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THE KINGSTON BAROGRAPH.

During the early part of the year 1892, plans were proposed to commence a series of observations relating to the diurnal variation of the barometric pressure for this Island on a more complete scale than those already compiled from only the 7 a.m. 3 p.m. and 11 p.m. eye-readings for the six-year period 1881-86, already referred to in previous reports; to effect this purpose it was arranged to construct an apparatus to record automatically, employing the photographic method, for insuring a continous registration of the full twenty-four hours for each day.

The room appropriated by the Weather Office, which is situated on the ground floor of the North range of Public Buildings, at the Parade Square, in the City of Kingston, was found to be admirably suited for the fitting up of this apparatus. After everything was placed in position the operation of recording was started in August, 1892, and was kept up without intermission until August 1894, therefore securing a faithful representation of each hourly pressure during a period of two years.

As but few Meteorological Stations, and especially those situated within the lower Latitudes, are thus equipped with this additional aid; the impediments arising are such as to involve much steady attention and labour to maintain an uninterrupted series of records for anylength of time, as well as the resulting work of tabulating and striking of the averages for such a large number of figures, these investigations were therefore instituted with a view of aiding to a small extent the scanty knowledge possessed of the alternations of atmospheric pressure on the earth's surface, relating not only to the diurnal rotation of the earth, and to the position of the station with regard to the changing declination of sun month by month, but also to those local disturbances which at irregular intervals may go to interrupt the curves of pressure, such as those of cyclone depressions, rain, thunderstorms &c.; and permitting, besides, the opportunity of comparisons to be made with the results derived from stations at other Latitudes.

Although photographs have been secured for the length of two years, all the measurements for the barometric means have been confined to the first twelve months, only; but reference has been however made as to the general character of the changes of pressure in relation to the local changes of weather during the whole period of two years, and much that is interesting will be discussed.

This article will be divided under the following heads :—

1. The description of the apparatus.
2. The determination of the Scale.
3. Remarks upon the Barograms, Diurnal variation, &c.
4. Local weather disturbances.

1. The description of the apparatus.

It may be mentioned that where a tolerable degree of accuracy is required the Aneroid Barograph on account of the insurmountable friction of its parts, is rendered almost unreliable for the purposes which are to be met in this case. This is overcome by using a good Mercurial Standard: where the slightest change of pressure is immediately communicated to the column of mercury, all friction being practically reduced to a minimum.

In the months of June and July 1892, a part of the room used as the Weather Office, already mentioned, was fitted up with the new apparatus. The East brick-wall was selected as a support for the fittings (this wall is about a century old) so that the parts of the apparatus permanently fixed into its face are to a great extent secured against any likely settlement or displacement.

The best seasoned white pine and cedar woods were employed in the construction of the camera-box, slides, supports &c. The apparatus is nearly entirely of wood.

The barometer is one of Negretti and Zambra's Standard pattern and the elevation of the cistern above the mean sea-level is 48 feet being almost adjacent with—and of the same level as—the Standard No. 1812 on which the daily 7 a.m. and 3 p.m. eye-readings are taken, in the same room, so that a very desirable comparison with one another can be made at convenience during the course of observations.

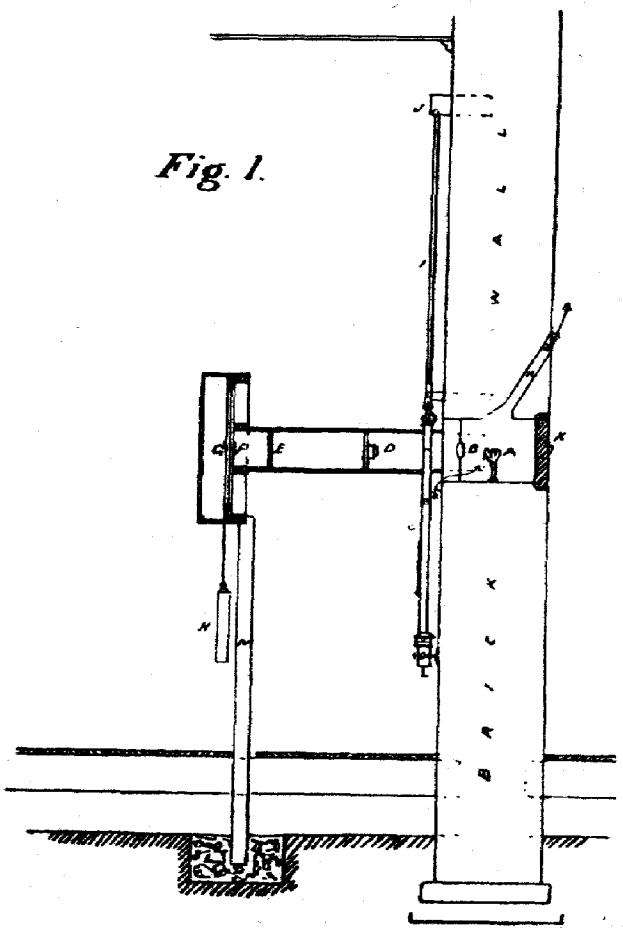
The apparatus is constructed as follows :—

Figs. No. 1, 2, and 3 will facilitate to explain the arrangement.

In Fig. No. 1 is shewn that the light is derived from a small gas burner A, inclosed in a recess in the wall; and the current of heated air is conducted through a draught hole N, into the open air of the next room. B is an ordinary double convex condenser. C the barometer suspended from a hook, which is attached to the temperature compensating device, the lower end of which is allowed to hang freely in the usual brass ring below so as to prevent swinging. D is an achromatic photo. view lens of single combination, and of about 6 inches focal length, mounted on a solid wooden frame.

E is a screen with a square opening of about 4 inches in height by $\frac{3}{4}$ inch in breadth, placed so as to intercept any diffused rays of light. G is the sensitive-plate holder which takes a dry-plate 10 ins. x 8 ins. size. The image of the top of the column of mercury is therefore focussed on to the plate, and being magnified to about twice the original, any slight variations in the movement of the mercury column are reproduced in greater detail. Before the image goes on the plate it passes through a slit, fixed very near to the plate, made up of two clean brass edges about $\frac{1}{200}$ inch apart, permitting only the light from the extreme top of the convex surface of the mercury to fall through; a very thin vertical line of light is therefore the impression made at the focus on the photographic plate, such line

Fig. 1.



VERTICAL CROSS SECTION.

will of course vary in length corresponding with the change in height of the column of mercury. G being the plate holder, it is made to travel horizontally from one side to the other by means of clockwork mechanism, better seen in Fig. No. 2. The long shaft of the clock is provided with a small pinion that drives the rack Q attached to the slide. At the opposite side of G a cord is attached which hangs over a single sheave pulley R at the end of which a weight H is suspended that aids the clock train, enabling the slide G to traverse with greater ease. The clock is so timed that three days are occupied by the slide in going from one side to the other. One hour on the barogram is represented by a space of about one-eighth of an inch.

For the purpose of having some mark to denote the hour of the day on the plate, a small shutter is fitted in front of the slit F, Fig. 3, which is made to shut off automatically the light from a small portion

of the slit at each hour, for the space of about five minutes, this is operated by an electro-magnet T. Kingston Mean Time has been taken—

At the end of the period of three days, a fresh line, below the first, is started on the plate. This is done by simply releasing the catch at the bottom of G and moving it to one of the next saw-cuts in the frame, marked P (the slide moving vertically as well), the entire slide then goes back to the left, horizontally: each line of the barogram is kept about one inch from the other during ordinary weather. In the event of a cyclone approaching, thenone, or even two, extra notches can be skipped, a plate will therefore accomplish a record of 24 days, there being 8 lines of 3 days each to a plate.

For getting steadiness to the arrangement a good white pine post M 11 ins. x 2 ins. in section, is screwed to the bottom of the camera, and the lower end is embedded in solid

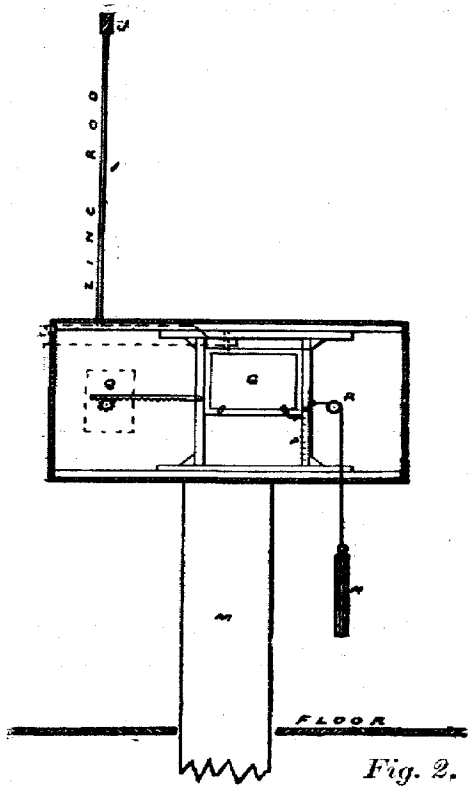


Fig. 2.

