—	
25	SW	29.96	62	o	pos.	—	
26	N	29.70	64	o	pos.	—	
27	N	29.83	62	strong	pos.	—	This day has been very showery, yet only one shower was strongly electrified.
28	W	29.95	59	o	pos.	—	Serene weather, and a constant electricity.
29	NW	30.	60	o	pos.	—	
30	W	30.12	62	o	pos.	—	
31	SW	30.10	66	o	pos.	—	
Sept. 1	W	29.95	67	o	pos.	—	
2	SW	29.80	62	small	pos.	—	A.M. In the afternoon, there was a thick dark sky, with small rain, and a strong wind. On an increase of rain the electricity became negative, with small sparks. When the rain abated, the electricity changed to positive, and so it ended.
3	W	29.50	58	strong	pos.	—	A.M. Near one o'clock P.M. the electric charge in the rod was negative. I then saw thunder-clouds forming in the south, and in the north. Some large drops of rain now fell, by which the charge in the rod became very strong; the bell now rings faintly, and the pith balls exhibit their waving motion, and sometimes sudden jerks. The distinct thunder-cloud, which was in the north, is now gone by the west into the south, during which the charge in the rod be-

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				came weaker and weaker, till it ended as it began, negative. This electric charge of the rod continued near one hour and a half.
Sept. 4	W	29.65	58	strong	pos.	—	A.M. One o'clock P.M. wind NW. Thin white clouds have been passing over the rod; but a distinct black cloud is now approaching, and some rain falls, mixed with hail; the rod is now highly charged with positive electricity; the bell rang loud, and a long time; and as the shower abated, so did the strength of the electric charge abate in the rod. This charge lasted near three hours, without change of kind.
5	NW	29.70	55	small	pos.	—	A quarter before three o'clock P.M. some rain fell, by which the rod became moderately charged positively, but soon changed to a weaker negative. There were two more gradual changes of electricity within the space of one hour.
6	N	30.	58	strong	—	neg.	Three o'clock P.M. a large dark cloud passed over the rod with drizzling rain; its electricity was negative; the bell rang weakly. The electric charge from this cloud began, continued, and ended, negative.
7	N	30.10	51	small	pos.	—	A.M. by the night bottle. Two o'clock P.M. a dark cloud, with drizzling rain, passed over the rod, by which it was electrified positively, with sparks; and ended negative.
8	N	30. 5	57	o	pos.	—	Moderate fine weather, and a weak electricity.
9	SW	30. 8	62	o	pos.	—	
10	NW	30.	58	o	pos.	—	
11	SW	30. 1	51	o	pos.	—	
12	SW	30.10	62	o	pos.	—	
13	W	30.	61	o	pos.	—	
14	S	29.84	62	o	pos.	—	
15	SW	29.80	66	small	pos.	—	The rod has been electrified positively nearly all this day. At five o'clock P.M. an awful darkness covered the heavens, until near six o'clock, succeeded by a drizzling rain, from which I could not obtain (in my common way) any electric fluid: but when the dark cloud became broken, and no rain fell, I then obtained visible sparks at the ball N, which continued until I went to bed;

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				and seemed to indicate that it would remain so all night, as the night is perfectly serene, and clear moonlight.
Sept. 16	W	30.	55	small	pos.	—	Five o'clock this morning, I found the rod charged positive, but not quite so strong as when I left it last night; and it gradually went off by nine o'clock, and returned again into the rod at near four o'clock P.M. from which time the fluid gradually increased with the cool of the evening, until visible sparks appeared at the brass ball N. In this state of intensity I left it at near eleven o'clock.
17	W	30.28	50	small	pos.	—	This morning, a little after five o'clock, I found the rod rather stronger charged with the same electricity than when I left it last night; and I have no doubt but it has been electrified all night. The pith balls have never closed this day: their divergency has been between half an inch and two inches. Weather serene.
18	SW	30.10	54	small	pos.	—	Five o'clock A.M. I found the rod electrified positively, and nearly of the same intensity it was in when I left it last night; that is to say, capable of emitting small sparks. The atmosphere this morning is perfectly serene. There is a dew, or low fog, about five or six feet high, spread over the ground in Hyde-Park, very beautiful to look upon from an upper window. For the space of two hours, this vapour gradually increased, and ascended higher and higher, until it quite intercepted the trees from my sight, and became a pale wet fog; which very much injured the insulation of the rod: for during its increase in height, the electricity of the rod decreased, insomuch, that I had almost concluded that the pith balls touched each other. But during this short suspense the sun rose higher, and diminished the fog very fast; and the electricity in the rod soon increased to its former strength; and so continued all day.
19	S	29.85	63	small	pos.	—	Five o'clock A.M. I found the rod electrified positively, but rather weaker than

