

REPORT
OF THE
METEOROLOGICAL COUNCIL

TO THE
ROYAL SOCIETY,

For the Year ending 31st of March 1882.

Presented to both Houses of Parliament by Command of Her Majesty.



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THE METEOROLOGICAL COUNCIL

1881-82.

Professor HENRY J. S. SMITH, F.R.S., Chairman.

MR. WARREN DE LA RUE, F.R.S.

Captain SIR FREDERICK J. O. EVANS, K.C.B., F.R.S., Hydro-
grapher to the Admiralty.

MR. FRANCIS GALTON, F.R.S.

Professor GEORGE GABRIEL STOKES, F.R.S.

Lieutenant-General RICHARD STRACHEY, C.S.I., F.R.S.

R E P O R T
OF THE
M E T E O R O L O G I C A L C O U N C I L
TO THE
R O Y A L S O C I E T Y,
For the Year ending March 31, 1882.

THE Council have remained unchanged during the financial year, and their executive officers continue as before, Mr. R. H. Scott, F.R.S., being the Secretary, and Captain H. Toynbee, F.R.A.S., the Marine Superintendent. Introductory.

Navigating-Lieut. C. W. Baillie, R.N., F.R.A.S., who has since October 1879 been temporarily employed, has now been placed on the permanent staff of the Marine Department.

Inasmuch as the period for which the Council was originally appointed, (in accordance with a letter from the Treasury to the President of the Royal Society, of May 24, 1877, Letter No. 9, Parliamentary Paper No. 351, Session 1877), would expire at the close of the year now under review, the Treasury, on the 10th November 1881, addressed the President of the Royal Society in order to ascertain if the President and Council of that Society wished to recommend any change in the arrangements for the administration of the Office.

The result of the correspondence which ensued is that the Treasury have approved of the continuance of the present Council until either Her Majesty's Government or the Royal Society expresses a wish to terminate the existing arrangement after having given not less than twelve months' notice of their intention, or such shorter notice as may satisfy the other party.

The present Report is as usual arranged under three headings:—

- I. Ocean Meteorology.
- II. Weather Telegraphy.
- III. Land Meteorology of the British Isles.

PART I.

OCEAN METEOROLOGY.

Collection of Information.—The methods followed by the Office in collecting observations relating to Marine Meteorology have undergone no material change. A concise account of these methods will be found in Appendix I. (p. 35). Collection of observations.

The Council having resolved that the Marine Department should undertake an investigation of the general distribution of baro-

metric pressure over the oceans of the globe, the extraction of observations from the ships' logs into data books on the old system has been discontinued for the present, as unnecessary for the object in view.

Appendix II. (p. 39) contains a list of all the observers who have contributed "excellent" logs during the past year. Some of them have regularly co-operated with the Office for many years; the names which now appear in the list for the first time are as follows:—

Presentation of charts to observers.

Captain's Name.	Ship.
Brown, James	S.S. "Thetis."
Dart, Leonard C.	"Fylde."
Kidley, W. H.	S.S. "Gaelic."
McBride, Andrew (the late)	"Island Belle."
Molony, E. J.	"British Merchant."
Prout, J. C.	"Cape St. Vincent."
Robinson, Thomas	"Chinsura."
Russell, Charles J.	"Baroda."
Slade, Lieut. E. J. W., R.N.	H.M.S. "Alert."
Smith, W.	"City of Madrid."

Proportion of "excellent" to total number of logs received.

The following is the total number of logs received from April 1, 1881, to March 31, 1882, and the number of logs which have been classed as "excellent":—

Total No. of Logs received.	No. of Excellent Logs.	Per-centage of Excellent Logs.
139	96	69

The average number of logs received annually during the five years, 1876–80, was 133, and the per-centage of excellent logs among these was 67.

The Council take this opportunity of expressing their best thanks to the observers who have assisted them during the past year.

Districts from which observations are obtained.

On the 31st of March 1882 the ships carrying instruments supplied by the Office were pursuing the following voyages:—

To Baffin's Bay or Greenland	5
" North America, East Coast	6
" " " West "	6
Off East Coast of North America	3
To South America, East Coast	12
" " " West "	8
" Australia and New Zealand, viâ Cape of Good Hope	16
" " " " viâ Suez	3
" India, viâ Cape of Good Hope	15
" China Seas, viâ Cape of Good Hope	4
" " " Suez	5
" Mediterranean Ports	1
" Cape of Good Hope	6
Round the World	1
Between British Ports	3
Total number of ships	94

Appendix III., p. 41, supplies a list of the logs and of all the documents from stations abroad received at the Office during the year.

The Discussion of the Meteorology of the district lying near the Cape of Good Hope.—The Charts of Meteorological Data for the Ocean District adjacent to the Cape of Good Hope, together with a volume of Explanatory Remarks, referred to in the last Report, are in course of publication. “The Cape Squares.”

The discussion of the Gales of the District has been entrusted to Captain Toynbee and his Report has now been completed. It comprises a detailed account of the gales experienced in January and July as typical of the summer and winter seasons respectively, and also short remarks on the gales experienced in each month of the year, with a summary giving the generalized results.

The Report is illustrated by diagrams showing for each month of the year the highest force on Beaufort's scale, attained by each gale, and the ship's position when that force was first recorded.

For the months of January and July additional plates are given illustrating the history of gales of various classes.

Sea Surface Temperature Charts.—The Sea Surface Temperature Charts for the three great oceans and for the four cardinal months of the year, viz., February, May, August, and November, have been completed by Lieut. Baillie, and are now in process of publication. Sea temperature charts.

The work will consist of thirteen charts, viz., four for the Indian, Pacific, and Atlantic Oceans respectively, and an Index Chart.

Charts of Barometrical Pressure.—It has been already stated that a discussion of the distribution of barometrical pressure over the Indian, Pacific, and Atlantic Oceans has been undertaken by the Marine Department. Besides the obvious utility to seamen of an acquaintance with the mean barometrical conditions of the seas which they traverse, it is an object of great importance to meteorological science to obtain a knowledge of the distribution of atmospheric pressure over the oceans of the globe more comparable to that which we possess at present for the continents. Attention has been frequently called to the fact that large portions of the ocean are rarely visited by ships, and that consequently but little uniformity exists in the geographical distribution of the available observations. But as the whole number of observations of barometric pressure at sea existing in the Office is estimated to amount to nearly 5,000,000, and as the deficiencies in the less frequented parts of the ocean can be supplemented from other sources, and especially from the Logs and Remark Books of Her Majesty's Ships, there is good reason to hope that a considerable accession to existing knowledge may be derived from so large a mass of material. Pressure charts.

In order to expedite the work it is proposed that the observations within any square, say of 2° or 4°, should be averaged by inspection of the ship's logs, without previous transcription into data books, and the means of the observations entered directly on charts.

Arctic
meteorology.

"Contributions to our Knowledge of the Meteorology of the Arctic Regions."—This work, which has been entrusted to Mr. R. Strachan, and of which Parts I. and II. are already published and have been noticed in previous Annual Reports, has been steadily advancing during the past year.

In the course of the discussion of the data, it has become apparent that the material is too extensive for a single part, as was originally proposed, and that it will be expedient to divide it into two parts. The portion intended for Part III. is nearly complete and will comprise the results of observations made at the following winter stations:—

Wintering Stations.	Ships.	Commanders.	Year.	Information already published.
Melville Island	H.M.S. "Hecla" and "Griper."	Sir W. E. Parry	1819-20	Abstracts published in Parry's first, second, and third voyages.
Lyon's Inlet	H.M.S. "Fury" and "Hecla."	Do. - -	1821-2	
Igloodik - Port Bowen	Do. do. H.M.S. "Hecla" and "Fury."	Do. - - Do. - -	1822-3 1824-5	
Port Leopold	H.M.S. "Enterprise" and "Investigator."	Sir James Ross	1848-9	Mean monthly temperatures published in the "Last of the Arctic Voyages."
Wolstenholm Sound Drifting in the pack.	H.M.S. "North Star" - "Advance" and "Rescue"	J. Saunders - E. J. De Haven, U.S.N.	1849-50 1850-1	
Walker Bay	H.M.S. "Enterprise"	Sir R. Collinson	1851-2	Nothing published.
Cambridge Bay	Do. - -	Do. - -	1852-3	
Camden Bay	Do. - -	Do. - -	1853-4	
Fort Simpson	- - -	W. J. S. Pullen	1849-51	Nothing published.

There will then remain to be dealt with in Part IV. the documents relating to the following winter stations:—

Wintering Stations.	Ships.	Commanders.	Year.	Information already published.
Prince of Wales's Strait.	H.M.S. "Investigator"	Sir R. McClure	1850-1	Monthly means of Meteorological elements are given in Sir W. Armstrong's "Personal Narrative."
Mercy Bay - Dealy Island	Do. - - H.M.S. "Resolute" and "Intrepid."	Do. - - Sir H. Kellett	1851-3 1852-3	
Melville Sound	Do. do. - -	Do. - -	1853-4	Abstracts in Capt. McDougall's "Voyage of the 'Resolute.'"
Beechey Island	H.M.S. "North Star"	W. J. S. Pullen	1852-4	
Floeberg Beach	H.M.S. "Alert"	Sir G. S. Nares	1875-6	Nothing published. Published as a Parliamentary Paper, [C. 2176]. Session 1878.
Lady Franklin Sound.	H.M.S. "Discovery"	H. F. Stephenson		
Rensselaer Harbour.	"Advance" - -	E. K. Kane, M.D., U.S.N.	1853-5	Meteorological Abstracts in "Arctic Explorations," by E. K. Kane, M.D., and discussed in "Smithsonian Contributions to Knowledge, No. 104."
Port Foulke	"United States" - -	Isaac J. Hayes, M.D., U.S.N.	1860-1	Discussed in "Smithsonian Contributions to Knowledge, No. 196."
Thank God Bay	"Polaris" - -	C. F. Hall - -	1871-2	"Scientific Results of the U.S. Arctic Expedition," by Emil Bessels, M.D.
Life Boat Cove	" - - -	S. O. Buddington	1872-8	

All the stations dealt with in the work are shown in the accompanying chart (Plate I).

Synchronous
weather maps.

Synchronous Weather Maps for the Atlantic Ocean.—The Council have resolved to undertake an investigation of the weather of the North Atlantic Ocean for the thirteen months beginning August 1882 and ending September 1883, being the period agreed upon for the maintenance of an international system of circumpolar observations.