FRONT ELEVATION.

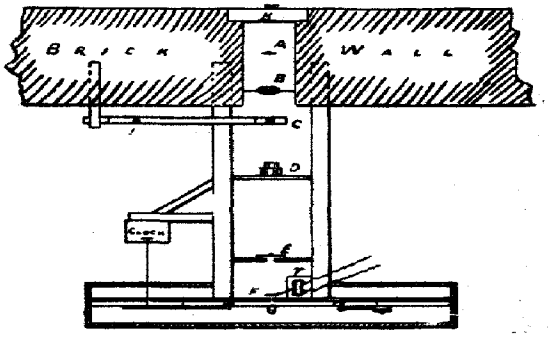


Fig. 3.

HORIZONTAL CROSS SECTION.

cement concrete in the ground below the floor: contact with the floor is therefore avoided.

As the temperature of the room varies (although small and hardly more than 8° Fah. in range of extreme temperature from the begiinning to the end of the month) a device for compensating the effects of temperatare is attached. This is given in detail on Fig. No. 4. Instead of having a long zinc bar about 14 feet in length above the barometer, acting directly, the principle of the lever is adopted as recommended by Mr. Maxwell Hall, the zinc bar required is therefore reduced to 42 inches in length, taking much less head-room. This zinc rod is $\frac{5}{8}$ inch in diameter, and both ends are threaded so as to fit losely into the threaded holes in the iron support S and the iron lever V, which answers all practical purposes to act as pivots, the movement being so insignificant. The short end of the lever is pivoted to a knife-edge and the long arm fixed to the barometer hook. Both the knife-edge and the support S are firmly cemented into the brickwall.

As the mercury in the cistern of an ordinary Standard Barometer covers about 10 times the area of the bore of the glass tube it will be evident that when the column of mercury falls the mercury in the cistern will rise, proportionately, provided that the bottom adjusting screw remains undisturbed.

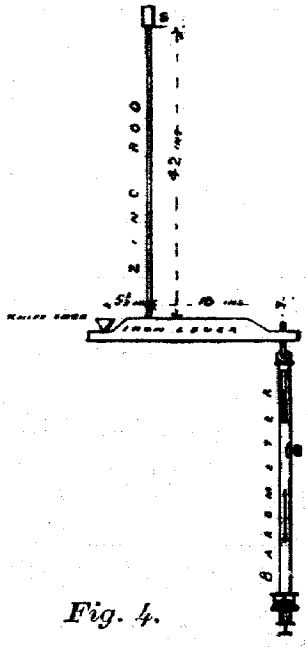


Fig. 4.

In this Barometer the adjusting screw remains permanently fixed, then suppose there should be an inch fall in barometric pressure the actual indicated fall on the *divided scale* would be only about 0.9 inch, and a rise of 0.1 inch, making a total of 1.0 inch shortening of the column from the cistern to the top, being purely relative. This proportion will remain true whether the pressure be changed by 0.001 inch or by 2 or 3 inches of mercury, therefore for all purposes no correction is needed for this, the real value of the height of the column will then depend solely upon the specially constructed scale for use upon the photographed image, where all allowance is made for the magnified image reduction in height of column &c. The method of computing this scale will be dealt with in the next.

2. The determination of the scale.

As the resulting barograms gave such an exceedingly sharp outline enabling very close scaling to be accomplished, considerable pains had to be taken to construct a scale of such fine divisions that was as near an approach to accuracy as the impressions

afforded—various modes of preparing this scale were tried but none at first came up to the mark hence a dividing machine of small compass was constructed to rule equal divisions on a silvered glass plate, such divisions were arrived at by taking the means of the 7 a. m., and 3 p.m., eye-readings for several months and those of the same hours on the barograms and making comparisons with these means to determine the true value of any differences. The mean results give an error of only 0.00034 ins. for every tenth of an inch which is equal to about 0 3 per cent, and is practically infinitesimal.

The mode adopted for employing the scale, in getting at the reading for each hour, as expeditiously as possible was to make a frame or holder to receive the glass negative and to clamp a short straight edge on the face so that the scale could be made to travel from side to side, a datum point being made to coincide all along, this reduced the labour considerably, all the results are taken from the glass negatives being not subject to expansion or contraction as would be expected from the paper prints. The scale as constructed has a range from 29.600 to 30.200 inches which will cover a moderate depression of a cyclone; for greater depressions than 29.600 the readings could be scaled off by the multiples of the divisions.

The actual magnification has been found to be 2.08 times of the original.

3. Remarks upon the barograms, diurnal variation &c.

After having arrived at a satisfactory scale for taking all the measurements, the means for the month are then easily determined from them. It was found advisable to compile two independent sets of readings for each month. Before proceeding to add up the completed columns for each hour, the two sheets of figures are then compared, and where any wide difference occurs such as say, .051 in No. 1 set and .951 in No. 2 set the barogram is again referred to and scaled afresh for that particular reading the wrong reading is then corrected. This course was found necessary when it was considered that nearly 1,500 measurements for each month had to be scaled off.

As the barograph on rare occasions had been interrupted for short intervals from the failure of the gas light, especially during the earlier months, there are some days which had to be omitted, for in the event of even a few hours having failed to be recorded at any part of the day the whole balance of that particular day is neglected, so that only the complete day of 24 hours is recognised for determining the monthly mean for each particular hour. The failure of the light at the commencement was due to the bore of the gas-pipe having been originally too small, and occasionally got choked, a larger pipe was then laid by the Gas Works and there has been no reason to complain since, with the exception of a slight variation in the intensity of the light caused by the day and night pressure of gas being changed, this in most instances makes a gradation of light and shade, for certain intervals of the day, on the resulting image on the plate, but for the purposes for which it is required this is immaterial.

The following gives the number of days for each month that is accepted and included into the column for the means.

1892.		Days.	1893.		Days
August	...	26	January	...	30
September	...	27	February	...	Full month
October	...	25	March	...	Full month
November	...	24	April	...	Full month
December	...	Full month.	May	...	29
			June	...	29
			July	...	Full month.

The resulting means for each month, with the mean hourly pressure for the twelve-month period, are given in Tables I. and II., respectively giving No. 1 and No. 2 sets, these are noted to the fourth decimal place.

Table III. shews the means of the two preceding Tables, but this table is reduced only to the *third* decimal place, for easier reference when compiling the mean diurnal corrections given in Table IV.

The negatives containing the barograms are marked by hand with a vertical line to denote the division of the days, and straight horizontal lines for the divisions of the scale, these are fixed to correspond to a tenth of an inch division. The midnight point is marked M., and the noon point marked N., a small dot is made at the 7 a.m., and 3 p.m., for easy reference when comparing with the eye readings. The scale is reduced to 32° and to sea level.

It should be borne in mind that all these results are based merely upon the observations of a period of but one year, and although they may afford a fair approximation to the values of the actual means derived for a longer period, these diurnal correction figures given in Table IV. should be applied with a certain amount of precaution, for it may be noted for instance that on referring to the difference of the six-year means (eye-readings) between the 7 a.m., and 3 p.m., for the month of August we get a range of .055 in., while for the month of August 1892, by barograph, we get .041 in., shewing that the amplitude of the barogram curve is somewhat less—see Table V.

There is a considerable variation from year to year so far as range is concerned for it may be exemplified again that in the case of August 1891, the range between 7 a.m. and 3 p.m. was only .037 in., while in August 1884, so much as 0.75 in., just double.

Should it be settled that the times for the occurrence of the maxima and minima, year by year, are fixed points on the curve it may become an easy matter to construct a variation curve to be adapted to each month of the year based, upon the eye-readings alone, for the 7 a.m., 3 p.m., and 11 p.m.

Fig. 5 illustrates the diurnal variation curve for the whole year: the curves for each separate month are not published for want of more space.