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				when I left it last night. The weather this day has been nearly the same with that of the preceding one; only the fog began later, and continued longer. The rod has been electrified all this day.
Sept. 20	W	29.70	57	strong	pos.	—	Near six o'clock A.M. I found the rod electrified, but very weak, barely sufficient to indicate the kind, and it remained so till near three o'clock P.M. The pith balls now closed (which I suppose has not happened before during the space of 92 hours) and opened negative. A heavy cloud from the NNW now approaches the rod, and a little rain falls, by which the rod is highly electrified negatively, and the bell rings briskly; the pith balls diverge to their utmost limit, and exhibit their waving pendulous motion. These operations took up about one hour; and the rod continued electrified negatively the rest of the day.
21	NW	29.90	58	o	—	neg.	By the night bottle. The electricity in the rod barely sensible.
22	W	30.20	52	small	pos.	—	The pith balls have not closed this day. The weather serene.
23	S	29.95	52	small	pos.	—	This morning a quarter before six o'clock, I found the electric charge in the rod much weaker than when I left it last night; which I afterwards found had been occasioned by a spider fixing its web from the rod to the wall of the house; for when the web was removed, the intensity of the electrical charge was soon increased.
24	N	30.30	58	o	pos.	—	} Dark cloudy weather, and a strong wind.
25	NW	30.30	58	o	pos.	—	
26	NW	30.38	55	small	pos.	—	Between six and seven o'clock this morning, I found the pith balls quite closed; nor would they even stick to my finger when I touched them. At this instant there was a visible dew spread over the ground in Hyde-Park: I examined it with my hand exploring-rod, and quickly charged an electrometer sufficient to ascertain the kind, which was positive. I now suspected my daily enemies the spiders; I therefore went upon the roof of the house with my

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				long feather broom, and gently swept the rod down; on examining the broom, I found a spider's web entangled in the feathers. I then went down to the apparatus, and found the pith balls a quarter of an inch open positive, which gradually increased, even to visible sparks.
Sept. 27	SW	30.35	57	small	pos.	—	Six o'clock A.M. I found the electric charge in the rod much weaker than when I left it last night. Nevertheless, when the sun got up a little above the horizon, the rod became stronger electrified. The pith balls never closed this day.
28	SE	30.12	48	small	pos.	—	The operations of the rod to-day have been nearly the same with the preceding one.
29	N	30.12	55	small	pos.	—	This morning a little before six o'clock, I found the pith balls closed. Atmospheric electricity has been more variable this day than for many days past; sometimes quite null, then weak, or strong by turns, until three o'clock P.M. when it again became constant during the remainder of the day.
30	NE	30.25	58	small	pos.	—	Six o'clock A.M. I found the pith balls open full three quarters of an inch positive, and they continued open all day. Their least divergency (as usual) about midday. The weather still thick and dark in the forenoon; and clear serene weather in the afternoon.
Oct. 1	E	30. 5	52	small	pos.	—	Six o'clock A.M. I found the pith balls opened near one inch and a quarter; and they never closed this day. Their least divergency, as usual, was about midday, and their greatest was near midnight. Weather serene.
2	E	29.84	56	small	pos.	—	Six o'clock A.M. I found the pith balls nearly closed, and the state of the air moist and foggy. Half after seven o'clock, the balls opened a little wider, and continued to increase in strength, so that between eleven and twelve o'clock their divergency was full three inches. I saw nothing in particular to occasion it; and I thought it was above the intensity of common serene weather. I saw indeed a dark cloud, but it was

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				at a very great height. However, this electric charge continued in the rod until seven o'clock P.M. when a shower of rain fell, and the pith balls now closed, and opened negative: a fact which has not happened for eight days. After the rain had ceased, the electricity became again positive.
Oct. 3	SE	29.80	63	o	pos.	—	A wet morning, the air moist, and a weak electricity.
4	NE	29.90	56	small	pos.	—	A very moist air. Half after ten o'clock, fell a heavy rain, which continued three hours. Its electricity was positive, but not strong.
5	SW	30. 2	58	small	pos.	—	A foggy damp morning. The rod has been electrified very near all this day.
6	S	29.85	60	strong	—	neg.	A heavy cloudy morning. Two o'clock P.M. the clouds float in the air lower than in the morning; and the rod is electrified negatively. Four o'clock, a heavy black cloud passed the rod, by which it was strongly electrified, but still negative, and continued so a full hour. During this time there were several sudden jerks exhibited by the pith balls. Near sunset the balls closed, and opened positive, and remained so. In the east part of Kent, some lightning and thunder this day.
7	S	29.85	61	o	pos.	—	A.M. the weather mild and fair.
8	N	29.85	54	small	—	neg.	By the night bottle: by the rod positive.
9	N	29.90	52	o	pos.	—	A.M. Perfectly fine weather.
10	W	30. 4	42	o	pos.	—	The electricity constant this day.
11	SW	30. 8	39	small	pos.	—	The rod electrified all this day.
12	SW	29.86	56	small	pos.	—	A little after six o'clock A.M. I found the rod electrified, but rather weaker than when I left it last night. The weather cloudy, with a thick moist air. One o'clock P.M. fell a sudden shower of rain; the electricity now changed to negative, with small sparks.
13	W	29.75	50	small	pos.	—	A little after six o'clock A.M. I found the rod electrified positively. A warm mizzling rain and moist air. Ten o'clock P.M. balls open two inches.
14	W	29.80	61	o	pos.	—	Six o'clock A.M. balls open half an inch positive.
15	W	30.	59	small	pos.	—	A.M. Fair weather, and strong gales of wind.