CHART OF THE PART OF ARCTIC AMERICA
SHOWING THE STATIONS FOR WHICH DATA ARE GIVEN IN PARTS I, TO IV.
OF "CONTRIBUTIONS TO OUR KNOWLEDGE OF THE METEOROLOGY OF THE ARCTIC REGIONS."

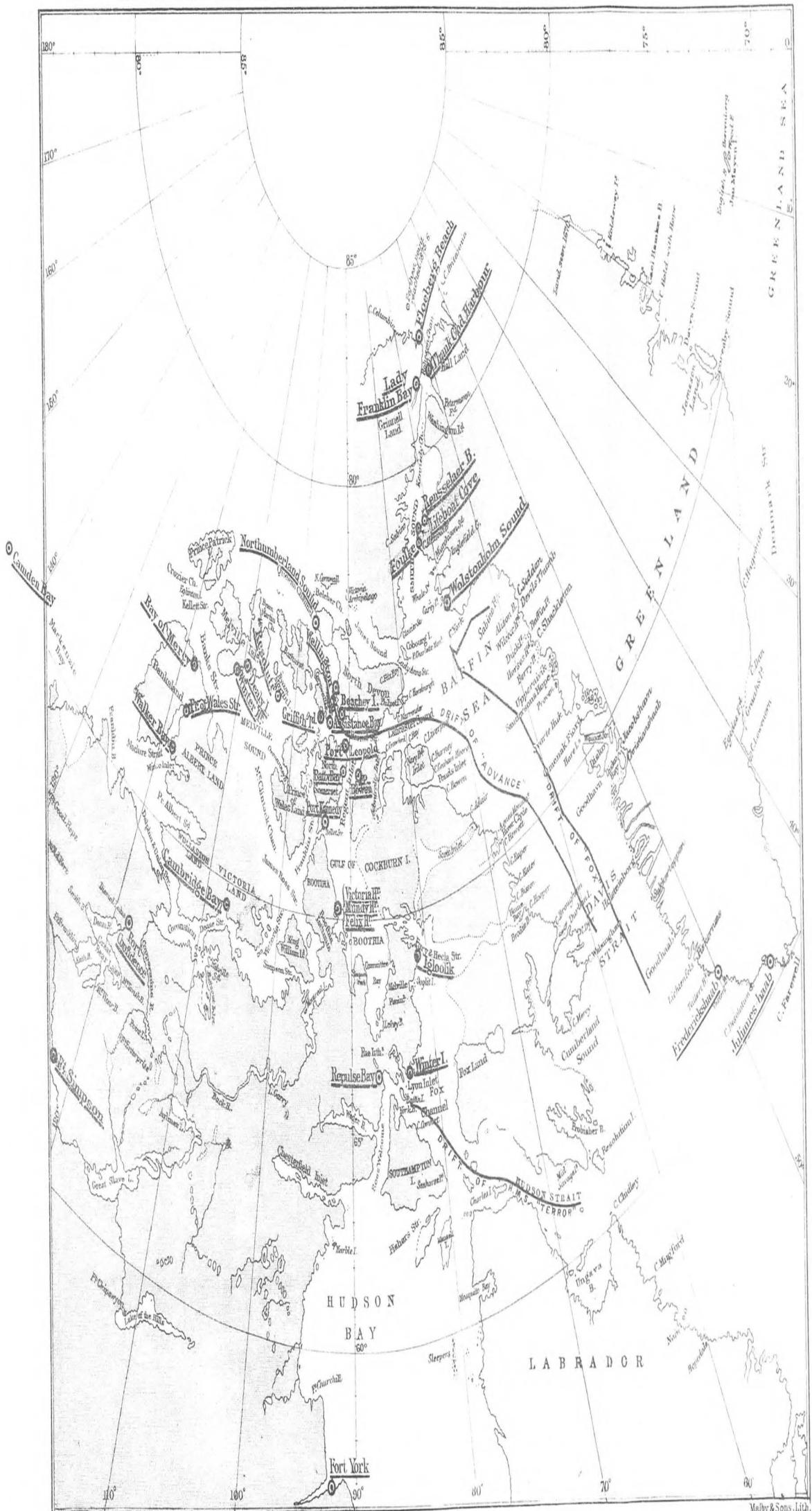


PLATE I.
 CHART OF THE PART OF ARCTIC AMERICA
 SHOWING THE STATIONS FOR WHICH DATA ARE GIVEN IN PARTS I, TO IV.
 OF "CONTRIBUTIONS TO OUR KNOWLEDGE OF THE METEOROLOGY OF THE ARCTIC REGIONS."



Attempts have been already made by the Office on previous occasions* to illustrate Atlantic weather by means of synoptic charts, and the experience gained in the course of these former efforts has encouraged the Council to organize a system of observations for a longer period, and with a wider basis of support. Synchronous weather maps.

They have accordingly made a special appeal for active co-operation to the British shipping interest, and have stated the grounds upon which this appeal is based in the following circular which has been widely distributed to shipowners and seafaring men.

CIRCULAR.

METEOROLOGICAL OFFICE, LONDON.

“ The Meteorological Council propose to undertake the preparation of Daily Weather Charts of the North Atlantic Ocean for the 13 months beginning on August 1st in the present year, and ending on August 31st, 1883.

“ It is well known that the changes of weather which we experience are in general caused by atmospheric disturbances which travel more or less rapidly, and undergo more or less modification during their progress. By far the larger number of the disturbances which visit the British Islands arrive on our shores from the Atlantic Ocean, and our earliest information as to any impending change is consequently derived from telegraphic reports from the Atlantic coasts, especially from the British Stations at Stornoway, Mullaghmore, and Valencia, and occasionally from the continental observatories at Rochefort and Corunna. But of the origin and previous history of these systems we have no sufficient knowledge, except in a few isolated cases.

“ The Meteorological Council believe that any systematic information which can be obtained as to the origin, development, and laws of motion of the atmospheric disturbances which occur over the Atlantic Ocean would promote the science of meteorology, and be of immediate practical utility. Such information could not fail to be of benefit to seamen traversing the Atlantic Ocean, and would tend directly to the improvement of the forecasts and storm warnings issued to the British coasts, by rendering the interpretation of the first indications of approaching changes observed at the western meteorological stations more easy and certain.

“ The importance of a systematic study of the weather of the North Atlantic Ocean has long been recognised, and series of daily synoptic charts, more or less resembling those now in con-

* In the “ Weather Book ” (Longmans and Co. 1863), p. 103, Admiral FitzRoy mentions that under his superintendence “ many hundreds ” of synoptic charts were drawn, which were “ intended to express consecutive simultaneous states of atmosphere, as if an eye in space looked down on the whole North Atlantic at one time.” None of these charts were published in full. The office subsequently on two occasions undertook similar enquiries, which were published under the following titles:—

- (1.) A Discussion of the Meteorology of the part of the Atlantic lying North of 30° N. for the 11 days ending 8th of February 1870. (1872.)
- (2.) The Meteorology of the North Atlantic during August 1873, by Captain Henry Toynbee. (1878.)

Synchronous
weather maps.
Circular.

templation, have been prepared at various times, not only by the Meteorological Office, but also by the Association Scientifique de France under the guidance of Leverrier, by Captain Hoffmeyer, of the Danish Meteorological Institute, by the Deutsche Seewarte, at Hamburg, and (as a part of a wider plan) by the Chief Signal Office of the United States. But none of these charts, however valuable in other respects, supply adequate materials for a satisfactory discussion of Atlantic weather, chiefly on account of the small number of the observations upon which they are founded as compared with the magnitude of the area over which they are spread.

“ Evidence of the interest attaching to the connection between English and Atlantic weather is afforded by the efforts which have been made during the last few years by the proprietors of the “New York Herald” to transmit to England from America telegraphic predictions of approaching disturbances, which (it is presumed) are founded on the reports of vessels arriving in America from the Atlantic Ocean. Reports such as these from a large number of vessels would be of great value; but the predictions taken by themselves cannot be utilized in a scientific investigation of weather.

“ The Meteorological Council gratefully acknowledge the large measure of invaluable help which they have hitherto received from seamen and the shipping interest generally. But as the object now proposed can only be achieved by the voluntary co-operation of an increased number of observers, they feel justified in making a special appeal for assistance to the owners, captains, and officers of ships, and especially to the great companies whose steamers ply between this country and America. In a science which, like meteorology, is still in its infancy, every advance is attended with great difficulties, and the Council are well aware that it would be easy to be too sanguine as to the importance of the results to be obtained by the inquiry which they are about to undertake. But having regard to the loss of life and property occasioned by storms on our coasts,* they feel confident that their proposal will commend itself to the public generally, and will ensure the active co-operation of those classes of the community for whose benefit it is primarily intended.

“ It is proposed to ask for observations of the barometer, of open air and sea surface temperatures, wind (direction and force) and

* The Wreck Return published by the Board of Trade for the year ending 30th June 1880 [C. 2906], (the last published), gives on p. 20 the following list of casualties on our coasts attributable to causes connected with the weather :

		Total Losses.	Serious Casualties.	Minor Casualties.	Total.
1879-80	Founderingings - -	16	0	0	16
	Strandings - -	81	108	170	365
	Other causes - -	0	103	405	510
Totals for 1879-80 - -	- -	97	213	581	891 gross total.
Totals for 1878-79 - -	- -	121	227	761	1,109 gross total.
Totals for 1877-78 - -	- -	138	289	1,002	1,429 gross total.
Totals for 1876-77 - -	- -	180	367	1,258	1,805 gross total.

weather at 8 a.m. and noon each day, with the position of the ship at noon." Synchronous weather maps.

A copy of the Form for recording observations and of the Instructions to observers will be found in Appendix IA., p. 37.

The Council are glad to say that the proposal has met with the most cordial support from the Board of Trade, which has instructed its officers at the various outports, when (pursuant to Act of Parliament) supplying official logs to captains of outward-bound ships to place in their hands the Forms for recording observations, with the request that they may be filled up and forwarded to London from time to time.

The Lords Commissioners of the Admiralty, in reply to a request addressed to them, have also informed the Council that copies of the forms for recording observations have been issued to the Commanders-in-Chief at Portsmouth, at Devonport, and on the North American station, as also to the Admiral in command of the Channel Squadron, for use on board any of H.M.'s ships which may be ordered to cruise in the North Atlantic, or to make a passage between England and North America or the West Indies.