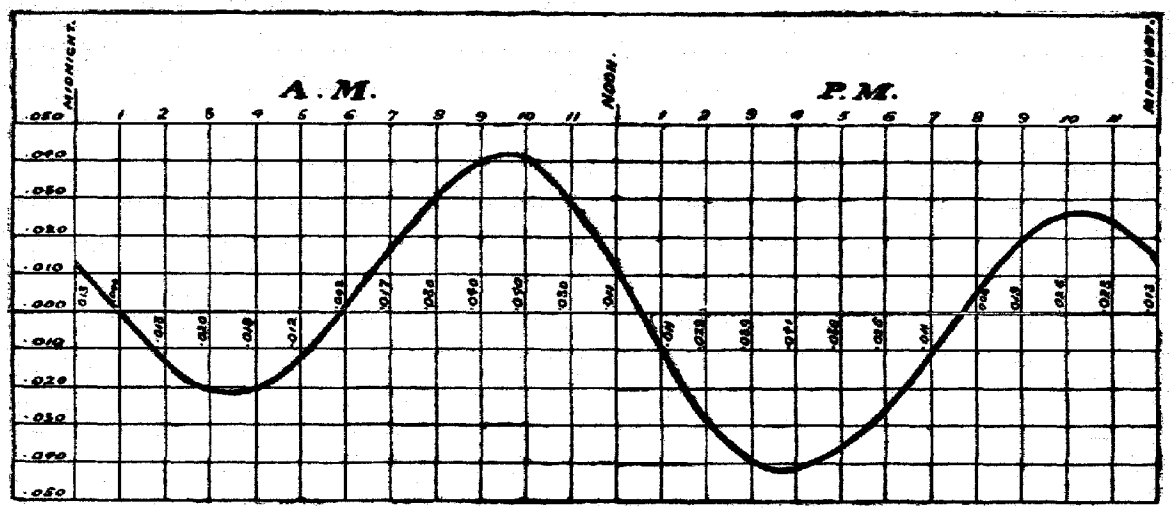


Fig. 5.

Upon examination of Table VI. which gives the time for each component of the curves as well as the sun's zenith distance at meridian passage, and the mean time at that instant for each month of the year, there will be found an extensive field open for the analysis of the respective periods of the occurrences with each other.

The morning minimum takes place early between the months of March and April, and then occurs late between September and October. On comparing it with the time of sunrise there is little to indicate a relationship. The mean for the whole year gives the time as 3h. 22 min., a.m.

The morning maximum shows considerable variation, in point of time, from month to month; occurring early in April and then latest in August. The mean for the whole year gives the time as 9h. 38 min., a.m.

The afternoon minimum, as has been noticed at other stations, is much governed by the annual march of the sun in latitude, and there is every reason to believe that the change of time is not only regulated by the mere change of the sun's declination, but more so when viewed from the point of latitude of this station. It has been found especially related to the sun's zenith distance when on the meridian. When the sun's position is just overhead, in May, it is latest in arrival: and when the sun goes further south the occurrence of this minimum is very early, producing a difference of from 4 h. 20 min., p.m., to 3 h. .05 min., p.m., showing a range of 1 h. 15 min. The mean for the whole year gives the time as 3h. 42 min. p.m.

On taking the difference of time for this component say from January when the sun is 38° south of Z. D., and in May when he is just overhead, we get in four months a change of arrival of from 3 h. 05 min. to 4 h. 20 min.=1 h. 15 min., this is equivalent to about every 1° change in declination to 2 min., of time in shifting of the occurrence. In support of this it will be observed that the same effect is produced, though to a smaller extent, when the sun goes north of us by only 5° during the months of June and July: the time of occurrence then becomes somewhat earlier. As this peculiarity of the third component has been noticed in other places of observation, it is worthy of recording here so as to further establish the fact with regard to being effected by the sun's position in declination.

The fourth component, which takes place between 10 and 11 p.m., is also early when the sun is furthest from the zenith at midday, but the range is less: being but 0 h. 46 min.

In summing up we therefore have the components occurring as follows:—1st, 3 h. 22 min., a.m., 2nd 9 h. 38 min., a.m., 3rd 3h. 42 min. p.m., 4th, 10 h. 12 min. p.m., representing the means for the whole year.

Table VII. gives the mean pressure for each of the diurnal components (leaving out the inches), taken at the extreme elongations of the diagrams for each month.

Some years ago Mr. Maxwell Hall estimated that by taking the mean result for the three hours viz. 7 a.m., 3 p.m., and 11 p.m., the mean pressure for the full 24 hours would be fairly approximated, we therefore now have the opportunity afforded of verifying this through the barogram records. On Table VIII. will be seen a statement of the means referred to; the last two columns are put side by side to enable a comparison to be made; for six months from April to September inclusive, they give practically the same results, the rest of the months differ by a few thousandths, and the most noticeable feature in the whole Table is the regular variation: starting with a maximum difference in January, then gradually decreasing to a minimum at zero in May and June, then increasing again to a maximum at the end of the year. Such differences do not change in sign but keep generally below the average to a very small extent, the mean of all the differences gives a figure 0.003 too short in the estimate, only!

4. Local Weather Disturbances.

This is probably the most important section of the article for in it we have a wide field open for the analysis of each weather phenomenon occurring, and as the extreme sensitiveness of the mercurial barometer responds to any special characteristic of pressure due to isolated phenomenon as in rain alone, or to a combination of weather disturbances as rain accompanied by a thunderstorm, &c., then by a careful study of the barograms we may be able to a certain extent to discriminate any distinguishing feature of each weather element.

Tables IX. X., and XI., are prepared lists of nearly all the cases of rain, squalls and thunderstorms, respectively; and against each combined disturbance is noted by an (R.) (T.) or (S.) shewing that either *rain, thunderstorms or squalls, occurred during the interval of any particular phenomenon.* Then Table XII., is a summary of results separating the cases where a *single* rise and fall, as against those of *two* or *more* rises and falls, have been recorded on the barograms. In these are embraced notes for the two years 1st August, 1892, to 31st July, 1894.

This article will be subdivided into the following heads and will be separately dealt with as Rain, Squalls, Thunderstorms, Earthquakes, &c.

Rain.

As Rain provides us with cases of greater frequency than the other disturbed conditions of the atmosphere, as in squalls or thunderstorms, there is a better opportunity to generalize upon. In column 1 of Table XII. there is to be seen that when rain occurs *alone* there is a majority of cases where there is only a single rise and fall of pressure there being 71 cases as against 52 where there are several rises and falls. The 52 cases may have been possibly associated with an electrical disturbance not manifested by a thuderstorm. It will herein be endeavoured to show that upon a downpour of rain the effect produced upon the atmosphere is to be suddenly compressed at the first stage of the fall and as the air is becoming restored to its normal condition a gradual release of pressure results and hence a Λ-shaped notch is imprinted on the barogram. The two most clearly marked cases occurred on 18th October, 1892, and 3rd December, 1893.—the latter case is represented in Fig. 7. We have only to refer to column 4 of the same table where squalls have occurred simultaneously with rain that the barogram presents several rises and falls of 13, against 2 of a single rise and fall—then again in column 5 during a thunderstorm every case shows a decided series of rises and falls specially favouring a single rise and fall when rain occurs alone. There are a few instances where there has been no discernible effect produced but these are small in comparison, and occur within the range of insignificant rain or drizzle.

Squalls.

There is a marked convulsed state of pressure during intervals of squalls alone, giving a series of rises and falls, these recurrent convulsions are not sudden in character of delineation but extend over a period of an hour or more in most instances, and indicating a prolonged action of such disturbance for each rise and fall of a series—see col. 2 of Table XII, there are 22 cases out of 27 where there is a series of rises and falls, and where we have rain at the same time as in col. 4 we find 13 cases out of 15.

Thunderstorms.

The same may be said for thunderstorms as in the case of squalls the action is somewhat identical, a very good idea can be gathered on referring to Fig. 6 which illustrates the occurence of a thunderstorm lasting from 7 to 10.15 p.m., on July 6 1893—the pressure remained disturbed for many hours after.

Earthquakes.

There have been only four earthquakes of any note during this period, and below will be found a statement of the particulars :—

Date.	Time.	Character.	Indication on Barogram.
1892. September 29th	5.50 p.m.	Slight	Feeble deflection of curve, but possibly due to rain.
1893. February 19th .	1.35 a.m.	Slight	Not the slightest interruption, curves sharp and regular.
" June 2nd .	8.15 p.m.	Slight	Nothing noticeable.
" June 4th .	8.35 a.m.	Sharp double shock	Three remarkable symmetrical waves starting about 5 minutes before the shock and continuing for 28 minutes after—see W. R. No. 160 for details.

Cyclones.