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				
Oct. 16	W	30.34	43	small	pos.	—	Six o'clock A.M. balls three-tenths of an inch open. The pith balls have not been unelectrified this day.
17	S	30.15	55	small	pos.	—	During a continuance of moderate weather, I have frequently observed that the atmospherical electricity has periods of increase and decrease of quantity, which are tolerably regular; I shall therefore be accurate in my account of this day's variation, as it may serve for an example of reference to many other days when similar appearances took place. When I left the rod last night, the pith balls were one inch open, positive. Six o'clock this morning, I found them three-tenths of an inch open, positive; and soon after this I perceived them to open wider and wider, so that a little before nine o'clock, the pith balls were stationary at near two inches open. But as the sun advanced towards the meridian, the electric charge in the rod decreased; and it was only possessed of various degrees of a weak intensity until four o'clock P.M.: the pith balls were then only two-tenths of an inch open. Half an hour after four o'clock, they began to increase their divergency, which gradually held on till a little after seven o'clock, when they again became stationary at full two inches open; a little after eight o'clock, they began to decrease; nine o'clock, they were one inch and a quarter open; near eleven o'clock, I left them at a bare inch open.
18	SW	29.90	62	small	pos.	—	Six o'clock, pith balls two-tenths of an inch open, positive. A dark cloudy morning. One o'clock P.M. some rain fell, yet the electric charge in the rod was positive. Near three o'clock, the fall of rain suddenly increased, so did the electric charge in the rod; and at the same time changed to negative, with sparks; and after this ended positive.
19	W	30.15	39	small	pos.	—	The rod has not been unelectrified this day: and the facts and appearances have been nearly like those of the 17th instant.

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				
Oct. 20	E	30. 5	46	small	pos.	—	The operations of the electricity in the rod to-day have been nearly the same with those of the 17th instant.
21	SE	29.91	62	small	pos.	—	The electric charge in the rod has been constant this day; and for particulars may justly be referred to the 17th instant.
22	SE	29.78	59	small	pos.	—	A.M. The pith balls closed and opened, without change of kind, several times this day: and they have been very irregular when compared with many of the preceding. A thin wet fog has prevailed all this day.
23	SE	29.75	53	small	pos.	—	A.M. Four o'clock P.M. fell a mizzling warm rain, by which the rod became electrified negatively, and emitted small sparks. When the rain was over the rod was electrified positively, and it continued so.
24	NE	29.76	54	small	pos.	—	The rod has been constantly electrified this day, and has been strictly periodical. See 17th instant.
25	N	29.75	54	small	pos.	—	The same as the preceding day.
26	N	29.89	50	small	pos.	—	The operations of the electric fluid in the rod this day have been nearly similar to those of the 17th instant.
27	E	29.90	49	o	pos.	—	Dark moist air, but fair, and some brisk gales of wind.
28	NE	29.73	49	o	pos.	—	
29	NE	29.80	47	o	pos.	—	
30	NE	29.85	44	o	pos.	—	
31	N	29.88	42	small	pos.	—	The thick easterly wind is now over-ruled by a clear northerly one: and the electrification of the rod this day has been of the periodical kind. The pith balls never closed.
Nov. 1	S	29.80	46	strong	pos.	—	Near six o'clock A.M. I found the pith balls open one inch and a quarter, positive; which is rather less than when I left them last night. Half an hour after ten o'clock, fell a heavy shower of rain: the pith balls now closed, and soon opened negative, which, with the rain, continued for the rest of the day.
2	SW	29.45	49	o	pos.	—	P.M. fair weather.
3	SW	29.80	44	strong	pos.	—	From a continued rain of four hours.
4	W	29.74	49	small	pos.	—	Nearly all day, but strongest after sunset.
5	W	29.95	47	o	pos.	—	A.M. and P.M. A cloudy atmosphere.
6	S	29.75	53	o	pos.	—	The electricity of the atmosphere this

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				day has been so weak, that I have been obliged to content myself with obtaining the kind by a pair of flaxen threads, without balls to them. The weather warm and showery.
Nov. 7	S	29.68	57	small	pos.	—	The operations in the rod, these two days, have been of the periodical kind. See 17th of October.
8	NE	29.90	42	small	pos.	—	
9	NE	30. 3	44	o	pos.	—	Pith balls not open this day. The kind was obtained by flaxen threads without balls to them. A moist air.
10	NE	30.15	46	o	pos.	—	Sharp dark weather, with a dry easterly wind; and a weak electricity.
11	E	30.	48	o	pos.	—	
12	NE	30.10	47	o	pos.	—	
13	NE	30.15	44	o	pos.	—	
14	NE	30.25	45	o	pos.	—	
15	NE	30.29	42	o	pos.	—	
16	NE	30.16	38	o	pos.	—	
17	E	30.	41	o	pos.	—	
18	N	29.77	33	o	pos.	—	
19	S	29.24	47	strong	—	neg.	The severe easterly wind is now gone, and a more intense atmospheric electricity is returned. Nine o'clock A.M. a large black cloud passed over the rod, and a moderate shower of rain fell, by which the rod was rather strongly electrified negatively. This shower lasted one hour; and near the middle of it, the electricity changed to a strong positive; after this, the electricity ended as it had begun, negative.
20	S	29.25	42	small	—	neg.	By the night bottle. Half an hour after two o'clock P.M. fell some rain, and the rod became electrified negatively. At Calstock, in Cornwall, in the evening of this day, much lightning and thunder.
21	W	29.16	47	strong	—	neg.	Half an hour after midday, fell a moderate shower of rain, attended with a great darkness. The rod now became rather strongly electrified negatively; and the bell rang weakly. There were after this several showers, which only gave a weak positive electricity; except one, which fell at ten o'clock at night; this indeed was strongly positive. At eleven o'clock this night, both at London and Portsmouth, there was much lightning and thunder. And also, at the