With such assistance from Departments of the Government, and with the interest which the scheme has already excited among the great shipowning companies in whose hands so much of the ocean carrying trade is vested, there appear to be fair grounds for the hope that a sufficient supply of information will be forthcoming for every day of the whole period.

Sea Temperature Observations round the Coasts of the British Islands.—The results for the year ending June 30, 1881, of these observations, which, as stated in the last Report, have been carried on with the courteous assistance of H.R.H. the Admiral Superintendent of Naval Reserves, the Trinity House, and the Commissioners of Irish Lights, are being discussed, and it is proposed that the mean values for the three years during which the system has been maintained should appear in the forthcoming Meteorological Atlas of the British Isles. The number of stations is 48, of which 20 are lightships and 28 coastguard stations. A chart, showing their distribution round the coasts of Great Britain and Ireland was given in the Report for 1879–80. The Council hope, with the consent of the above-named authorities, to be able to continue this useful system of observations. Sea temperatures round the British Isles.

Supply and Stock of Instruments.—In Appendix IV. (p. 53) will be found a list of the meteorological instruments supplied by the Office to ships in the Royal Navy during the year, with a statement of the entire stock and distribution of instruments standing on the books, to the account of the Admiralty, on the 31st March 1882. Instruments belonging to the Office.

Appendix V. (p. 54) gives similar information with regard to the disposal of the other instruments belonging to the Office, which are mainly supplied to the mercantile marine.

PART II.

WEATHER TELEGRAPHY.

Reporting
stations.

Telegraphic Reporting Stations.—In the case of a few of the stations the telegraphic communication has again experienced some serious interruptions during the year. The four cables to the Shetlands, Hebrides, Scilly, and the Channel Islands all suffered damage to a greater or less extent; in the case of the first line the enforced cessation of communications lasted for the eight months ending with October 1881, while the cable to Stornoway was out of order continuously until the 24th May. As in former years these failures were productive of serious inconvenience not only to the British system of weather telegraphy, but also to that of all the countries of Northern Europe, which depend on reports from Sumburgh Head and Stornoway to show the earliest signs of Atlantic storms threatening the North Sea. The interruptions in the communication with the Channel Islands were of less importance.

A list of the telegraphic reporters will be found in Appendix VI. (p. 55). The only changes during the year have been the substitution of Mr. MacDonalld for Mr. Sutherland at Stornoway, and Mr. Mayes for Mr. M'Neil at Ardrossan, Mr. J. B. Smith for Mr. Sibert at Spurn Head, and Mr. Foster for Mr. Wooding at Hawes Junction.

Inspection
of the stations.

Inspection of the Reporting Stations.—The reporting stations have been inspected during the year, in England (including Jersey and the Isle of Man) mainly by the Rev. W. C. Ley, but in a few cases, by Mr. Scott and Mr. Gaster; in Scotland by Mr. Buchan; and in Ireland and Wales by Mr. Scott. The reports submitted by the Inspectors to the Council, which are printed in Appendix VII. (p. 56), show that the efficiency of the service has been fairly maintained.

Discussion of
the reports.

Discussion and Publication of the Information received.—A description of the practice of the Office in the collection, discussion, and dissemination of the meteorological information received by telegraph is given in Appendix VIII. (p. 70). A list of the institutions and persons who received the Daily Weather Charts free of cost in 1880 forms Appendix IX. (p. 77).

Forecasts.

Weather Forecasts.—There has been no material change in the system of preparation and issue of the forecasts during the year.

Forecasts for the ensuing 24 hours are issued twice a day, at 11 a.m. and at 8h. 30m. p.m. The Forecast prepared at 11 a.m. on the information derived from the 8 a.m. reports is posted up in several public places in London,* and supplied to the afternoon

* Viz., in the City, at the Mansion House, at Lloyd's Rooms, and at Messrs. R. & J. Beck's, Cornhill; in the West End, in the Libraries of the House of Lords and House of Commons, at Messrs. Elliott's, Strand, Messrs. Stanford's, Charing Cross, Messrs. Negretti & Zambra's, Regent Street, and Messrs. Pastorelli's, New Bond Street.

editions of the newspapers. The 8 p.m. Forecast is at present supplied to the public through the morning newspapers only, that is, when 12 out of the 24 hours for which it is made have already elapsed. Forecasts communicated gratis to newspapers.

Owing to the additional information afforded to the public by the appearance of these Forecasts in so many of the daily papers the number of special inquiries has been small. The inquiries received through the Post Office during the year amounted to 128, and the personal applications 46, being rather less than in the previous year. The rules of the Office relating to such inquiries continue the same as in previous years.

The results of a comparison of the Forecasts issued at 8 p.m. during the year with the weather actually experienced is given in Appendix XII., p. 90, and the following summary of successes and failures, estimated in the manner explained in that Appendix, shows that the average of success over the whole United Kingdom has been 78 per cent. :— Testing of the forecasts.

SUMMARY OF RESULTS.

Districts.	Percentages.				Total percentage of Success.
	Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N. - -	39	42	14	5	81
" E. - -	35	43	15	7	78
ENGLAND, N.E. - -	32	46	17	5	78
" E. - -	33	44	17	6	77
MIDLAND COUNTIES -	31	46	18	5	77
ENGLAND, S. - -	35	46	14	5	81
SCOTLAND, W. - -	30	44	19	7	74
ENGLAND, N.W. - -	32	44	17	7	76
" S.W. - -	34	42	18	6	76
IRELAND, N. - -	36	44	14	6	80
" S. - -	35	41	16	8	76
Summary - -	34	44	16	6	78

Hay Harvest Forecasts.—The Council renewed in 1881 the offer made in 1879 and 1880 to the Royal Agricultural Society, the Royal Dublin Society, and the Highland Society to send daily Forecasts gratis during the hay season to a number of observers selected by the Councils of those Societies, on the two conditions, that the information should be made as widely known as possible, and that a record should be kept of the value of each Hay harvest forecasts.

Hay harvest forecasts.

prediction and sent in weekly to the Office. The Societies again cordially accepted the proposal, and the following list of recipients was prepared:—

LIST of those who received HAY HARVEST FORECASTS in 1881.

Districts	To whom sent.	Address.
0. SCOTLAND, N.	- { Rev. Dr. Joass - J. R. Mitchell -	Golspie. Drynie, Inverness.
1. SCOTLAND, E.	- { G. Johnstone - W. S. Macdonald -	Glamis, by Forfar. Craigielaw, Longniddry.
2. ENGLAND, N.E.	- { J. Wilson - J. Turner -	Woodhorn Manor, Morpeth. The Grange, Ulceby.
3. ENGLAND, E.	- { W. Birkbeck - Sir J. B. Lawes, Bt., and J. H. Gilbert.	Thorpe, Norwich. Rothamsted, Harpenden.
4. MIDLAND COUNTIES	- { Royal Agricultural College. The Duke of Somerset	Cirencester. Gerrard's Cross, Bucks.
5. ENGLAND, S.	- { C. Whitehead - E. P. Squarey -	Barming House, Maidstone. The Moot, Downton, Wilts.
6. SCOTLAND, W.	- { C. H. H. Wilson, of Dalnair. J. S. R. Ballingal - J. Chisholm -	Endrick Bank, Drymen. Eallabus House, Islay. Chapel Rossan, Stranraer.
7. ENGLAND, N.W.	- { G. W. Wray - The Earl of Derby	Leyburn, Yorkshire. Knowsley Hall, Prescott.
8. ENGLAND, S.W.	- { Colonel J. B. Turbervill The Earl of Ducie - T. Dyke - R. Neville -	Ewenny Priory, Bridgend, Glamorgan. Whitfield, Falfield, R.S.O. Long Ashton, Clifton, Bristol. Butleigh Court, Glastonbury.
9. IRELAND, N.	- { W. M. Kirk - J. Simson - C. C. Hamilton	The Bush, Antrim. Kilrush, Hollymount, Co. Mayo. Cherrymount, Moynalty, Co. Meath.
10. IRELAND, S.	- { D. A. M'Cready - D. A. Milward - W. Talbot Crosbie	Loughton, Moneygall, King's Co. New Ross, Co. Wexford. Ardfert Abbey, Tralee, Co. Kerry.

The general result of this repetition of the experiment of 1879 is shown by the subjoined table, which has been compiled solely from the reports of the above-mentioned gentlemen, and is entirely independent of any estimate formed within the Office itself:—

SUMMARY of RESULTS.

Hay harvest forecasts.

Districts.	Names of Stations.	Percentages.				Total percentage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N.	Golspie and Drynie	32	40	26	2	72
„ E.	Glamis and Longniddry	21	62	13	4	83
ENGLAND, N.E.	Morpeth and Ulceby	22	42	31	5	64
„ E.	Thorpe and Rothamsted	35	49	12	4	84
MIDLAND COUNTIES	Cirencester and Gerrard's Cross	34	50	16	—	84
ENGLAND, S.	Maidstone and Downton	33	50	14	3	83
SCOTLAND, W.	Drymen, Islay, and Stranraer	28	48	20	4	76
ENGLAND, N.W.	Leyburn and Prescot	28	46	22	4	74
„ S.W.	Bridgend (Glamorgan), Falfield, Clifton, and Glastonbury.	29	43	24	4	72
IRELAND, N.	Antrim, Hollymount, and Moyalty	23	46	26	5	69
„ S.	Moneygall, New Ross, and Ardfer Abbey	30	44	23	3	74
	Mean for all districts	29	47	21	3	76

The final result of the checking shows that the general percentage of success for the past year (76) is precisely the same as in 1880, but that the proportion of *completely* successful forecasts, as distinguished from those which are only partially successful, is decidedly smaller than it was in 1880. This is especially the case in "Scotland, E." and "England, N.E." The percentage of success in "Ireland, N." has been materially reduced by the very low values attained at Hollymount, Co. Mayo, and as the reports of the weather received from that locality are confirmed by our own working charts, it appears that for the western part of the district the Forecasts were by no means successful.

The largest percentage of complete success has been reached in "England E.," the Midland Counties, and "England S."

In a communication to the Office, Mr. J. R. Mitchell, of Drynie, Inverness, has stated that the Forecasts this year were remarkably correct; and, similarly, Colonel Turbervill, of Bridgend, Glamorganshire, has reported that they were so fully appreciated by the farmers in that neighbourhood, that he determined to continue the telegrams at his own expense at the time of wheat harvest.