During the period of these two years but only 6 cyclones of any note passed within barometric range of the Island, and none had actually passd over, as follows :—

1892—17th August	1893—20th August
" 7th October	" 25th August
1893—13th August	" 8th October

By a study of these barograms it has been noticed that a passing cyclone has not the peculiar action on the pressure as in the cases of either squalls or thunderstorms—hence there is some distinguishing feature pointing out that all local phenomena become subordinate to the large wave of depression

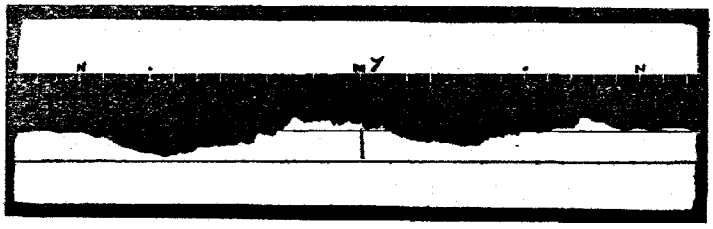
and are consequently sweptaway: the barograms in each instance leave a clear outline as we find in fine weather. Then again the diurnal waves or variation are not superposed but preserve their characteristic throughout, this is of the utmost importance to add to our knowledge in estimating a depression; for when it becomes an established fact that the diurnal variation during an approaching cyclone remains uninterrupted, all our allowances for the corrections, to arrive at a proper mean for any particular hour, can be applied with safety.

Northers.

It is most notable that northers although experienced in gusts do not affect the barograms in any way like squalls; here we get a clear sharp outline as we have in fine weather. There were seven instances of Northers on record to base this data upon, and they all indicate this same characteristic.

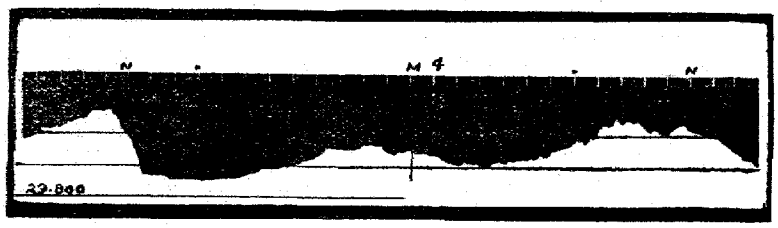
In conjunction with the preceding notes it may be stated that the barograms have every tendency to become affected by any disturbed weather many miles off, and there are many instances where an interrupted pressure is recorded, yet the local conditions of the weather are either fine or fair. For generally fine weather all round we get a clear sharp outline upon the barograms.

It is to be hoped that these investigations, though very elementary in form and procured from the ordinary devices at command, will prove of use for future research, when all meteorological phenomena shall have become more satisfactorily co-ordinated; so in the meantime perhaps only add to the vast amount of raw material now preserved and awaiting timely analysis.



6TH JULY, 1893.

Fig. 6.



3RD DECEMBER, 1893.

Fig. 7.

TABLE I.—Mean hourly pressure for each Month of the year, reduced to the 4th Decimal place.

SET No. 1.

Month.	A.M. 1	2	3	4	5	6	7	8	9	10	11	Noon.	P.M. 1	2	3	4	5	6	7	8	9	10	11	Mid-night.
1892.																								
August ..	9935	9802	9708	9723	9766	9832	9990	0087	0148	0183	0154	0017	9872	9696	9582	9543	9565	9635	9740	9910	0084	0229	0202	0087
September ..	9669	9493	9419	9410	9491	9596	9731	9864	9946	9941	9856	9686	9469	9293	9179	9178	9241	9329	9422	9610	9801	9867	9833	9771
October ..	9141	9032	8985	8984	9055	9178	9330	9480	9590	9630	9490	9272	9027	8889	8820	8826	8896	8984	9124	9310	9402	9443	9403	9304
November ...	9396	9270	9211	9233	9335	9489	9642	9827	9947	9940	9757	9492	9224	9056	8982	9002	9090	9215	9415	9577	9660	9689	9625	9518
December ...	0099	9965	9859	9875	9947	0085	0248	0467	0587	0563	0385	0130	9845	9661	9576	9617	9716	9852	0023	0180	0320	0357	0284	0193
1893.																								
January ..	9962	9851	9777	9778	9838	9955	0122	0297	0448	0423	0256	0013	9736	9535	9453	9487	9593	9699	9859	0025	0135	0176	0137	0052
February ...	0307	0171	0101	0099	0171	0319	0477	0645	0792	0822	0682	0444	0191	9966	9834	9836	9902	0016	0177	0370	0500	0588	0550	0484
March ...	0409	0263	0205	0237	0361	0507	0675	0827	0927	0956	0838	0623	0406	0159	0025	0006	0067	0176	0305	0475	0626	0688	0659	0537
April ...	0138	0019	9962	9991	0084	0229	0390	0517	0576	0560	0472	0323	0107	9903	9783	9710	9748	9847	9986	0149	0298	0404	0379	0263
May ...	9681	9555	9497	9519	9614	9753	9905	9992	0070	0073	9986	9843	9666	9504	9368	9272	9293	9398	9526	9704	9829	9949	9961	9827
June ...	9889	9772	9725	9742	9766	9900	0021	0090	0165	0188	0158	0039	9888	9735	9625	9545	9566	9624	9783	9937	0045	0152	0131	0059
July ...	9938	9794	9716	9727	9742	9858	9971	0041	0107	0116	0074	9987	9842	9700	9630	9573	9608	9651	9799	9950	0078	0204	0183	0067

TABLE II.—Same as above.

SET No. 2.

Month.	A.M. 1	2	3	4	5	6	7	8	9	10	11	Noon.	P.M. 1	2	3	4	5	6	7	8	9	10	11	Mid-night.
1892.																								
August ...	9934	9797	9707	9723	9762	9835	9986	0084	0146	0185	0154	0010	9868	9690	9578	9540	9559	9633	9738	9904	0082	0230	0198	0083
September ...	9659	9487	9418	9416	9491	9597	9726	9860	9945	9936	9851	9688	9462	9289	9175	9173	9240	9326	9423	9617	9802	9859	9827	9767
October ..	9138	9029	8981	8982	9059	9185	9334	9480	9587	9625	9481	9255	9007	8882	8813	8826	8892	8979	9129	9307	9392	9437	9388	9297
November ...	9395	9272	9212	9237	9336	9493	9645	9831	9949	9941	9756	9492	9225	9053	8979	9001	9091	9217	9411	9570	9655	9683	9617	9516
December ...	0093	9957	9854	9873	9942	0084	0249	0462	0590	0558	0383	0127	9845	9658	9575	9616	9714	9848	0023	0175	0323	0350	0280	0184
1893.																								
January ...	9964	9851	9774	9771	9832	9955	0122	0296	0445	0423	0255	0015	9735	9530	9452	9488	9587	9697	9856	0024	0135	0174	0133	0047
February ...	0311	0171	0103	0096	0169	0323	0478	0646	0791	0822	0673	0440	0186	9966	9835	9837	9904	0017	0180	0369	0499	0584	0545	0482
March ...	0396	0268	0197	0237	0358	0507	0660	0818	0923	0945	0827	0612	0394	0143	0011	0003	0062	0173	0298	0469	0624	0681	0651	0553
April ...	0139	0004	9953	9982	0077	0224	0382	0512	0576	0553	0470	0308	0098	9894	9773	9709	9748	9849	9985	0150	0303	0396	0375	0246
May ...	9873	9550	9487	9510	9602	9749	9909	9998	0068	0063	9979	9830	9652	9489	9354	9263	9291	9393	9530	9706	9821	9947	9951	9809
June ...	9882	9761	9733	9735	9765	9893	0020	0089	0160	0182	0150	0029	9879	9718	9616	9534	9555	9619	9784	9937	0041	0151	0126	0043
July ...	9922	9777	9708	9717	9743	9858	9972	0038	0098	0109	0067	9984	9833	9691	9620	9568	9603	9655	9804	9951	0081	0198	0174	0061

The inches and decimal point are omitted.

TABLE III.—Mean hourly pressure for each month of the year, reduced from the means of Tables I and II, to the 3rd decimal place.