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				same time, at Salisbury, where it appeared to roll along the ground like a body of liquid fire.
Nov. 22	SW	29.40	49	o	—	neg.	A.M. The weather showery.
23	NW	29.68	49	o	pos.	—	P.M. A foggy moist air.
24	SW	29.84	37	o	pos.	—	A.M. and P.M.
25	S	29.78	50	o	—	neg.	P.M. Weather showery.
26	NW	29.58	51	o	pos.	—	Atmospheric electricity, these four days, has been governed by its periodical laws. The weather very mild.
27	N	30.20	36	o	pos.	—	
28	N	30.35	39	small	pos.	—	
29	SE	30.12	35	small	pos.	—	
30	N	29.74	32	small	pos.	—	From a shower of snow.
Dec. 1	SE	29.62	32	o	pos.	—	There has been very moderate weather these 12 days. The pith balls have been variable, between null, and one inch open.
2	W	29.42	44	o	pos.	—	
3	S	29.83	45	o	pos.	—	
4	W	29.95	42	o	pos.	—	
5	NW	29.95	32	o	pos.	—	
6	N	30.30	38	o	pos.	—	
7	W	30.30	38	o	pos.	—	
8	N	30.15	49	o	pos.	—	
9	N	30.15	48	o	pos.	—	
10	W	30.18	48	o	pos.	—	
11	SW	29.95	52	o	pos.	—	
12	SW	30. 7	37	o	pos.	—	
13	SW	29.88	48	strong	—	neg.	There has been a constant drizzling rain, with a strong gale of wind, from early in the morning to seven o'clock P.M.; the wind then became a storm. The rod had been null to this time, but now gave signs of a negative charge, and continued increasing its charge until near nine o'clock; at this time the storm seemed to be at its height. The wind now suddenly shifted from SW to N: every appearance is now awful; the pith balls diverge to their utmost limits, and are very much agitated; and the bell rang for half a minute. Half an hour after nine o'clock, the storm ceased; and the charge in the rod became very weak. During the space of two hours the electricity changed six times.
14	W	29.91	39	o	pos.	—	A.M.
15	W	29.40	48	small	—	neg.	From five to eight o'clock A.M. there was a storm of wind and rain. The electricity changed once only.
16	S	29.71	39	o	—	neg.	P.M. A showery day.
17	SW	29.41	41	o	pos.	—	A.M.

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				
Dec. 18	N	28.98	37	small	—	neg.	A.M. and P.M. Strong gales of wind, with rain.
19	S	29.54	33	strong	pos.	—	Between eleven and twelve o'clock A.M. fell a shower of rain, mixed with snow, by which the rod became rather strongly electrified, positively; which continued, with some variation of intensity (without change of kind) near three hours. The greatest divergency of the pith balls was four inches, when fine sparks were received from the brass ball N.
20	N	29.93	32	o	pos.	—	Nearly all day. Divergency three-quarters of an inch. Weather serene.
21	SW	29.90	46	o	pos.	—	The air is extremely moist; and some small rain fell several times this day, which was almost void of the electric fluid; for I could not obtain it in quantity sufficient to ascertain the kind, until I added a *lighted pitch torch* to my hand exploring-rod.
22	W	30. 5	37	o	pos.	—	The pith balls half an inch open nearly all day.
23	W	29.80	44	o	pos.	—	Five o'clock this morning, a most tremendous storm of wind, rain, lightning, and thunder, visited London and other parts. I, being not well, and in bed, did not get up to make observations. I thought I heard the bell ring: however, the rod was but weakly electrified the rest of the day. The high wind continued, without rain, all day.
24	SW	30.20	39	o	pos.	—	Moderate weather, and nearly a constant charge of electricity in the rod.
25	N	30.	45	o	pos.	—	
26	SW	30.22	29	small	pos.	—	
27	S	30. 3	31	o	pos.	—	
28	N	30.	32	o	pos.	—	
29	S	30.20	25	o	pos.	—	
30	S	29.96	37	small	—	neg.	P.M. A fair morning, and a wet evening.
31	N	30. 5	38	o	pos.	—	The rod has been electrified nearly all day, by a fog.
Jan. 1 1791.	S	30. 2	40	o	pos.	—	A.M. In the evening negative, from a fall of rain. This evening much lightning and thunder at Canterbury.
2	SW	29.72	31	small	pos.	—	A.M. A foggy morning. Half an hour after eight o'clock P.M. happened a sudden gale of wind and rain, by which the rod became rather strongly electrified, negatively.