Storm Warnings for the Coasts of the United Kingdom.—In Appendix XI. (p. 82) will be found the names of the stations which are furnished with signals for Storm Warnings, in accordance with Circular 717 of the Board of Trade issued in February 1874. Storm warn-ings.

These stations were, at the end of March 1881, 138 in number, situated:—

68 in England, 13 in Wales, 37 in Scotland, 14 in Ireland, 3 in the Isle of Man, and 3 in the Channel Islands.

Result of storm warnings in 1881.

The usual comparison has been instituted in the Office between the warnings issued in 1881 and the weather experienced on our coasts, the warnings being tested by the method explained in Appendix VIII. The results of the comparison are shown in the following tables:—

RETURN of the Result of the Comparison between the Warnings issued and the Weather experienced in 1881.

Coasts.	Total No. of Orders to hoist and repetitions.	Warnings justified by subsequent Gales. Force 8 and upwards.	Warnings justified by subsequent strong Winds. Forces 6 and 7.	Warnings not justified by subsequent Weather.	Warnings late. Force 9 reached at two Stations before issue.	Warnings partly late. Force 9 reached at one Station before issue.	Warnings in Error owing to Telegraphic mistakes.	Storms for which no Warning was issued.
Ireland, South	63	39	15	7	—	3	—	Feb. 7.
„ East	55	30	14	10	—	1	—	Feb. 7, April 3.
Scotland, East	51	37	6	6	1	1	—	May 15, July 7, Dec. 18, Dec. 26.
„ West	44	27	9	6	—	3	—	May 15.
England, North-west	50	31	9	7	—	3	—	Feb. 7, April 3.
„ West	50	21	17	12	—	—	—	Feb. 7, April 3.
„ South	63	33	19	7	3	1	—	Feb. 7, April 3, April 7, Nov. 21,* Nov. 24.*
„ South-east	31	20	4	7	—	—	—	Feb. 7, April 3, April 7, Nov. 21.
„ East	47	28	13	5	—	1	—	Feb. 7, Dec. 18.
Totals -	454	266	106	67	4	11	—	
Per-centages -	—	58·6	23·3	14·8	0·9	2·4	—	

* Storms on the South Coast marked thus were only felt in the Eastern part of the Channel.

Comparison of results for 1881 with previous years.

The following table contains a comparative statement of the storm warnings and their results in 1881 and in the ten preceding years. It will be seen that the percentage of warnings justified is about the same as in the previous year:—

Years.	Total No. of Warnings issued.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not justified by subsequent Weather.
1871	299	46	17·7	63·7	22·0
1872	379	61	19·5	80·5	11·9
1873	250	45·2	34·0	79·2	16·8
1874	317	45·4	32·8	78·2	16·4
1875	248	41·1	35·1	76·2	21·0
1876	265	61·1	21·5	82·6	11·7
1877	475	53·3	25·9	79·2	16·4
1878	485	56·7	20·8	77·5	17·9
1879	509	50·5	25·1	75·6	20·6
1880	390	58·2	24·6	82·8	13·3
1881	454	58·6	23·3	81·9	14·8

As it seemed advisable to obtain from the local authorities at the coast stations an expression of opinion as to the general utility of the warnings, a circular was issued at the end of the year 1881 containing a series of questions bearing on the subject. The replies were, with very few exceptions, highly favourable. The circular with abstracts of the replies, 135 in number, will be found in Appendix XIa., p. 85.

Opinions of the value of storm warnings.

Arrangements for Warning the Coasts of France.—In previous Reports of the Office it has been stated that the issue of warnings to the French Coasts was included among the regular duties of the staff. This arrangement has existed for more than 20 years, having been originated at the first institution of British storm warnings in 1861 by Admiral FitzRoy. Of late years the system has from time to time undergone slight modifications, and since 1873 the agreement in force has been that the London Office should issue, whenever necessary, to the Ministère de la Marine, in Paris, warnings for the entire French seaboard from Dunkerque to Nantes, expressed in the same terms as those to our own coasts.

Storm warnings to French coasts.

The recently effected complete organization of the French system by the Bureau Central Météorologique has, as a natural result, led to the adoption in France of an uniform system of storm warnings extending to the Mediterranean coasts, as well as to those of the Atlantic and Channel.

In contemplation of the introduction of this system the Ministre de la Marine, in August 1881, addressed the following letter to the Meteorological Council, and the issue of special warnings to France accordingly ceased on September 1st. The two Offices, however, interchange notices regularly whenever storms appear to threaten the adjacent shores of either country:—

MONSIEUR,

Paris, le 9 Août 1881.

DEPUIS plusieurs années, le service d'avis de tempêtes organisé d'après vos indications, fonctionne, à la grande satisfaction de nos marins, sur les côtes de France, de Dunkerque à Rochefort; et les signaux sont, comme vous le savez, arborés en exécution des avertissements donnés par le Meteorological Office de Londres.

M. le Directeur du Bureau Central météorologique de France vient de me faire connaître qu'à la suite de l'expérience acquise maintenant, et grâce aux relations télégraphiques régulières qu'il entretient avec l'office Britannique, il pense être en mesure de fournir directement les prévisions en question à nos ports.

En conséquence, et conformément à la demande de M. Mascart, j'ai l'honneur de vous informer que le Bureau Central météorologique de France se chargera désormais de la transmission à nos ports des *Avis de mauvais temps*; et que, d'après l'accord établi avec M. le Ministre des Postes et des Télégraphes, ce nouveau service fonctionnera à dater du 1er Septembre prochain.

Storm warn-
ings to French
coasts.

En vous donnant avis de ces dispositions, et au moment où le Meteorological Office de Londres va cesser l'envoi de ses avis de coups de vent, je tiens, Monsieur, à exprimer la vive gratitude du Département pour les services importants que cet Office nous a rendus, pendant de longues années, en adressant ses avertissements, si hautement appréciés par la Marine Française et par nos populations du littoral.

Je m'empresse, d'ailleurs, d'ajouter que la nouvelle disposition énoncée dans la présente dépêche concerne seulement les avis de tempêtes; et que l'Office de Londres continuera d'envoyer, dans les mêmes conditions que par le passé, la dépêche météorologique quotidienne donnant les pressions barométriques, la direction et la force du vent, l'état du ciel et celui de la mer.

Recevez, Monsieur, les assurances de ma considération la plus distinguée.

LE MINISTRE DE LA MARINE ET DES COLONIES.

Monsieur Robert Scott,

Secrétaire du Meteorological Office de Londres.

Storm of
Oct. 14, 1881.

The Storm of October 14th, 1881.—The unusual violence and destructiveness of the storm with which the United Kingdom was visited on the 14th of October has induced the Council to have a special report prepared on the history of that disturbance, so far as it is exhibited by the telegraphic and other reports reaching the Office in the ordinary course of its business, and especially by the automatic records from the observatories. The Report is intended not only to give an account of the phenomena of the gale, but also to furnish materials for estimating the degree of minuteness with which the organization of the observational system enables the Office to trace the history of such a disturbance, and also to furnish an example of the degree of completeness of the warnings which it is able to issue. The Report, which has been prepared by the Secretary, Mr. R. H. Scott, is illustrated by eight maps, showing the weather conditions of these islands at as many different periods between the 13th and 14th of October, and indicating the warnings issued or already in force at the date of each map. No attempt has been made to estimate the extent of damage done by the storm on land or at sea, that subject having been fully discussed in papers by Mr. G. J. Symons, F.R.S., Mr. C. Harding, and Mr. J. W. Peggs, printed by the Meteorological Society in its Quarterly Journal.

Observations
on Ben Nevis.

Observations on Ben Nevis.—In the early part of the year 1878 the Council received an intimation that the Scottish Meteorological Society had in contemplation the establishment of an observatory on Ben Nevis, and in the course of that year they informed the Society that they would contribute 100*l.* a year towards the annual expense of the station, provided that the observatory were built and a sufficient staff of observers were maintained.

In June 1881 the Society found itself in a position to have observations taken once a day on the mountain. For this they

were indebted to the zeal and physical endurance of a private gentleman, Mr. Clement L. Wragge, F.M.S., who ascended the mountain daily from Fort William during the whole period, from June 1 until October 14, on which day he was stopped by the gale already mentioned. Observations on Ben Nevis

On his return from his daily excursion Mr. Wragge despatched a telegram to the Office in London, which however rarely arrived before 6 p.m., so that it could not be used except in the preparation of the 8 p.m. forecasts.

The sum of 100*l.* was contributed by the Council towards the expenses of this experiment. The results of the observations are being discussed by Mr. Buchan for the Scottish Meteorological Society, and such observations (if they should be renewed) will be carefully considered in the preparation of forecasts in the Office.

Fishery Barometers.—The Office still continues to issue barometers on loan for public exhibition at the smaller ports and fishing stations. The whole number of stations on our coasts supplied with these instruments by the Office is at present 158, being three in excess of the previous year. Of these stations, 57 are in England, 5 in Wales, 42 in Ireland, 50 in Scotland, 3 in the Isle of Man, and 1 in Jersey. The list is given in Appendix X., p. 81. Fishery barometers.

Simultaneous Observations.—The Office has continued its co-operation with the system of simultaneous observations, taken once in every 24 hours, which was organized nine years ago at the request of the Chief Signal Office of the United States. Simultaneous observations.

The list of observers at land stations for 1881 is given in Appendix XIV., p. 96.

A form for the entry of the simultaneous observations is bound up with every ship's log issued by the Office, and whenever a captain has filled up this form, a copy of his entries is supplied to the Chief Signal Office.

In the last Report it was stated that the Lords Commissioners of the Admiralty had kindly consented, at the request of the Council, to issue instructions for these observations, to be taken (in addition to those made by the Service Regulations) on board each detached ship-of-war on foreign service; or, in the case of a squadron acting together, on board the ship of the senior officer. The number of these returns which have been received during the year from the Royal Navy has been 14,986, and from the Mercantile Marine, 4,511. Copies of them have been forwarded to Washington.

Sunshine Records.—The registration of sunshine at 28 stations has been regularly maintained throughout the past year. Sunshine records.

The Council have arranged to publish the returns for the year in the form of which a specimen was given in the last Report.

Cirrus Observations.—This system has not yet got beyond the tentative stage, but the Council have it in contemplation to modify their existing arrangements in accordance with the experience already gained. The observers during the year have been Mr. Cullum at Valencia, Mr. Gaster in London, Mr. Glyde Cirrus observations.

at Torquay, Mr. Kerr at Mullaghmore, and Mr. Ley at Lutterworth, and to these there have recently been added Dr. Probert at St. David's, and Mr. Dowson at Beccles.