Month.	A.M. 1	2	3	4	5	6	7	8	9	10	11	Noon	P.M. 1	2	3	4	5	6	7	8	9	10	11	Mid-night.
1892.																								
August ...	993	980	971	972	976	983	999	008	015	018	015	001	987	969	958	954	956	963	974	991	008	023	020	008
September ...	966	949	942	941	949	960	973	986	994	994	985	969	946	929	918	917	924	933	942	961	980	986	983	977
October ..	914	903	898	898	906	918	933	948	959	963	948	926	902	888	882	883	889	898	913	931	940	944	939	930
November ...	939	927	921	923	933	949	964	983	995	994	976	949	922	905	898	900	909	922	941	957	966	969	962	952
December ...	010	996	986	987	994	008	025	046	059	056	038	013	984	966	957	962	971	985	002	018	032	035	028	019
1893.																								
January ...	996	985	977	977	983	995	012	030	045	042	025	001	973	953	945	949	959	970	986	002	013	017	013	005
February ...	031	017	010	010	017	032	048	064	079	082	068	044	019	997	983	984	990	002	018	037	050	059	054	048
March ...	040	026	020	024	036	051	067	082	092	095	083	062	040	015	003	000	006	017	030	047	062	068	065	054
April ...	014	001	996	999	008	023	039	051	058	056	047	031	010	990	978	971	975	985	998	015	030	040	038	025
May ...	968	955	949	951	961	975	991	999	007	007	998	984	966	949	936	926	929	939	953	970	982	995	996	982
June ...	988	977	973	974	976	990	002	009	016	018	015	003	988	973	962	954	956	962	978	994	004	015	013	005
July ...	993	978	971	972	974	986	997	994	010	011	007	998	984	969	962	957	960	965	980	995	008	020	018	006

TABLE IV.—Correction for Diurnal Variation.

Month.	A.M. 1 a.m.	2 a.m.	3 a.m.	4 a.m.	5 a.m.	6 a.m.	7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.	Noon	P.M. 1 p.m.	2 p.m.	3 p.m.	4 p.m.	5 p.m.	6 p.m.	7 p.m.	8 p.m.	9 p.m.	10 p.m.	11 p.m.	Mid-night.
1893.																								
January ...	—.002	+.009	+.017	+.017	+.011	—.001	—.018	—.036	—.051	—.048	—.031	—.007	+.021	+.041	+.049	+.045	+.035	+.024	+.008	—.008	—.019	—.023	—.019	—.011
February	—.000	.014	.021	.021	.014	—.001	.017	.033	.048	.051	.037	.013	.012	.034	.048	.047	.041	.029	.013	—.006	.019	.028	.023	.017
March ...	+.005	.019	.025	.021	.009	—.006	.022	.037	.047	.050	.038	.017	.005	.030	.043	.045	.039	.028	.015	—.002	.017	.023	.020	.009
April ...	+.002	.015	.020	.017	.008	—.007	.023	.035	.042	.040	.031	.015	.006	.026	.038	.045	.041	.031	.018	+.001	.018	.024	.022	.009
May ...	+.001	.014	.020	.018	.008	—.006	.022	.030	.038	.038	.029	.015	.003	.020	.033	.013	.040	.030	.016	—.001	.013	.026	.027	.013
June ...	+.001	.012	.016	.015	.013	—.001	.013	.020	.027	.029	.026	.014	.001	.016	.027	.035	.033	.027	.011	—.005	.015	.026	.024	.016
July ...	—.004	.011	.018	.017	.015	+.003	.008	.015	.021	.022	.018	.009	.005	.020	.027	.032	.029	.024	.009	—.006	.019	.031	.029	.017
1892.																								
August ...	—.004	.009	.018	.017	.013	+.006	.010	.019	.026	.029	.026	.012	.002	.020	.031	.035	.033	.026	.015	—.002	.019	.034	.031	.019
September ...	—.008	.009	.016	.017	.009	—.002	.015	.028	.036	.036	.027	.011	.012	.029	.040	.041	.034	.025	.016	—.003	.022	.028	.025	.019
October ...	+.005	.016	.021	.021	.013	+.001	.014	.029	.040	.044	.029	.007	.017	.031	.037	.036	.030	.021	.006	—.012	.021	.025	.020	.011
November ...	+.005	.017	.023	.021	.011	—.005	.020	.039	.051	.050	.032	.005	.022	.039	.046	.044	.035	.022	.003	—.013	.022	.025	.018	.008
December ...	—.003	.011	.031	.020	.013	—.001	.018	.039	.052	.049	.031	.006	.023	.041	.050	.045	.036	.022	.005	—.011	.025	.028	.021	.012
Means ...	—.000	+.013	+.020	+.019	+.012	—.002	—.017	—.030	—.040	—.040	—.030	—.011	+.011	+.029	+.039	+.041	+.036	+.026	+.011	—.006	—.019	—.026	—.023	—.013

The months are re-arranged in consecutive order in Table IV.

TABLE V.—Diurnal Correction.

Comparisons between the mean results derived from the 6 year period and fromthose months now produced by Barograph, as to the "*corrections for diurnal.*"

Month.	7 a.m.			3 p.m.			11 p.m.		
	6 year mean corr.	Barog.	Diff.	6 year mean corr.	Barog.	Diff.	6 year mean corr.	Barog.	Diff.
1892.	—	—		+	+		—	—	
August ...	.013	.010	.003	.042	.031	.011	.029	.031	.002
September ...	.016	.015	.001	.047	.040	.007	.030	.025	.005
October ...	.019	.014	.005	.046	.037	.009	.025	.020	.005
November ...	.024	.020	.004	.050	.046	.004	.026	.018	.008
December ...	.023	.018	.005	.051	.050	.001	.026	.021	.005
1893.									
January ...	.021	.018	003	.050	.049	.001	.029	.019	.010
February ...	.019	017	.002	.049	.048	.001	.030	.023	.007
March ...	.020	.022	.002	.048	.043	.005	.029	.020	.009
April ...	.023	.023	.000	.048	.038	.010	.024	.022	.002
May ...	.018	.022	.004	.045	.033	.012	.026	.027	.001
June ...	.013	.013	.000	.042	.027	.115	.030	.024	.006
July ...	.015	.008	.007	.045	.027	.018	.031	.029	.002
Means ...	.019	.017	.002	.047	.039	.008	.028	.023	.005

TABLE VI.—Kingston, Jamaica.—Barometric pressure, mean time of Diurnal Maxima and Minima

Month.	A. M. Minimum.	A. M. Maximum.	P. M. Minimum.	P. M. Maximum.	Sun's Z. D. at app. noon Lat. 18° N.	Mean time of apparent Noon.*
1893.	H. M.	H. M.	H. M.	H. M.	°	H. M.
January ...	3 30	9 24	3 05	10 00	38 S	12 10
February ...	3 32	9 42	3 24	10 05	30½ S	12 14
March ...	3 06	9 48	3 42	10 06	20 S	12 09
April ...	3 02	9 14	4 06	10 24	8 S	0 00
May ...	3 18	9 30	4 20	10 34	1 N	11 56
June ...	3 20	10 00	4 12	10 24	5 N	0 00
July ...	3 24	9 36	4 06	10 30	3 N	12 06
1892.						
August ...	3 18	10 05	4 06	10 24	4½ S	12 04
September ...	3 36	9 36	3 36	10 08	15¼ S	11 55
October ...	3 34	9 46	3 24	10 05	27 S	11 46
November ...	3 15	9 30	3 14	9 54	36¼ S	11 45
December ...	3 24	9 25	3 05	9 48	41 S	11 55
Means ...	3 22	9 38	3 42	10 12	18° S	—
Ranges ...	0 34	0 51	1 15	0 46	—	

Results of one year's observation—August, 1892, to July, 1893, arranged in the sequence of the months.

* Means for the month, derived from the Equation of Time.

TABLE VII.—Kingston Barometric pressure.

The four diurnal components.

Month.	P_1	P_2	P_3	P_4	Mean pressure for the month for the 24 hours.
1893.					
January	.976	.047	.945	.017	.994
February	.009	.083	.983	.059	.031
March	.020	.096	.000	.068	.045
April	995	.059	.971	.042	.016
May	.949	.008	.926	998	.969
June	.973	.018	.954	.017	.989
July	.970	.012	.957	.022	.989
1892.					
August	.970	.018	.954	.025	.989
September	.940	.997	.916	.986	.958
October	.898	.964	.882	.944	.919
November	.921	.996	.898	969	.944
December	.985	.060	.957	.036	.007
Means	.967	.030	.945	.015	.988

$P_2 - P_1 = .063$ $\quad P_1 - P_3 = .022$

$P_4 - P_3 = .070$ $\quad P_2 - P_4 = .015$

The above figures are derived by scaling off from the plotted curves for each month, taken at the extreme elongations.

TABLE VIII.—Mean pressure by Barograph for the 3 hours, and their means, as compared with the mean pressure for the month.