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				
Jan. 3	SW	29.40	29	small	pos.	—	The morning of this day was frosty, and the evening wet. The electricity of the former was positive, and the latter negative.
4	SW	29.40	38	o	—	neg.	P.M. Balls three-quarters of an inch open. Strong gales of wind, with rain. Nine o'clock P.M. severe lightning and thunder at Falmouth.
5	SW	29.29	35	o	pos.	—	Very fine weather. Divergency of the pith balls has been between null and near one inch open.
6	SW	29.46	37	o	pos.	—	
7	W	29.18	51	o	pos.	—	
8	W	29.26	43	o	pos.	—	
9	W	28.96	42	small	—	neg.	Eight o'clock A.M. I saw a large black cloud in the N and NW: soon after, a strong wind suddenly sprang up, and a little rain fell; during which, the rod was rather strongly electrified negatively, with small sparks. This charge of the rod only lasted eighteen minutes.
10	S	29.75	42	o	pos.	—	Fine weather, and almost a constant electricity.
11	W	29.75	48	o	pos.	—	
12	S	29.95	42	o	pos.	—	P.M. A very high wind, and a weak electricity. In the evening of this day, much lightning and thunder at Plymouth.
13	W	29.48	43	o	—	neg.	P.M. from a shower of rain.
14	W	29.80	42	o	pos.	—	Very moderate weather, and a weak electricity.
15	SW	30.	32	o	pos.	—	
16	SW	29.82	50	o	pos.	—	
17	SW	29.50	49	o	pos.	—	
18	S	29.50	42	o	—	neg.	From rain, with a strong wind.
19	S	28.87	43	o	—	neg.	
20	SW	28.48	43	o	pos.	—	The weather for these twelve days having been moderate, the electricity of the atmosphere has only been of such intensity as is common to serene weather.
21	W	29.22	37	o	pos.	—	
22	S	29.85	35	o	pos.	—	
23	W	29.76	48	o	pos.	—	
24	S	30.50	32	o	pos.	—	
25	SW	30.27	45	o	pos.	—	
26	SW	30.15	45	o	pos.	—	
27	SW	29.84	45	o	pos.	—	
28	N	30.	33	o	pos.	—	
29	SW	30.	38	o	pos.	—	
30	NW	29.85	44	o	pos.	—	
31	NW	29 85	51	o	pos.	—	
Feb. 1	W	29.85	47	small	pos.	—	P.M. from a shower of rain, of large drops; the rod became electrified rather strongly positive, and emitted fine bright sparks at the brass ball N.

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				
Feb. 2	N	30.	38	o	pos.	—	The weather these nine days has been foggy and clear by turns; and the electrification of the atmosphere constant.
3	N	30.20	32	o	pos.	—	
4	N	30.40	32	o	pos.	—	
5	N	30.45	36	o	pos.	—	
6	SW	30.40	36	o	pos.	—	
7	NW	30.32	42	o	pos.	—	
8	W	30.36	43	o	pos.	—	
9	SW	30.32	43	o	pos.	—	
10	SW	30. 8	46	o	pos.	—	
11	SW	29.80	49	o	pos.	—	There has been, these three days, a strong wind, with mizzling rain; and the electricity so weak, that I was obliged to connect, with the hand-rod, *a lighted torch*, to ascertain the kind.
12	W	30.11	36	o	pos.	—	
13	SW	29.95	46	o	pos.	—	
14	SW	29.88	53	o	pos.	—	Fine mild weather, with a constant electricity.
15	SW	29.80	47	o	pos.	—	
16	SW	29.85	43	o	pos.	—	
17	SW	30.10	40	o	pos.	—	
18	SW	29.35	30	o	pos.	—	
19	NE	29.40	37	strong	pos.	—	Five o'clock, a dark cloudy morning, with some small rain; by which the rod became rather strongly electrified, positively. During the passage of one low cloud, the electric charge in the rod changed five times; all of which changes, I have reason to think, were only influentially effected.
20	NE.	29.80	40	small	pos.	—	A.M. Rainy dark weather. In the afternoon the charge in the rod became negative, and remained so full three hours, without change of kind.
21	S	29.56	42	o	pos.	—	Dark rainy weather, and a very weak electricity.
22	SW	29.73	32	o	pos.	—	
23	SW	29.55	47	o	pos.	—	
24	W	29.90	33	o	pos.	—	
25	E	30.	37	strong	pos.	—	There has happened this day a continued rain, mixed with snow. The rod has been several times strongly charged; and the electricity gradually changed four times.
26	N	29.72	33	strong	pos.	—	The weather and the electrification of the rod have been nearly the same as in the preceding day.
27	N	30.	38	strong	pos.	—	The weather and the operations of the rod have been nearly the same as in the two preceding days.
28	N	30. 8	36	o	pos.	—	The weather has been foggy these three days.
March 1	N	30.12	35	o	pos.	—	
2	S	30.25	32	o	pos.	—	