Weekly
Weather
Report.

Weekly Weather Report.—The publication of the Weekly Weather Report, of which, with the Quarterly Summary, specimens in their present form will be found in Appendix XV., p. 97, has been continued, and the Council have again to express their thanks to the Meteorological Society (of London) for supplying to this publication returns from several of its stations at a cost little above that of copying.

At the close of the year 1881, after four years' experience of the Report in its present form, the Council resolved to take the opinion of scientific agriculturists as well as of meteorologists as to the advisability of modifying of the contents of the publication so as to render the information conveyed more immediately useful to the farmer than it is at present. The general tenour of the replies received has induced the Council to arrange for the publication from time to time with the weekly reports of a statement of the total cumulative amount of sunshine, rainfall, and temperature from a given assumed date, so as to admit of an estimate being made of the operation of these climatic factors on the growth of plants. The principle upon which this is proposed to be done will be explained in the next Report.

PART III.

LAND METEOROLOGY OF THE BRITISH ISLES.

Observatories and Stations.—Records of the climate of the British Isles are received by the Office from Stations of different degrees of fulness of organisation, which may be arranged in five classes.

Observatories.

1. The Observatories furnished with self-registering instruments by which all the principal meteorological phenomena are recorded continuously, and which thus afford materials for the study of the periodic variations of the meteorological elements.

Anemographic stations.

2. Anemographic stations furnished with instruments registering the wind only. The records from these stations relate to weather as distinguished from climate, and are especially useful in connexion with the passage of storms, and as affording evidence available in the courts of law with respect to collisions at sea, and damage done by wind.

Stations of second order.

3. Stations of the Second Order furnishing climatological information from eye observations taken twice a day. The observers at these stations are all volunteers.

Telegraphic reporting stations.

4. The Telegraphic Reporting Stations at which eye observations are taken, forming the material upon which the daily weather reports and forecasts are based. The hours of observation at these stations are limited by the requirements of the telegraphic system, as explained in Part II., but the data which they furnish are occasionally utilized to afford climatological information for parts of the country where Stations of the Second Order do not exist.

5. Extra stations furnishing returns with less completeness, and with less detail than those of class 3. Extra stations.

A detailed account of these several stations and of the methods employed by the Office in dealing with the records they respectively furnish will be found in Appendix XVI., p. 103.

Appendix XVII., p. 108, contains a list of all documents relating to the land meteorology of the British Isles received at the Office during the year. Documents received.

Inspection of the Stations.—The self-recording observatories and the anemographic stations (Classes 1 and 2), as well as the Telegraphic Reporting Stations (Class 4), are regularly visited each year by the inspectors of the Office. The extra stations (Class 5) are inspected as opportunity offers. Of the Stations of the Second Order (Class 3), some belong to the Meteorological Society (of London); these are visited by an inspector appointed by the Society, an allowance being made by the Office toward the cost of the inspection, in accordance with the recommendation of the Treasury Committee (1877). The remaining Stations of the Second Order, which are in immediate connexion with the Meteorological Office, are visited at least once in every two years by the inspectors of the Office. The Superintendent of the Kew Observatory, Mr. G. M. Whipple, is especially employed to inspect and report on the self-registering apparatus, and on the photographic processes at the observatories. Extracts from the Reports of the inspectors of the Office and of Mr. Whipple will be found in Appendix VII., p. 56. Inspection of the stations.

Information supplied to the General Register Office, Ireland.—Reports from the Irish stations of the Office have been regularly supplied to the Registrar General for Ireland, for use in his Weekly and Quarterly Returns. Reports supplied to Registrar General for Ireland.

Quarterly Weather Report.—The engraving of the plates for the Quarterly Weather Report has been continued; the plates for 1876, 1879, and 1880 are finished, those for 1877 are more than half completed, and as the year 1878 is the only one untouched, it may be hoped that all the arrears will be caught up by the summer of 1883. The Council have determined to discontinue the issue of the detailed copperplate reproduction of the observatory records with 1880, at which time twelve complete years will have been published. They have also resolved to issue without delay the plates for the years 1879 and 1880 which have been engraved, and to allow the accompanying letterpress to follow at a later date. Quarterly Weather Report.

The Harmonic Analyser.—This instrument is at present in use. The work hitherto completed with it has been the reduction of the records of air temperature, “the dry-bulb thermograms” for all the observatories for the years 1871–72. Harmonic Analyser.

Inquiry into the Causes and Prevalence of London Fog.—In the last Report it was mentioned that a committee, consisting of Dr. Abel, Professor Frankland, and Dr. W. J. Russell, had been appointed to undertake an investigation into the chemical and physical properties of London fog, and in the preliminary account London fog.

London fog.

of their proceedings which appeared in that Report it was stated that it had been ascertained that the experiments must be conducted on a much larger scale than was at first contemplated. Note A, p. 25, contains an account of the arrangements which the committee have made to facilitate their dealing with sufficient quantities of air to enable them to obtain satisfactory results as to the particular agencies to which the characteristic effects of London fogs are due.

Hygrometry and Evaporation.

Experiments on Hygrometry and Evaporation.—The experiments undertaken on behalf of the Council by Mr. W. N. Shaw as to the comparison of different hygrometers have been continued during the past year, and a report by him in continuation of that given in the last Report of the Council will be found at Note B, p. 25.

Atmospheric electricity.

Atmospheric Electricity.—A grant has been made by the Council to Mr. Whipple, Superintendent of Kew Observatory, for the tabulation and reduction, on a plan proposed by him, of the electrograms taken at Kew Observatory. Mr. Whipple has discussed the electrograms from the year 1880 and has submitted, with the consent of the Council, a paper on the results to the British Association at their last meeting at York. A report by Mr. Whipple on the method he has adopted will be found at Note C, p. 29.

Rainfall of the United Kingdom.

Rainfall of the United Kingdom.—The return for 366 stations at which the daily records are complete for the fifteen years, 1866 to 1880 inclusive, have been received from Mr. G. J. Symons, F.R.S. The monthly means, with the averages for each five-year period separately, and for the entire fifteen-year period have now been printed, and the graphical representation of the results in maps will be at once taken in hand with the view of the speedy publication of the work, which will embody the chief results of the system of rainfall observations begun many years ago by Mr. Symons, and maintained by his energy and perseverance.

The Council venture to believe that, both as to accuracy and as to the geographical distribution of the stations, the tables leave little to be desired. They form a more complete record of rainfall for the whole area of the British Isles than exists in any other country.

Meteorological atlas of the British Isles.

Meteorological Atlas of the British Isles.—The preparation of these maps has, as explained in the last Report, been entrusted to Mr. W. Marriott, the Assistant Secretary of the Meteorological Society. An account of the stations from whence the data used in the calculations has been obtained will be found in Note D, p. 32. It will be noticed that in certain districts, notably in the north and west of Ireland information is only available for a portion of the 20-years period. For these districts, therefore, it has been found necessary to take such returns as are now available for shorter intervals, and by interpolation to deduce approximate means comparable with those for stations where the observations are more continuous.

With these maps of barometrical pressure and air temperature will be combined those for the sea temperature round our coasts for the three years, July 1879 to June 1882, of which mention has already been made in this Report.

Thermometer Screen Experiments.—During the last two years a series of comparative experiments have been conducted at Kew on Stevenson's and Professor Wild's thermometer screens. The observations have now been discontinued, and the results are being discussed by Mr. Whipple. Thermometer screens comparison

Balloon Experiments.—It was stated in the Report for 1879–80 that the Council were endeavouring to organise a series of balloon ascents with the view of obtaining more systematic information than exists at present as to the vertical distribution of meteorological phenomena. In the course of last winter Captain James Templer was employed, under the instructions of the Council, in making occasional ascents in the balloon "Saladin," lent by the War Office for the purpose. On two occasions he was assisted by clerks from the Meteorological Office, who volunteered to accompany him. But the experiments were brought to an untimely close by a fatal accident on the 10th December 1881. On that day Captain Templer ascended from Bath, accompanied by Mr. Walter Powell, M.P., (himself an experienced aeronaut), and by Mr. Agg-Gardner. The balloon went southwards, and on its touching the ground, near Bridport, Captain Templer and Mr. Gardner were thrown out. Mr. Powell remained in the balloon, which drifted out to sea, and, although a search was immediately commenced and continued for a long period, nothing has since been heard of it or its occupant. The only relic found has been a broken thermometer frame which was washed ashore on Portland Bill, 10 days after the accident, December 20, 1881. Balloon experiments.

Mr. Powell joined in the expedition solely from his great interest in ballooning; and the Council have to express their deep regret that a life so valuable should have been lost in the course of an ascent undertaken on their behalf. This regret is increased by the circumstance that Mr. Powell had most generously placed his services as an observer at their disposal in the balloon ascents which he proposed to undertake on his own account. Special reports on the circumstances attending the accident, which were submitted to the Council by Captain Templer, at their request, are printed in Appendix XVIII., p. 111.

Motion of the Upper Air Currents.—A new method has been proposed by Mr. Galton for ascertaining the direction and rate of the wind at considerable altitudes, by watching the drift of a smoke cloud produced by firing a shell upwards over the sea, or wherever there would be no danger from the falling fragments. Upper air currents.

At the request of the Council Captain A. Noble, F.R.S., very kindly undertook to make experiments at EISWICK. He mounted a light field-piece carrying 6-lb. shells in such a way that it could be fired with safety at an elevation of 75°, and he employed a time fuse of the greatest length that could be fitted to shells of

the ordinary construction. The duration of the flight of the shell before the explosion proved in each case to be a trifle under 14 seconds, the angle above the horizon at which it took place was 62° , and its sound reached the ear in a trifle less than 10 seconds. This showed that the vertical height of the smoke cloud was nearly 9,500 feet. The shell had, however, in no case reached its maximum height before it burst. The smoke cloud was clearly visible under a blue sky and remained so for a considerable time. Further experiments are in progress.

LIBRARY.

The library contains standard works on Meteorology and the allied sciences. It consists at present of about 7,000 volumes and pamphlets, exclusive of charts and MS. records of observations. The books and other documents are accessible to scientific men.

Appendix XIX., p. 117, contains a list of the accessions to the library during the year. A few volumes have been purchased.