Month.	7 a.m.	3 p.m.	11 p.m.	Mean Pressure for the 3 hours.	Mean pressure for the month.	Diff.
January ...	30.012	29.945	30.005	29 987	29.994	.007
February ...	.048	.983	.048	30.026	30.031	.005
March ...	.067	30.002	.054	.041	.045	.004
April ...	.039	29.978	.025	.014	.016	.002
May ...	29.991	936	29.982	29.969	29.969	.000
June ...	30.002	.962	30.005	.989	.989	.000
July ...	29.997	.962	.006	.988	.989	.001
August ...	.999	.958	.008	.988	.989	.001
September ...	.973	.918	29.977	.956	.958	.002
October ...	.933	.882	.930	.915	.919	.004
November ...	.964	.898	.952	.938	.944	.006
December ...	30.025	.957	30.019	30.000	30.007	.007
Means ...	30.004	29.948	30.001	29.985	29.988	.003

TABLE IX.—Rain.

Date.		Time.	Total Rainfall.	Indication on Barogram.
1892.			ins.	
August	10	4 to 5 p.m. ...	0.09	The ascending curve became straight: reading higher.
"	16	2 a.m. ...	0.05	A sudden rise and then a drop during the rain.
"	22	1 p.m. ...	0.05	Same.
"	24	6 a.m. ...	0.60	A slight rise and fall.
"	"	1 p.m. ...		Three remarkable rises and falls, partly due to thunderstorms. (T.)
"	25	11.30 a.m. ...	0.05	Very slight rise and fall.
"	30	1 to 1.30 p.m. ...	0.20	Rise and fall.
September	4	8 a.m. ...	0.03	Not much marked.
"	6	2.30 p.m. ...	0.08	Rise and fall, moderate.
"	9	1.15 to 2 p.m. ...	0.02	Not perceptible.
"	17	3.10 p.m. ...	0.10	Interrupted. (T.)
"	20	3.15 p.m. ...	0.03	Slight rise and fall.
"	21	2.30 to 3.15 p.m. ...	1.14	Moderately interrupted, partly due to thunderstorm (T.)
"	22	0.30 to 6 a.m. ...	1.20	Large rise and fall from midnight to 2 a.m.
"	26	8 p.m. ...	0.12	Slight rise and fall.
"	28	6 p.m. ...	0.11	Same.
"	29	4 to 5 p.m. ...	0.33	Two rises and falls.
October	1	3.30 p.m. ...	0.02	Curve straightened.
"	2	5 p.m. ...	0.02	Rises and falls, 3 to 5 p.m.
"	4	7.30 to 11 a.m. ...	0.50	Moderate rise and fall.
"	11	1.45 p.m. ...	0.20	Two slight rises and falls.
"	12	8 a.m. ...	0.13	Moderate rise and fall. (S.)
"	13	1.30 to 3 p.m. ...	0.40	Not much marked.
"	14	3.15 to 6 p.m. ...	1.14	Moderate rises and falls. (T.)
"	15	11 a.m. ...	0.01	Not much marked.
"	16	1.30 to 2.30 p.m. ...	0.05	Three rises and falls, partly due to thunderstorm. (T.)
"	17	1.30 to 2 p.m. ...	0.68	Moderate rise and fall.
"	18	4 to 4.40 p.m. ...	1.89	Very sharp rise and fall, .032 rise and .025 fall during a heavy shower, lasting 45 minutes. See W. R. No. 150.
"	19	11 a.m. to 1 p.m. ...	0.11	Not much marked.
"	20	Early morning and from 3. pm.	0.68	Moderate rises and falls.
"	21	Midnight to noon ...	0.80	Much interrupted all through with numerous rises and falls.
"	22	3.30 to 4.30 a.m. ...	0.02	Slight rise and fall.
"	23	1.15 to 2.30 and at 4 p.m. ...	0.06	Not much marked.
"	25	3 p.m. ...	0.01	Moderate rise and fall. (T.)
"	26	4.30 to 6 p.m. ...	0.21	Slight rise and fall.
November	4	4 to 7 p.m. ...	0.39	Not much marked.
"	5	3 to 5 p.m. ...	0.95	Slight rise and fall.
"	21	7 a.m. ...	0.40	Same
"	22	2 p.m to 1.30 p.m. ...	0.96	Several rises and falls, slight.
"	23	3 p m. ...	0.08	Slight rise and fall.
"	25	Noon ...	0.06	Not much marked.
December	9	6 45 a.m. and 6 to 8.30 p.m.	0.65	Several moderate rises and falls.
"	16	7.45 a.m. ...	0.02	Moderate rise and fall.
"	17	6 p.m. ...	0.01	Not much marked.
"	31	2.15 p.m. ...	0.04	Slight rise and fall.
1893.				
January	2	4 a.m. and 10 p.m. ...	0.04	Slight rise and fall.
"	24	10.30 a m. to 2.30 p.m. ...	0.34	Much interrupted. (S.)
February	4	4.50 to 5.30 p.m. ...	0.02	Not much marked.
"	6	2 to 2.30 p.m. ...	0.36	Slight rise and fall.
"	9	11 p.m. ...	0 03	Small rise and fall.
"	10	3.30 to 4.30 p.m. ...	0.25	Not much marked.
"	12	10.30 a.m. ...	0.11	Sudden rise and fall. (S.)

TABLE IX.—Rain, *continued.*

Date.		Time.	Total Rainfall.	Indication.
1893.			ins.	
March		No rain.		
April	3	4 p.m. ...	0.04	Straightened curve.
"	4	4 30 to 5.30 p.m. ...	0.03	Slight rises and falls.
"	8	3.30 p.m ...	0.04	Rise and fall, moderate. (S.)
"	23	2 10 to 4 p.m. ...	0.57	Slight rise and fall.
"	24	1.50 to 4.20 p.m ...	0.39	Not much marked.
"	25	11 a.m. and noon ...	0.22	Rise and fall.
May	3	12.45 to 2.30 p.m. ...	0.33	Rise and fall at 2 p.m.
"	4	2 p.m. ...	0 01	Not much marked.
"	11	2.45 to 3.45 p.m. and at 6 p.m.	0.08	Irregular jagged marks.
"	12	2.30 p.m. ...	0.03	Slight rises and falls.
"	16	7 a.m. ...	0.03	Slight rise and fall.
"	24	2 p.m. ...	0.02	Rise and fall, moderate.
"	25	3 to 4.30 p m. ...	0.70	Two rises and falls.
"	27	4.30 to 5 a.m. ...	0.24	Very irregular.
"	29	5 to 7 p.m. ...	0.17	Large rise and fall.
"	31	8.45 a.m., 1.30 to 7.30 p.m. ...	1.06	Much interrupted through those hours. (T.)
June	1	8 a.m., 10 a.m. and 12.30 p.m.	0.83	Rises and falls during those hours.
"	2	6. a.m. ...	0.02	Very slight rise and fall.
"	4	1.30 to 6 p.m. (light) ...	0 02	Several rises and falls.
"	5	3.15 to 8.30 p.m. ...	0.22	Five rises and falls. (T.] (S.)
"	10	1.15 p.m. ...	0.24	Moderately interrupted. (S.)
"	17	2 p.m. ...	0.03	Large rise and fall.
"	18	1.30 p.m. ...	0.13	Slight rise and fall. (T.)
"	21	1 and 2 p.m. ...	0.05	Rise and fall, jagged.
July	3	2.45 to 4.15 p.m, ...	0.20	Slight rises and falls.
"	4	4.20., 6.30 and 8 p.m. ...	0.11	Very large rises and falls. (S.)
"	5	3 a.m. to 7 a.m. ...	0.02	Rises and falls, very sharp. (S.)
"	6	7 to midnight ...	1 08	Very remarkable jagged rises and falls. (See illustration Fig. 6.) (T.)
"	7	Continued from midnight to 7.30 a.m. and from 9.30 a.m. to 2.30 p.m.	1.85	Rise and fall at each of the intervals
"	9	3.30 to 4.30 p.m. ...	0.43	Three rises and falls. (T.)
"	10	11 a.m. ...	0.04	Slight rise and fall.
"	13	3.40 to 4.15 p.m. ...	0.22	Series of rises and falls. (T.)
"	18	5.45 p m. ...	0.01	Small rise and fall.
"	19	3.50 p.m. ...	0.01	Two rises and falls.
"	24	3.15 p.m. 9.30 p.m. ...	0.20	Series of rises and falls. (T.)
"	25	7.15 a.m., noon to 4 p.m. and 9 to midnight	1.36	Very jagged series of marks, but partly due to squalls. (T.) (S,)
"	26	Midnight to 7 a.m. ...	0.40	A series of jagged marks during the intervals.
August	6	3.30 to 5 a.m. and 10.45 a.m.	0.06	Moderate rises and falls during these intervals. (S.)
"	7	Midnight to 8 a.m. ...	0.39	Four rises and falls.
"	24	1 to 1 30 p.m. ...	0.08	Moderate rise and fall (T.)
"	25	2 to 2.30 p.m. ...	0.07	Rises and falls. (T.)
"	26	7 to 8.15 p.m. ...	0.66	A series of rises and falls. (T.)
"	27	7.30 p.m. to midnight ...	0.43	Very sharp jagged marks similar to those of 6th inst. (S.) (T.)
"	28	Midnight to 4 a.m. ...	0.50	Same continued.
September	6	2 a.m. ...	0.07	Small rise and fall.
"	17	2.30, 4 and 8.30 p.m. ...	0.08	Sharp rise and fall 4.30 p.m. (T.) Small rises and falls for other hours.
"	25	5.30 to 8 am. and from 10 a.m. to noon	0 69	Moderate rises and falls.
"	26	Midnight to 6 a.m. and at 8 p.m.	1.83	Several moderate rises and falls.
"	29	12.40 and 2 p.m. ...	0.03	Small sharp rises and falls. (T.)
"	30	4.30 p.m. ...	0.02	Moderate rise and fall.