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				
March 3	SW	30.50	32	o	pos.	—	Serene fair weather these seventeen days; and the nights were generally frosty. The electricity of the atmosphere has been constant; but too weak to afford visible sparks.
4	SW	30.40	45	o	pos.	—	
5	SW	30.44	47	o	pos.	—	
6	SW	30.20	40	o	pos.	—	
7	NW	30.25	41	o	pos.	—	
8	N	30.55	37	o	pos.	—	
9	SW	30.65	34	o	pos.	—	
10	W	30.55	35	o	pos.	—	
11	SW	30 46	39	o	pos.	—	
12	W	30.28	40	o	pos.	—	
13	SW	30.20	44	o	pos.	—	
14	SW	30 18	47	o	pos.	—	
15	SW	30.35	50	o	pos.	—	
16	SW	30.40	51	o	pos.	—	
17	SW	30.40	40	o	pos.	—	
18	SW	30.28	50	o	pos.	—	
19	SW	30.15	39	o	pos.	—	
20	W	29.68	46	o	—	neg.	This morning fell a warm drizzling rain; which seems to have acted like a charm on the late constant electrification of the atmosphere: for I find it so weakly electrified since the rain fell, that I was obliged to connect, with the rod, *a lighted torch*, to ascertain the kind.
21	NW	29.15	44	strong	pos.	—	Four o'clock this morning, a severe storm of wind and rain, driving full against my bed-room window, induced me to rise from my bed to see the state of the rod; which I found highly electrified, positively. This wind did not abate its force till sun-set. Four o'clock P.M. some rain fell, mixed with snow, which lasted near one hour. During this time the rod was most powerfully electrified positively: I counted seventeen spontaneous explosions between the brass ball and bell, notwithstanding the bell was ringing all the time. Half an hour after five o'clock, came a second shower of rain, hail, and snow, which lasted half an hour, attended with uncommon darkness. During about half this time, the electric charge in the rod was as strong as it could possibly be; for the fluid almost streamed between the brass ball and bell: I counted near two hundred very brilliant explosions between the ball and bell. The bell rang all the time. This latter very high

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				charge was negative. There were four changes of electricity, but all gradual.
Mar. 22	N	29.85	44	o	pos.	—	The disposition of the atmosphere has been mild and regular these four days; and the state of atmospheric electricity constant and periodical.
23	W	30. 3	54	o	pos.	—	
24	N	30.50	44	o	pos.	—	
25	S	30.38	43	o	pos.	—	
26	S	29.85	46	small	—	neg.	Half an hour after nine o'clock A.M. fell some rain, by which the rod became electrified negatively. The wind now became N, and attended with showers of rain the rest of the day: all of them moderately electrified, negatively.
27	N	30.	40	o	pos.	—	The weather has been fair during these ten days, and the atmospheric electricity has been constant; yet it has been too weak to afford visible sparks.
28	NW	30.10	45	o	pos.	—	
29	SW	30. 6	50	o	pos.	—	
30	E	30.	44	o	pos.	—	
31	SE	30. 8	44	o	pos.	—	
April 1	SW	30.	50	o	pos.	—	
2	E	29.81	51	o	pos.	—	
3	E	29.78	50	o	pos.	—	
4	NE	29.90	46	o	pos.	—	
5	NE	29.72	46	o	pos.	—	
6	N	29.45	43	small	—	neg.	Six o'clock A.M. I found the night bottle charged sufficiently to explode with a visible spark; the kind, negative. During the night, the weather had changed from dry to a mild rain. The rod has been electrified negatively nearly all this day.
7	W	29.78	47	o	pos.	—	Mild serene weather. The divergency of the pith balls has been varying between null and one inch open.
8	NW	29.92	53	o	pos.	—	
9	NW	29.90	51	o	pos.	—	
10	W	30.	50	o	pos.	—	
11	SE	30.	50	small	—	neg.	Weather still mild, and a constant electricity this day.
12	N	29.95	54	o	pos.	—	From a fog.
13	NE	30.	51	o	pos.	—	Mild serene weather these nine days; some of them foggy: but whether clear or foggy, the vapour in the air has been constantly electrified, positively.
14	W	30.	59	o	pos.	—	
15	SW	30. 6	55	o	pos.	—	
16	SE	30.10	55	o	pos.	—	
17	SE	30.	61	o	pos.	—	
18	SW	29.80	57	o	pos.	—	
19	SW	29.75	59	o	pos.	—	
20	S	29.57	59	o	pos.	—	
21	SW	29.48	56	o	pos.	—	
22	SW	29.25	55	small	—	neg.	A wet morning. Twelve o'clock, the rain fell more plentifully, and the rod was rather strongly charged negatively.
23	SW	29.24	54	strong	—	neg.	Half an hour after twelve o'clock P.M. an