In conformity with a practice now generally recommended by authorities on bibliography, all books and pamphlets received during the year have been catalogued upon cards, besides being entered in the existing reference catalogues.

EXPENDITURE.

Appendix XX., p. 142, shows the receipts and payments during the year ending 31st March 1882. The amount voted by Parliament was 15,000*l.* as in the previous year.

The following abstract of expenditure shows the amount properly chargeable to the year in question, and its distribution under the various heads, together with the increase or decrease in 1881-82, as compared with the previous year:—

NET EXPENDITURE.	1880-81.	1881-82.	Increase.	Decrease.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Payment of Council -	1,000 0 0	1,000 0 0	—	—
Secretary -	800 0 0	800 0 0	—	—
Office salaries -	711 7 5	705 10 11	—	5 16 6
Rent, fuel, and lighting -	666 4 7	654 18 2	—	11 6 5
Alterations to premises, attendance, and contingencies -	462 8 11	532 1 2	69 12 3	—
Expenses incidental to International Meteorological Congress -	33 10 9	—	—	33 10 9
Special Researches -	735 10 5	1,099 3 10	363 13 5	—
Land Meteorology -	3,766 10 8	4,027 19 11	261 9 3	—
Weather Information -	3,314 6 5	3,846 6 5	532 0 0	—
Inspections -	520 10 6	523 19 11	3 9 5	—
Ocean Meteorology -	2,108 14 5	2,156 19 4	48 4 11	—
Total -	£ 14,119 4 1	15,346 19 8	1,278 9 3	50 13 8

(Signed) HENRY J. S. SMITH,
Chairman of the Council.

NOTE A.

Chemical Laboratory,
St. Bartholomew's Hospital, E.C.,

GENTLEMEN,

April 24, 1882.

ACCORDING to your instructions received in December, we at once considered how the experimental investigation of the chemical nature of fog could best be carried out on a large scale. Our first intention was to use a fan driven by a small gas engine for passing the air through the filtering and absorbing apparatus, but on further consideration this plan was abandoned, and we have had a large, double-acting air-pump constructed, capable of drawing nearly 1,000 cubic feet of air per hour. The planning and construction of this pump, although we did all we could to expedite matters, occupied considerable time, and the season for fogs was over before we received it. The necessary preliminary experiments with this instrument for ascertaining how the impurities can best be extracted from the very considerable volume of air which it is desirable to operate upon will occupy some time, and further the determination of the amount of the several impurities in the air in its normal condition, to serve as a basis of comparison, with what we may find to be present during the occurrence of fogs, will also require experiments extending over a considerable length of time. I have carried on for some months past, and consequently during several of the late fogs, determinations of the amount of carbonic acid present in the air in the City, and have obtained very important results, showing the great increase of the amount of this gas during fog. In some cases the increase amounted to upwards of two and a half times the quantity ordinarily present. The result is important, not only as demonstrating the presence of abnormal amounts of this gas during fogs, but also as indicating by its accumulation the probability that the proportion of other atmospheric impurities may be increased to a like extent.

We shall hope to have our methods of investigation well tested, and the necessary constants determined by next autumn; so that if during the ensuing winter there should be any dense fogs we may hope to obtain interesting data relating to their chemical composition.

I have, &c.

(Signed) W. J. RUSSELL.

To the Meteorological Council.

NOTE B.

PRELIMINARY REPORT ON HYGROMETRY.

Since May last my attention has been devoted principally to Schwackhöfer's instrument and wet and dry bulb thermometers.

1. *Schwackhöfer's Instrument.*—As mentioned in my last report, this instrument was, so far as its construction was con-

cerned, very nearly completed. After the apparatus was put together, I proceeded to calibrate the tube by which the diminution in volume of the air contained in the burette, due to the absorption of its aqueous vapour, is measured. Upon this depends, of course, the accuracy of the observations. It proved a much more difficult and tedious operation than I had anticipated, but I ultimately succeeded in calibrating so as to ensure an accuracy of reading within 1 p.c. by inserting a very fine glass nozzle into the bottom of the tube and drawing up mercury by an air pump, and then allowing air to enter in small quantities at a time so as to calibrate for every inch. The quantity of mercury which ran out was determined by weighing and the length of tube it had occupied observed by placing a millimetre scale alongside of it, and reading off the difference of height by a telescope. The difference in volume of equal lengths of the tube deduced from these observations fully justified the precautions taken for its accurate determination.

When the calibration was completed the mercury cistern was filled up to the level of the bottom of the plunger in its highest position. It then turned out that the plunger when depressed as far as possible did not drive sufficient mercury into the burette to completely replace the air in it, and on investigation it appeared, moreover, that the burette contained more air than could be held in the absorption vessel. These defects can only be remedied by replacing the burette by a smaller one. I decided to postpone this undertaking until after September, by which time I hoped to have consulted the manufacturer of the instrument (M. E. Schneider) upon the subject in Vienna. I have since done so, but I have not at present been able to see my way to the reconstruction of the instrument.

2. *Psychrometric Observations.*—In order to compare the influence of various conditions upon the reading of the wet bulb thermometer, I have disposed ten thermometers A, B, C, D, E, F, G, H, K, L, upon a wooden screen which forms a door to an open brick fireplace, in the chimney of which a gas-jet burns. Behind the bulb of each thermometer is a circular hole which can be closed at any time by a metal plate. An extra hole has been made at which a small Casella wind gauge can be placed to determine roughly the velocity of the current of air passing over the bulbs.

Of the thermometers, K, L are dry bulbs and the rest wet. Each of the wet bulbs is covered with fine Indian muslin which has been boiled in a dilute solution of caustic potash, and well washed and boiled in distilled water. The thermometers A, B, C, D are supplied with moisture by connecting their bulbs with beakers of distilled water by fine cotton wicks treated in the same way as the muslin. From the bottoms of E, F, and G the muslin dips into the turned-up ends of tubes connected with Marriotte's bottles, so arranged as to keep the water just at the level of the mouths of the tubes into which the muslins dip, without overflowing. The bulb of the thermometer H was moistened by

wetting the muslin with a brush, but that method proved unsatisfactory and the thermometer was generally not read.

The thermometers were selected so as to give the greatest available range in the size of the bulb. The approximate length of each bulb is given in Table I. below. The relative variation in diameter of the bulbs is quite as great as in the length, so that, for instance, the bulb of A has about one hundred times the capacity of that of C.

In order to compare the readings of the different thermometers a table of corrections was formed for each. All except A and D had been compared at Kew, and it was therefore only necessary to determine their freezing points. The range of A* was only from 10° to 15°, and it had therefore to be compared with one of the others between those temperatures, but it showed no observable error. The thermometer D was compared with two Kew-corrected ones for every five degrees between zero and 30° C.

The freezing points of each thermometer was determined by immersing it in finely-pounded ice well washed and rinsed with water. The results of the observation appear in the subjoined Table:—

Thermometer.	Maker.	Value of Smallest Graduation.	Freezing Point.	Length of Bulb.	
WET BULBS.					
Moistened by wicks	A	Cetti -	0·02 C.	?	Ins. 2·7
	B	Casella -	0·2 F.	32·2	0·7
	C	Geissler -	0·1 C.	0·0	0·4
	D	Cetti -	0·2 C.	0·4	1·3
Moistened by Marriotte's bottles	E	Geissler -	0·1 C.	0·32	1·5
	F	Geissler -	0·1 C.	0·15	0·5
	G	Negretti -	0·5 F.	32·3	0·9
Moistened by brush	H	Geissler -	0·2 C.	0·4	0·6
DRY BULBS.					
K	-	Casella -	0·2 F.	32·2	0·7
L	-	Negretti -	0·5 F.	32·5	0·9

The readings of the thermometers were taken by means of a telescope placed at a distance of 6 feet from the screen on which they were mounted, after it had been ascertained by observation that the parallax error was insensible at that distance. In order to avoid introducing any error in consequence of a change of the state of the atmosphere during the course of observation, the thermometers were read in the order A to L, and then back again in the reverse order. If a difference of more than one-fifth of a degree occurred between the readings of the same thermometer the set of observations was rejected, and in case the error lay within that limit, the mean of the two readings was taken as the true one. This was then corrected for the error of reading of the

* A could be replaced, when necessary, by another similar thermometer with a range from 15° to 20°.

thermometer, and the result expressed finally for each thermometer in the centigrade scale.

In order to obtain a check upon the mean reading of all the thermometers, the dew point was observed (sometimes by Bogen's, sometimes by Alluard's instrument) before and after each set of observations, and the mean of the two taken.

The following Table (II.) shows a complete set of results obtained in this manner on one occasion :—

II.

Thermometers.	Gas not alight.	Gas very low.	Gas half full.	Gas full on.	Gas full.	Gas very low.
	Holes behind Thermometers marked S—Shut; O—Open. Wind Gauge irregular.	Wind Gauge, 50 feet per min.	Wind Gauge, 65 feet per min.	Wind Gauge, 90 feet per min.	Holes all open.	Holes all shut.
A - -	No obsn.	O 14·845	O 14·78	O 14·74	14·803	15·31
B - -	S 13·7	O 14·5	O 14·45	O 14·4	14·41	15·25
C - -	S 13·8	O 14·85	O 14·8	O 14·76	14·85	15·19
D - -	O 13·05	S 15·0	S 15·05	S 15·0	14·7	15·05
E - -	O 13·34	S 14·9	S 14·9	S 14·75	14·6	14·95
F - -	O 13·35	S 15·25	S 15·35	S 15·1	14·7	15·4
G - -	S 13·61	O 14·6	O 14·7	O 14·5	14·6	15·05
H - -	O 13·25	Not observed.				
K - -	O 16·85	O 17·8	O 17·8	O 17·8	17·8	17·9
L - -	S 16·95	S 17·9	S 17·9	S 17·9	17·9	18·0
Dew point -	9·1	11·6	11·6	11·55	11·6	11·6

Humidity (not calculated)—

Humidity	By Jelinek's tables	{ Open	69·	69·	68·	
		{ Shut	72·5	72·	71·5	
	By Glaisher's tables	{ Open	70·	70·	69·	
		{ Shut	72·	73·	71·	
	From the dew point -		-	67·	68·6	68·2

The table gives one instance of many sets of observations taken in August last, which exhibited very slight variations in consequence of the relatively small variation of the humidity of the air of the room during that month. I hope to discuss the results more fully when I have obtained a more extended group. The thermometers are now being observed daily. It may, however, be as well to notice that the size of the bulb appears to have no influence upon the indication of the instrument, nor do the different methods of moistening employed show any difference of result. In those cases in which some of the holes are open and some shut, the open holes give always the lower indications, the mean values for the thermometers with holes shut in the second,

third, and fourth groups of observations, being 15·05, 15·1, and 14·95 respectively, and for the open holes 14·7, 14·7, and 14·6, showing differences of ·35, ·4, and ·35, corresponding to indications of the wind-gauge of 50, 65, and 90 feet per minute.