TABLE IX.—Rain, *continued.*

Date.		Time.	Total Rainfall.	Indication.
1893.			ins.	
October	1	2 to 3.15 p.m. ...	0.05	Small, rises and falls.
"	3	1.45 to 2.30 p.m. ...	0.37	Sharp rise and fall.
"	4	12.45 to 2 p.m ...	0 02	Series of sharp rises and falls. (T.)
8	8	2.30 to 3.05 p.m. ...	0 23	Slight rise and fall.
"	15	12.15 to 12.30 p.m. and 2.30 to 3 p.m.	0.26	Moderate rises and fall.
"	17	2 a m. ...	0 15	Small, sharp rise and falls.
"	18	1.15 to 3.15 p.m. ...	0.28	Long rise and fall.
"	21	7.30 p.m. to midnight ...	0.96	Numerous sharp rises and falls, largest at 10 p m.
"	22	Midnight to 5.30 a.m., 2.15 to 4.30 p.m. and from 6 to 7.45 p.m.	2.00	A series of small rises and falls.
"	23	Midnight to 7 a.m., 2.45 to 3 p.m.	1.25	Curves much interrupted.
"	24	5 to 2.30 a.m., 3 a.m. to Noon	2.33	Series of moderate rises and falls.
"	25	3 to 4 p.m. ...	0.16	Moderate rise and fall.
"	26	1.25 to 4 p.m. ...	0.60	Maximum component shortened.
"	28	3.30 p.m. ...	0.03	Slight rise and fall.
"	31	Midnight to 8 p.m. ...	0.85	Very large and sharp rises and falls.
November	1	5 a.m. to noon ...	0.78	Same continued.
"	3	1.45 to 3 p.m. and at 7 p.m. ...	0.07	Moderate rises and falls.
"	4	8 p.m. ...	0.05	Sharp rise and fall.
"	8	12.45 to 1 p.m. ...	0.42	Long rise and fall.
"	9	1 p.m. and 4.15 to 4.30 p.m. ...	0.21	A series of rises and falls.
"	11	Midnight to 2 a m. and midday to 3.30 p.m. ...	0.66	Very sharp rises and falls.
"	12	4.30 p.m. ...	0.03	Slight rise and fall.
"	13	2 to 2.30 p.m. ...	0.12	Long rise and fall.
"	15	3.15 to 5 p.m. ...	0.52	Several moderate rises and falls.
"	22	1.45 to 2.30 p.m. ...	0.21	Slight rises and falls.
December	3	5 a.m. to noon. ...	1.57	A series of moderate rises and falls in combination with a general very large rise and fall, see Fig. No. 7, and weather report No. 166. (T.)
"	4	8 a m. to 1 p.m. ...	0.58	Very much interrupted all through, see illustration Fig. 7. (T.)
"	14	11 p.m. ...	0.02	Moderate rise and fall.
"	18	1.45 to 2.15 a.m. and 8 p.m. ...	0.78	Moderate sharp rises and falls. (S.)
"	19	8.30 to 9 a m. ...	0.08	Small rises and falls.
"	25	4 a.m., 11 a.m., 1.20 to 4. p.m.	0.21	Several small rises and falls.
"	29	9.30 p.m. ...	0.04	Small sharp rise and fall. (S.)
1894.				
January	1	4 to 4.15 p.m. ...	0.04	Slight rise and fall.
"	15	8 to 10 a.m. ...	0.08	Moderate rise and fall.
"	26	6.50 p.m. ...	0.04	Slight rise and fall.
"	31	1.15 p.m. ...	0.03	Moderate rise and fall.
February	4	8.30 a.m. ...	0 07	Two moderate rises and falls.
"	15	5 a.m. ...	0.12	Small sharp rise and fall.
"	16	11.30 p.m. ...	0.04	Small interruptions.
"	17	Noon, 6 p.m., 7 to 9.30 p.m. ...	0.28	Ditto.
March	1	12.30 p.m. ...	0.02	Not much marked.
"	2	1.45 to 2.15 p.m. ...	0.08	Small interruptions.
"	11	3.45 to 4.30 p.m. ...	0.61	Two small rises and falls.
"	31	2.40 to 4.05 p.m. ...	0.03	Not much marked.
April	2	9 p.m. ...	0.05	Not much marked.
"	3	6 p.m. ...	0.12	Slight rise and fall.
"	5	4 p.m. ...	0.08	Three small rises and falls.
"	18	2 and 3 p.m. ...	0 17	Moderate rise and fall.
"	19	3.30 to 4 p.m. ...	0.17	Moderate rises and falls. (S.)

TABLE IX.—Rain, continued.

Date.		Time.	Rainfall.	Indication.	
1894.			ins.		
May	1	2.50 to 4 p.m. ...	1.18	Small rises and falls.	
"	4	3.30 p.m. ...	0.03	Moderate rise and fall.	
"	13	2.45 p.m. ...	0.04	Slight rise and fall.	
"	17	4.30 a.m. till 4 p.m. ...	2.98	Several sharp rises and falls.	
"	18	All day ...	2.68	Curves much interrupted.	
"	19	Midnight to 7 a.m. and from 4.30 to 6 p.m.	1.90	Curves much interrupted.	
"	20	Early morning and at 10.20 p.m	0.08	A series of small rises and falls.	
"	22	7.30 to 8.30 p m. ...	0.39	Curves interrupted from 3 p m.	
"	28	10.15 a.m. ...	0.22	Long rise and fall.	
"	29	9 to 10 a.m. and 3 to 4 p.m. ...	0.12	Very sharp small rises and falls.	
"	30	Midnight to 3 a.m., 3.30 to 5.30 p.m. ...	0.70	Curves much interrupted.	
"	31	Midnight to 6 a.m. ...	0.33	A series of small rises and falls.	
June	1	Early morning ...	1.10	Long rises and falls.	
"	2	4 and 11 a.m. ...	0.07	Slight rise and fall.	(S.)
"	3	4 a.m. ...	0 04	Not much marked.	(S.)
"	24	2.30 p.m. to 3.15 p.m. ..	0.30	Small rises and falls.	
"	26	11 a.m. to 2 p.m. ...	0.09	Moderately sharp interruption.	
July	9	4. p.m. ...	0 09	Small interruptions.	
"	12	1.30 p.m. ...	0.07	Sharp rise and fall.	
"	13	2 p.m. ...	0.13	Ditto.	(S.)
"	19	11 a.m. and 1 p.m. ...	0.14	Several sharp rises and falls.	
"	21	3 p.m ..	0.26	Slight rise and fall.	
"	24	10.50 a.m. to 6 p.m. ...	0.52	Very sharp.	

TABLE X.— Squalls.

Date.		Time.	Direction.	Indication.	
1893.					
August	6	8 a.m. ...	SE	Interrupted after squalls.	
"	14	10 20 a.m. ...	...	Not much marked.	
October	11	9 p.m. ...	...	Interrupted.	
"	12	7.30 a.m. ...	...	Moderate rise and fall.	(R.)
"	"	2.45 p.m. ...	...	Interrupted.	
"	15	10.15 p.m. ...	...	Light rise and fall.	
"	21	5.30 p.m. ...	SE	Not much marked.	
1893.					
January	24	9.30 to 10.30 a.m. ...	SE	Interrupted.	
February	2	3.15 to 5 p.m. ...	NW	Not much marked.	
"	3	3 to 5 p.m ...	NW	Ditto.	
"	4	3 p.m. ...	NW	Ditto.	
"	12	10.30 a m. ...	SE	Sudden rise and fall.	(R.)
"	"	5 p.m. ...	SE	Slight rise.	
"	13	6.45 p m. ...	SE	Not much marked.	
March	13	5 to 6 p.m. ...	NW	Not much marked.	
April	8	3.30 p.m. ...	N	Moderately interrupted.	(R.)
May	28	2.30 p.m. ...	SE	Ditto.	
June	5	8.30 and 11 a.m., 12..30 and 2.15 p.m..	SE	Much interrupted.	(R.)
"	10	1.15 to 8.30 p.m. ...	SE	Moderatly interrupted.	(R)
"	11	Midnight to 7.30 a.m. ...	...	Ditto.	