Days.	Wind.	Barom.	Ther.	Sparks.	Pos.	Neg.	
		Inches.	o				extensive black cloud, without any breaks in it, approached the rod, by which it became strongly electrified, negatively; and in the space of twelve minutes a most awful darkness filled the atmosphere, and some rain fell, mixed with hail. The electric charge in the rod now became positive; and for the space of ten minutes it was as strongly electrified as it possibly could be; for I now counted 172 spontaneous explosions between the brass ball and bell; the bell ringing briskly all the time. These lucid sparks succeeded each other almost too quick to be noted. When the explosive sparks ceased, the electricity of the rod changed, and ended as it had begun, negative. A little after five o'clock fell a heavy shower of rain, and a second strong charge in the rod succeeded, attended with three gradual changes of kind.
April 24	SW	29.31	54	strong	—	neg.	A little after two o'clock P.M. fell a shower of rain, by which the rod became moderately electrified, negatively. The bell rang weakly. This charge in the rod continued four hours, without change of kind.
25	W	29.84	51	strong	pos.	—	A.M. Three o'clock P.M. fell a shower of rain, which was rather strongly electrified, negatively, attended with three changes of kind.
26	E	30.	53	o	pos.	—	} Serene foggy weather.
27	NE	29.84	53	o	pos.	—	
28	N	29.81	52	o	pos.	—	
29	N	29.86	51	strong	—	neg.	A.M. from a shower of rain.
30	N	29.90	48	small	—	neg.	During the greatest part of the day. The weather showery.
May 1	N	29.80	48	small	pos.	—	A.M. Afternoon negative. The weather still showery.
2	N	29.85	48	small	—	neg.	A.M. A mild showery morning.
3	N	30.	45	o	pos.	—	A.M. but very weak. Fair weather to-day.
4	N	30.	45	o	pos.	—	The atmospherical electricity has been so very weak this day, that I was obliged to connect, with the hand-rod, a *lighted torch*, to ascertain the kind of electricity.
5	N	29.96	47	o	pos.	—	} Fair serene weather these four days; and the atmospheric electricity constant.
6	N	30.	46	o	pos.	—	
7	N	30.28	45	o	pos.	—	
8	N	30.32	48	o	pos.	—	

A monthly account of sparks, and of positive and negative electricity, as indicated by the pith-ball electrometer, connected with the rod; excepting a few times, in very moist weather, in which it was obtained by the hand exploring-rod, with a lighted *torch* to it. See Fig. 2. Tab. IV.

		Times.		Times.		Days.
23 days of May, 1790, and 8 days of May, 1791,	Positive	40	Negative	27	Sparks drawn	13
June	Positive	45	Negative	22	Sparks drawn	5
July	Positive	36	Negative	23	Sparks drawn	8
August	Positive	33	Negative	6	Sparks drawn	3
September	Positive	39	Negative	11	Sparks drawn	19
October	Positive	37	Negative	7	Sparks drawn	22
November	Positive	30	Negative	8	Sparks drawn	11
December	Positive	35	Negative	11	Sparks drawn	6
January	Positive	28	Negative	8	Sparks drawn	3
February	Positive	36	Negative	12	Sparks drawn	6
March	Positive	34	Negative	8	Sparks drawn	2
April	Positive	30	Negative	14	Sparks drawn	8
		423 times		157 times		106 days

It appears, by comparing the monthly account of this year with that of the preceding, that there has been a considerable disproportion in the electrical positive state of the atmosphere; but which, when duly weighed, will not appear so very great as it now does. For when it is considered, that in the preceding year there were 73 days in which weak signs only of the electric fluid were observed; that seven days were destitute of electric signs; and that that kind of weather in which very weak signs of atmospherical electricity could be obtained, is now found, by a more sensible electrometer than was at that time used, to be always positively electrified, it will, I presume,

diminish the apparent disproportion. And as for the remaining difference, I also attribute a good deal of it to the accuracy of my present mode of obtaining atmospherical electricity, with a more complete apparatus; by which I have been able to collect the electric fluid, in sufficient quantity to ascertain the kind which predominates in the atmosphere, even in its weakest state. I have, therefore, found it an easy matter to fix the kind of electricity that the aqueous vapours in the air were charged with in each day throughout the year.

From repeated observations, and long experience, I am perfectly satisfied that the aqueous vapours, suspended in the air, are constantly electrified; requiring only the aid of a proper collector, to render the effects of their electricity at all times sensible. And for this reason, there may be justly said to be, an electrical atmosphere within our aerial atmosphere.

During a course of moderate weather, the electricity of the atmosphere is invariably positive; and exhibits a flux and reflux, which generally causes it to increase and decrease twice in every twenty-four hours. The moments of its greatest force are about two or three hours after the rising, and some time before and after the setting, of the sun; those when it is weakest, are from mid-day to about four o'clock. The periodical electricity of the atmosphere seems to be manifestly influenced by *heat* and *cold*. Hence it plainly appears, why we always find warm small rain to be but weakly electrified; when cold rain, which falls in large drops, is the most intensely electrified of any.