The thermometer B when the hole behind it was open always showed a lower temperature than the rest. This is probably due to the fact that its bulb was nearer to the hole than that of any of the others. In order to determine how far the temperature of a wet bulb can be further lowered by air passing by it, when all the holes were open, I directed alternately upon E and F the current of air from a foot-bellows, which when directed upon the wind-gauge gave the indication 220 feet per minute.

The results were:—

E. Blown	-	14·65		F. Blown	-	14·45
F. Not blown		14·8		E. Not blown		14·8
		Difference	-			Difference
		·15				·35

I have not yet examined the cause of this difference.

I have also designed an aspiration apparatus by which to use the chemical method for comparison of the indications of the wet bulbs. It is now nearly completed.

W. N. SHAW.

Emmanuel College, November 10, 1881.

NOTE C.

REPORT on the RESULTS of a TENTATIVE REDUCTION of a YEAR'S ELECTROGRAMS at the KEW OBSERVATORY.

Although the Thomson electrograph has been in daily action at the Kew Observatory almost continuously since March 10th, 1874, no increase has been hitherto made by its means to our knowledge of the laws governing the changes of atmospheric electricity. This has been principally owing to the great difficulty which appeared to exist in deriving information from the curves, since, by reason of the rapid and almost constant fluctuations which they exhibit, tabulation with any degree of accuracy would seem to be almost an impossibility.

Whilst the method of utilising curves by tabulating was under consideration, we have been enabled, by the kindness of Mr. De La Rue, to take steps towards the determination of the exact scale value of the deflections of the instrument as recorded on the photographic sheet, and the results of certain experiments made at the laboratory in Charlotte Street have been accepted as the value of the scale at the date given above.

Full details respecting these experiments were embodied in a paper printed in Vol. XXVII., p. 356, of the proceedings of the Royal Society.

Recently it occurred to me that it would be quite feasible to tabulate the electrograms rapidly and efficiently by means of a

glass scale which should enable the computer to combine in one operation the two processes adopted by Professor Everett in his reduction of the Kew electrograms for the years June 1862—May 1864, as described in the *Phil. Trans.*, Vol. CLVIII., pp. 347–361, and by means of which he should at once determine and measure the length of the mean ordinate of the curve for the hour.

Accepting then, the scale value of the instrument already determined as a convenient one for working upon (although possibly from re-adjustment of the electrograph at the present date not absolutely correct), the scale represented in the annexed drawing was engraved on a plate of glass by Mr. Baker, first assistant in the Observatory.

It is constructed as follows:—

Two parallel vertical lines are drawn upon the glass, the interval separating them being made equal to the length of photographic curve produced by the instrument in one hour of mean solar time. The two vertical lines are intersected by a horizontal line at a point taken as zero of the scale and from this point scales are carried both upwards and downwards on each vertical line, each division of which represents a value of 10 volts of electromotive force, as indicated by the electrometer, the graduations above the zero representing negative, those below positive tension of atmospheric electricity.

Other vertical lines, parallel to and beyond the first-named ones, are placed at distances representing half an hour of time. The object of this being to allow of the curves being tabulated at odd hours by reference to the time breaks in the zero line which only indicates the even hours.

The operation of tabulating a curve has been conducted as follows:—

The observer having placed the curve so that the centre lies over the hour for which the tension is required, shifts it up and down until he succeeds in placing its zero line in such a position that he estimates it to represent the mean position of the trace for the interval contained between his two vertical scales. He then runs his eye down the scales until he meets the zero curve, when he reads off the division at which it intersects the scales. This is entered as the tension at the hour of observation, being really the estimated mean tension during the interval comprised between the half hour before and the half hour after the time recorded.

Care is always taken that the zero trace shall cut both vertical scales at the same point, and in this manner true horizontality of the zero line of the scale is always ensured.

The glass is then moved to the next or odd hour, the true position of which on the trace is determined by making the exterior vertical lines lie over the breaks in the curve made at the adjacent even hours.

Having experimentally tested the suitability of this means of tabulating for the purpose, the four months curves were measured, and results having been submitted to Professor Stokes, a grant of 5*l.* was made by the Council for the purpose of completing the tabulations for the year 1880. This has accordingly been performed by the aid of two of the Kew assistants, and tables have been prepared showing the mean electrical tension for each hour of the day during the year, when the instrument was in good working order, and when it was not affected by thunderstorms, or other great electrical disturbances, sufficiently large as to prevent a fair estimation being made of the proper electrical condition of the atmosphere.

Copies of these tabulations are appended to this report, together with an abstract showing the average electrical daily tension during the year, and a full-sized drawing of the glass scale employed for the measurement of the photographic traces.

Having received the kind permission of the Council to make use of the above tabulations, I briefly discussed them, and laid a short paper embodying my results before the meeting of the British Association in 1881. This paper the General Committee printed *in extenso* among the reports, and I beg respectfully to append a copy of it to this statement.

As regards the working of the Thomson electrograph as fitted at Kew, I would venture to suggest to the Meteorological Council as the result of experience, the advisability of effecting certain alterations in the instrument in the event of its being considered desirable to retain it in permanent use. At present many of its fittings are of a temporary make-shift character.

These alterations are as follows:—

1. The employment of a cistern of larger capacity than the present one, fitted with proper appliances for straining the water to prevent choking the jet, and a regulating apparatus to ensure a constant rate of flow of the water.

2. A properly fitted arrangement for heating the water in times of frost.

3. Proper means of connecting and fixing the conducting wires between the different parts of the apparatus, and of making earth contacts from time to time.

4. An improved suspension, or other controlling apparatus, which would enable the sensibility of the instrument to be reduced in times of great electrical disturbance.

5. A better arrangement of the illuminating apparatus and dark box, in order to prevent the occurrence of accidental photographic action on the curves.

6. The provision of a small constant battery, or other appliance, for the purpose of determining the scale value of the instrument from time to time.

Kew Observatory, May 1882.

G. M. WHIPPLE.

NOTE D.

LIST of the STATIONS from which the DATA used in the PREPARATION of the METEOROLOGICAL ATLAS of the BRITISH ISLES has been derived.

STATIONS FOR TEMPERATURE.

Counties.	Stations.	Counties.	Stations.
SCOTLAND.		York - -	Leeds.
		" - -	Sheffield.
Shetland Islands -	North Unst.	Lincoln - -	Appleby.
Orkney Islands -	Sandwick Mansc.	Norfolk - -	Holkham.
Hebrides -	Stornoway.	" - -	Norwich.
Sutherland -	Scourie.	Bedford - -	Cardington.
" -	Dunrobin Castle.	Cambridge - -	Royston.
Inverness -	Culloden.	Middlesex - -	Camden Town.
Elgin -	Elgin.	Kent - -	Greenwich.
Aberdeen -	New Pitsligo.	Sussex - -	Worthing.
" -	Aberdeen.	Hampshire - -	Bournemouth.
" -	Braemar.	Wiltshire - -	Wilton.
Kincairdine -	Fettercairn.	" - -	Marlborough.
Forfar -	Arbroath.	Oxford - -	Oxford.
" -	Barry.	Berks - -	Streatley.
Perth -	Perth.	Cumberland - -	Silloth.
" -	Stronvar.	" - -	Carlisle.
Fife -	Balfour.	" - -	Cockermouth.
" -	Nookton.	Lancashire - -	Stonyhurst.
Haddington -	Smeaton.	" - -	Liverpool.
" -	East Linton.	Flint - -	Hawarden.
" -	Thurston.	Carnarvon - -	Llandudno.
Edinburgh -	Dalkeith.	Anglesey - -	Holyhead.
Berwick -	Thirlston Castle.	Cardigan - -	Lampeter.
" -	Milnegraden.	Hereford - -	Ross.
Selkirk -	Bowhill.	Gloucester - -	Gloucester.
Argyll (Islay) -	Eallabus.	Devon - -	Exeter.
" -	Calltonmor.	" - -	Plymouth.
" -	Rothesay.	Cornwall - -	Truro.
Dumbarton -	Balloch Castle.	" - -	Penzance.
Renfrew -	Greenock.	Scilly Islands - -	St. Mary's.
" -	Paisley.	Channel Islands - -	Guernsey.
Lanark -	Douglas Castle.	IRELAND.	
Dumfries -	Wanlockhead.	Donegal - -	Greencastle.
" -	Drumlanrig	Down - -	Miltown.
Kirkcudbright -	Cargen.	Armagh - -	Armagh.
ENGLAND AND WALES.		Dublin - -	Dublin.
Northumberland -	North Shields.	King's County - -	Parsonstown.
" -	Bywell.	Kildare - -	The Curragh.
" -	Allenheads.	Cork - -	Buttevant.
Durham -	Durham.	" - -	Fermoy.
		" - -	Roche's Point.
		Kerry - -	Valencia.

STATIONS FOR PRESSURE.

Counties.	Stations.	Counties.	Stations.
SCOTLAND.			
Shetland Islands -	North Unst.	Norfolk -	Norwich.
Hebrides -	Stornoway.	Bedford -	Cardington.
Sutherland -	Scourie.	Cambridge -	Royston.
" -	Dunrobin Castle.	Kent -	Greenwich.
Inverness -	Culloden.	Hants (I. of Wight) -	Osborne.
Elgin -	Elgin.	Oxford -	Oxford.
Aberdeen -	New Pitsligo.	Berks -	Streatley.
" -	Aberdeen.	Cumberland -	Silloth.
" -	Braemar.	" -	Carlisle.
Kincardine -	Fettercairn.	Lancashire -	Cockermouth.
Forfar -	Arbroath.	" -	Stonyhurst.
" -	Barry.	Carnarvon -	Liverpool.
Perth -	Perth.	Devon -	Llandudno.
" -	Stronvar.	" -	Barnstaple.
Dumfries -	Wanlockhead.	Channel Islands -	Plymouth.
			Guernsey.
IRELAND.			
		Donegal -	Greencastle.
		Down -	Milltown.
		Armagh -	Armagh.
		Dublin -	Dublin,
		Cork -	Cork.
		Kerry -	Valencia.
ENGLAND AND WALES.			
Northumberland -	Shields.		
" -	Allenheads.		
Durham -	Durham.		
York -	Sheffield.		
Norfolk -	Holkham.		