TABLE X.—Squalls, *continued.*

Date.	Time.	Direction.	Indication.	
1893.				
July 4	4.20 to 6.30 p.m. ...	...	Very sharp interruptions.	(R.)
" 5	3 a.m. and 7 a.m. ...	SE	Ditto	(R.)
" 20	4.45 a m. ...	SE	Not much marked.	
" 25	7.15 a.m. ...	SE	Moderately interrupted	(R.)
" 25	Noon ...	SE	Very much interrupted.	
" 25	10.30 p.m. ...	SE	Moderately marked.	
August 6	3.30 a.m. ...	SE	Ditto	(R.)
" 6	10.45 a.m. ...	SE	Ditto	
" 10	4.30 p.m. ...	...	Ditto	
" 27	6.30 p.m. ...	SSW	Very much interrupted.	(R.)
" 27	9.30 p.m. ...	S	Ditto	
" 29	Noon and 1 p.m. ..	E	Moderately marked.	
September 17	9.15 a.m. ...	SE	Not much marked.	
" 26	1 and 1.30 p.m. ...	...	Moderately interrupted.	
" 26	4 to 4.30 p.m. ...	...	Ditto	
" 26	8 p.m ...	...	Very much interruptod.	
October	Nil.			
November	Nil.			
December 4	2 a.m. ...	SE	Not much marked.	
" 18	1.45 to 2.15 a.m. ...	SE	Moderately marked.	(R.)
" 29	1.30 to 9.30 p.m. ...	SE	Ditto	
1894.				
January 28	7 p.m. ...	SE	Moderately marked.	
" 28	9.30 p m. ...	SE	Not much marked.	
" 28	Midnight ...	SE	Ditto	
February 8	9.40 p.m. ...	...	Ditto	
" 12	3 a.m. ...	SE	Sharp rise and fall	
March	Nil.			
April 19	3 p.m. ...	SE	Moderately marked.	(R.)
" 26	3.30 p.m ...	NNE	Slight rise and fall.	
May	Nil.			
June 2	11 p.m. ...	...	Slight interruption.	(R.)
" 3	1 to 4 a.m. ...	...	Ditto	(R.)
" 9	2.15 p.m. ...	E	Moderate interruption.	
July 13	2 p.m. ...	SE	Sharp interruption.	(R.)

TABLE XI.—Thunderstorms.

Date.	Time.	Indication.		
1892.				
August 5	5 p.m. ...	Slightly	jagged impression.	
" 24	1 p m. ...	Strongly	ditto	(R.)
" 26	Noon ...	Slightly	ditto	
" 29	3 p.m. ...	Moderately	ditto	
September 4	2 p m. ...	Ditto	ditto	
" 16	8 p.m. ...	Slightly	ditto	
" 17	3.10 p.m. ...	Moderately	ditto	(R.)
" 19	5 a.m. ...	Ditto	ditto	
" 21	2 p.m. ...	Ditto	ditto	(R.)
" 25	11 a.m. ...	Slightly	ditto	
" 26	6.30 a.m. ...	Moderately	ditto	
" 28	6 p.m. ...	Slightly	ditto	(R.)
October 1	1 p.m. ...	Ditto	ditto	
" 14	3.15 to 6 p.m. ...	Moderately	ditto	(R.)
" 16	1 p.m. ...	Ditto	ditto	(R.)
" 23	11 a.m. ...	Slightly	ditto	
" 25	2 to 3 p.m. ...	Moderately	ditto	(R.)

TABLE XI.—Thunderstorms, *continued.*

Date.	Time.	Indication.			
1893.					
April 8	11 p.m. ...	Moderately jagged impression.			
" 29	3 p.m. ...	Slightly	ditto		
May 2	1 p.m. ...	Ditto	ditto		
" 31	12.30 p.m. ...	Strongly	ditto		(R.)
June 5	Noon to 3 p.m. ...	Moderately	ditto	(T.)	(R.)
" 8	3 p.m. ...	Slightly	ditto		
" 11	6.30 to 8.30 a.m. ...	Moderately	ditto		
" 18	1 p.m. ...	Slightly	ditto		(R.)
" 24	1 p.m. ...	Moderately	ditto		
" 26	Noon to 1 p.m. ...	Ditto	ditto		
July 6	7 p.m. to 10.15 p.m. ...	Strongly	ditto	See Fig. 6	(R.)
" 9	Noon and 3.30 p.m. ...	Slightly	ditto		(R.)
" 10	2 to 4 p.m. ...	Moderately marked impression.			
" 13	1 to 2 p.m. and 4 p.m., and to midnight	Moderate at first but strong near midnight.			(R.)
" 18	1 p.m. ...	Strongly marked impression.			
" 19	4.20 p.m. ...	Ditto	ditto		
" 24	5 p.m. and 9.30 p.m. ...	Moderately	ditto		(R.)
" 25	6 a.m. ...	Ditto	ditto		(R.)
" 25	1.27 to 2 p.m. ...	Strongly	ditto		(R.)
" 29	2 p.m. ...	Moderately	ditto		
" 30	2 p.m. ...	Slightly	ditto		
August 5	3 p.m. ...	Moderately	ditto		
" 12	2.30 p.m, ...	Ditto	ditto		
" 13	1.30 p.m. ...	Ditto	ditto		
" 15	Afternoon ...	Ditto	ditto		
" 16	3 to 5 p.m. ...	Ditto	ditto		
" 20	2 to 3 p.m. ...	Slightly	ditto		
" 23	2 to 3 p.m. ...	Ditto	ditto		
" 24	1 to 1.30 p.m. ...	Moderately	ditto		(R.)
" 25	1 to 2 p.m. ...	Ditto	ditto		(R.)
" 26	3 to 7.30 p.m. ...	Strongly	ditto		(R.)
" 27	4 to 5 p.m. ...	Ditto	ditto		(R.)
" 27	7.34 to 9.30 p.m. ...	Very strongly	ditto		(R.)
September 3	2 to 5 p.m. ...	Moderately	ditto		
" 10	Noon to 4 p.m. ...	Slightly	ditto		
" 11	1 p.m. ...	Ditto	ditto		
" 14	7 to 10 p.m. ...	Ditto	ditto		
" 15	Noon ...	Ditto	ditto		
" 17	2 p.m. and 4 p.m. ...	Moderately	ditto		(R.)
" 20	2 to 4 a.m. ...	Strongly	ditto		
" 23	2 to 3 p.m. ...	Moderately	ditto		
" 24	2 to 3 p.m. ...	Ditto	ditto		
" 29	12.40 p.m. ...	Strongly	ditto		(R.)
October 2	9.30 to 5 p.m. ...	Moderately	ditto		
" 4	12.45 p.m. ...	Ditto	ditto		(R.)
" 24	2 to 2.30 a.m. ...	Ditto	ditto		
November 4	2 and 7 p.m. ...	Slightly	ditto		
" 11	Noon to 3.30 p.m. ...	Moderately	ditto		
December 3	5 a.m. to noon ...	Strongly	ditto	See Fig. 7	(R.)
" 4	7 a.m. ...	Ditto	ditto	ditto	(R.)
" 13	7 to 8 p.m. ...	Slightly	ditto		
" 14	1 to 5 a.m. ...	Moderately	ditto		
1894.					
May 3	1 p.m. ...	Slightly	ditto		
" 5	2 p.m. ...	Moderately	ditto		
" 23	6 p.m. ...	Slightly	ditto		
" 24	Forenoon ...	Ditto	ditto		
June 10	3 p.m. ...	Ditto	ditto		

TABLE XII.—Statement shewing the Comparative effect produced on the barograms during various disturbed conditions of the Atmosphere.

Indication.	Rain alone.	Squalls alone.	Thunderstorm alone.	Rain with Squalls.	Rain with Thunderstorm.
	1	2	3	4	5
A single rise and fall ...	71	5	0	2	0
Several rises and falls ...	52	22	47	13	26

Spanish Town,
27th October, 1896.

J. F. BRENNAN.