The abovementioned eighth day of May, completes my second year's journal; which, agreeable to my promise, I have now the honour of presenting to the Royal Society, with a

description of the improved atmospheric apparatus, which has been used for the foregoing observations.

I must now close that regular account which, for the last two years, has daily occupied my attention. Should any very remarkable appearances, however, in future take place, during a long course of frosty weather, which is the only state of the atmosphere that I have not yet experienced,* as my apparatus will continue in order, I shall carefully note them, and present them to the Royal Society: hoping that some more able philosopher may be induced to take his share of labour in this interesting and promising field, in order to investigate, as far as possible, the nature of so active, universal, and, in all probability, important an agent, as the atmospherical electricity seems to be; and to pursue the subject, with that diligence, and unprejudiced accuracy, which has been my principal object in the course of my observations.

* As I do not remember that there have been twenty-four hours of hard frost, during the two last winters.

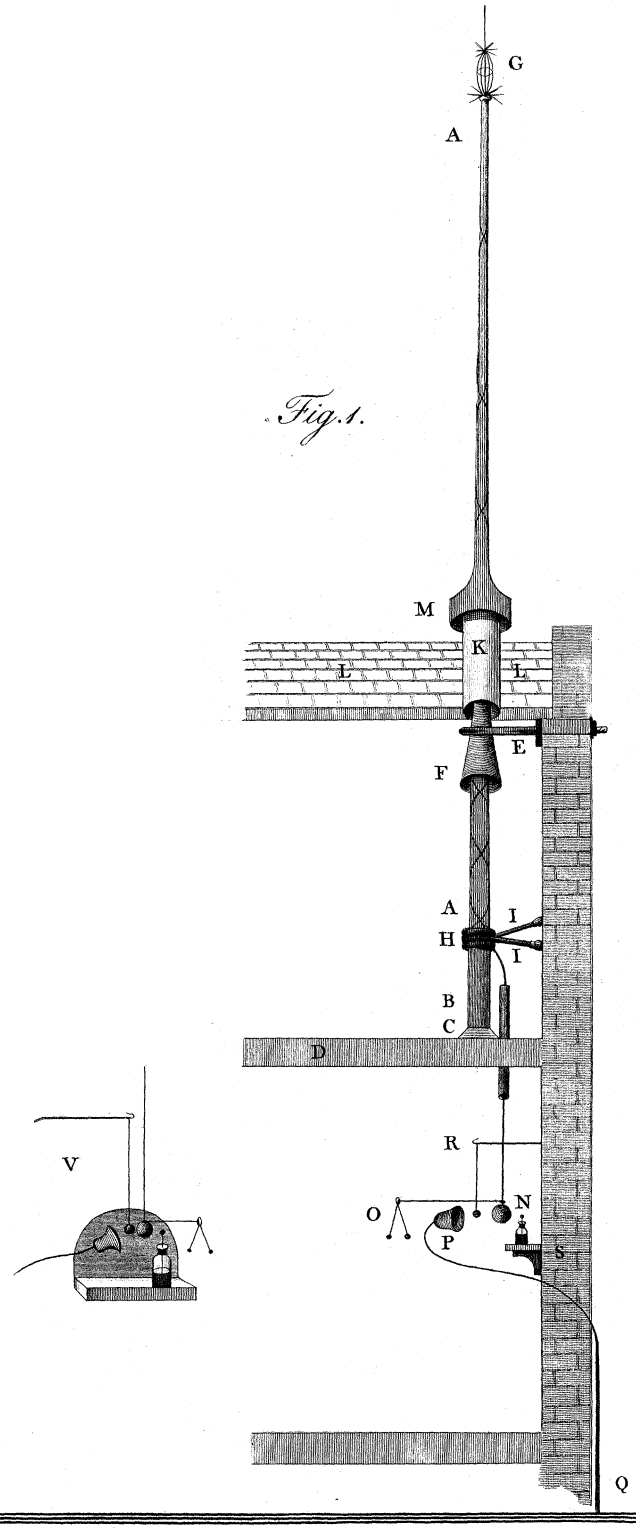

Fig. 1.

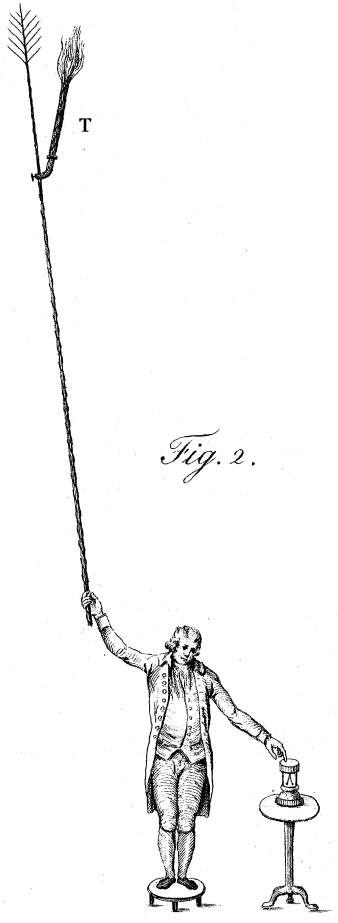

Fig. 2.