NOTE.—This list may possibly be altered by the addition of a few other names before the actual publication of the Atlas.

APPENDIX.

APPENDIX I.

METHOD followed by the OFFICE in the EXTRACTION of DATA from SHIPS' LOGS.

THE method which has been followed by the Office, since its first establishment in 1854 up to the present date, in the collection of information on Ocean Meteorology, has been to supply officers of the Mercantile Marine with a complete outfit of verified instruments, on the condition of their returning the instruments, and the log of observations made with them, to the Office, or to one of the agents mentioned below, at the completion of the voyage.

Every instrument supplied has been originally verified at Kew Observatory, and on the completion of the voyage it is compared with a standard instrument either at the Office or by one of its agents. Under ordinary circumstances it is not requisite to send the instruments to Kew for re-verification after every voyage, as the changes in their errors are generally slight.

The regular outfit of a ship consists of :—

- 1 Barometer (Kew pattern).
- 6 Thermometers, with a thermometer screen.
- 4 Hygrometers.

The first record of observations is made in a Rough Book supplied for the purpose, which is retained by the captain, who copies the observations into a Meteorological Log kept for the Office.

In order to facilitate the communications between the Office and the observers, agencies are established at some of the principal ports, and instruments are supplied directly from such agencies to the ships.

The following is a list of the agents at present in connexion with the Office :—

Aberdeen	-	J. R. Jones	-	-	-	Navigation School.
Cardiff	-	H. J. Thatcher	-	-	-	Bute Docks.
Dundee	-	P. A. Feathers	-	-	-	40, Dock St.
Glasgow	-	Messrs. D. M'Gregor & Co.	-	-	-	44, Clyde Place.
Greenock	-	Do.	do.	-	-	32, Cathcart St.
Hull	-	Z. Scaping	-	-	-	Trinity House.
Liverpool	-	J. Gill	-	-	-	Sailors' Home.
Southampton	-	C. H. Permain	-	-	-	13, Oriental Place.

A set of instruments is kept in working order at the Office in London and at each agency. A notice to captains is inserted as a standing advertisement in the "Nautical Magazine," and copies of it are supplied to each agent. When a captain expresses himself willing to observe, he is invited to inspect the instruments and learn what will be required of him. If this takes place at one of the agencies, and the captain decides to undertake the work, his name is submitted to the Marine Superintendent, who, if the owners of the ship are British subjects, and she is likely to return to some port in the United Kingdom, sanctions the supply, having due regard to the nature of the proposed voyage and

giving preference to captains intending to visit the districts whence the information existing in the Office is scanty.

In a few exceptional cases captains are supplied at ports where there are no agencies, and in these cases the instruments are sent from the Office in London.

Agents receive a fee of 1*l.* 5*s.* for each case of supply and return of instruments, and an additional fee of 1*l.* for the first "excellent" log sent in by any observer whom they may have invited to begin keeping a log, but the Council reserve to themselves the right of deducting the fees for both supply and return of the instruments, if no log is returned, or one which is worthless.

Captains are requested to give notice of their return to any port in the United Kingdom to the agent at the port, if there be one, or else to the Office in London, and steps are then taken to send for the instruments and log. The latter is sent up to London, and the instruments are at once compared with a standard set, and if received at an agency, the results of such comparison are duly forwarded to London.

As regards the Royal Navy, Her Majesty's ships have been supplied by the Office, since its foundation in 1854, with the meteorological instruments used in the service, and for this provision is annually made in the Estimates furnished by the Office to the Treasury upon which the vote for the Meteorological Council is based. The records of observations made by naval officers are in due course deposited at the Admiralty, where they are available for use. It is optional with the observers to keep for the Office a Meteorological Log in addition to the regular record of observations required by the rules of the service. The Council are glad to say that they receive from time to time Meteorological Logs of high value from Her Majesty's ships.

Meteorological Logs received at the Office, whether from Her Majesty's ships or from the Mercantile Marine, are tested according to a definite form (the "test sheet," which has been published in the Report of the Maritime Conference of London, 1874, p. 35), and the observations are classified according to their quality.

As soon as this first testing has been effected, a letter is written to the captain, and if any questions arise to which he can probably give an answer, he is requested to do so while the incidents are fresh in his memory. The replies are noted in the log for future reference.

The method of discussion varies according to the object proposed and the amount of data to be dealt with.

If it is proposed to discuss all the meteorological observations in a given part of the sea, they are first transcribed into data books; an account of the way in which the data books are prepared and used has been given in previous Reports.

If only one element (such as the surface temperature of the sea) is to be discussed, it has been found best to plot the data directly from the logs in geographical position on a chart, and to deduce from the chart means for spaces as small as the number of the observations will allow.

METEOROLOGICAL OBSERVATIONS IN THE NORTH ATLANTIC OCEAN.

SHIP'S NAME AND DESCRIPTION {
 OWNER'S NAME {
 CAPTAIN'S NAME {
 AND ADDRESS {
 AND ADDRESS {

See back of this form for Instructions.

YEAR 188....	MONTH	DAY. HOUR.	BAROMETER. Mercurial or Aneroid, (a)	AT- TACHED THER- MOME- TER.	TEMPERATURE.		COMPASS DEVIATION (due to the iron of the ship) ON THE COURSE STEERED, (b)	WIND.		WEATHER	SHIP'S POSITION AT NOON.	FIRE OF HEARF	REMARKS. (1) Giving the times of important changes of wind, with the direction and force before and after the change. (2) Giving the reading of the lowest barometer during a gale and the time of its occurrence, with the direction and force of wind at that time.
					AIR ON DECK,	SEA SUR- FACE.		DIRECTION by Compass. (c)	FORCE.				
1		8 A.M. NOON.									LAT. LONG.		
2		8 A.M. NOON.									LAT. LONG.		
3		8 A.M. NOON.									LAT. LONG.		
4		8 A.M. NOON.									LAT. LONG.		

(a) Erase "or Aneroid" if it be a mercurial barometer, and "Mercurial or" if it be an aneroid; if both are on board always record the mercurial in preference to the aneroid.
 (b) The Compass Deviation on the course steered should be copied from the Deviation Card; the Variation is not asked for.
 (c) The corrections for Deviation and Variation will be applied in the Office.

METEOROLOGICAL OFFICE, LONDON.

The Meteorological Council propose to chart and discuss the weather of the North Atlantic Ocean for the thirteen months, beginning August 1st, 1882, and ending August 31st, 1883; and they request owners, captains, and officers of steam vessels, and sailing vessels traversing the North Atlantic Ocean to assist in the work, by furnishing observations transcribed on forms of which this sheet is a specimen, and which will be supplied by the Office. The Council propose to discuss the observations as early as possible. The use of the forms will save much time and labour in the Meteorological Office, and it is believed that a transcription from the log will cause but little trouble to the observers.

OBSERVATIONS TO BE TAKEN AT SEA AT 8 A.M. AND AT NOON OF SHIP'S TIME.

Barometer and (if a thermometer is attached to it) the **Attached Thermometer**. Give, if possible, a few readings in port before leaving, and in each port which you visit.

Temperature of Air in the Shade on Deck (if observations can be made).

Temperature of Sea Surface (if observations can be made).

Compass Deviation (that is, the error due to the iron of the ship) **on the Course** steered.

Wind—Direction (by compass) and Force.—The force may be expressed in words, or by the figures of Beaufort's scale, whichever the observer is in the habit of using.

Weather—In words or by the letters of Beaufort's notation whichever the observer is in the habit of using.

Position of the Ship—at Noon only.

In the column headed **Remarks** please to enter—

- (1) Whenever an important change of wind occurs—the time of its occurrence, and the direction and force of the wind before and after the change.
- (2) Whenever a gale occurs—the lowest reading of the barometer during the gale, the time of the lowest reading, and the direction and force of the wind at that time.

Officers willing to observe are requested to communicate with the
MARINE SUPERINTENDENT.

Meteorological Office,
416, Victoria Street,
LONDON. S.W.,

stating how many monthly forms they want. They should give an address to which additional forms can be sent.

BEAUFORT'S SCALE OF WIND FORCE.

- 0 Calm.
- 1 Light air Just sufficient to give steerage way. With which a well-conditioned Ship of War of Admiral Beaufort's time (1800—1850), with all sail set would go in smooth water and "clean full," from
- 2 Light breeze 1 to 2 knots.
- 3 Gentle breeze 3 to 4 knots.
- 4 Moderate breeze 5 to 6 knots.

FOR SHIPS RIGGED WITH DOUBLE TOPSAILS.*

- 5 Fresh breeze Royals, &c. Single-reefed topsails and topgallant sails.
- 6 Strong breeze 6 Topgallant sails.
- 7 Moderate gale To which she could just carry in chase, "full and by" 7 Topsails, jib, &c.
- 8 Fresh gale Double-reefed topsails, jib, &c. Triple-reefed topsails, &c. Close-reefed topsails and courses.
- 9 Strong gale 8 Reefed upper topsails and courses.
- 10 Whole gale With which she could scarcely bear close-reefed maintopsail and reefed foresail. 9 Lower topsails and courses.
- 11 Storm Which would reduce her to storm-stay-sails.
- 12 Hurricane Which no canvas could withstand. 10 Lower main topsail and reefed foresail.

* These modifications are made to meet the requirements of double topsails, introduced since Admiral Beaufort's time.

BEAUFORT'S NOTATION OF WEATHER.

- b Blue Sky.
- c Clouds (detached).
- d Drizzling Rain.
- f Foggy.
- g Gloomy.
- h Hail.
- l Lightning.
- m Misty (hazy).
- o Overcast.
- p Passing showers.
- q Squally.
- r Rain.
- s Snow.
- t Thunder.
- u Ugly (threatening) appearance of weather.
- v Visibility. Objects at a distance unusually visible.
- w Dew.

NOTE.—A bar (—) under any letter indicates increased intensity; thus f very foggy; r heavy rain; v very heavy rain,

APPENDIX II.

LIST of CAPTAINS (and Officers) who have sent in Logs classed as "Excellent" during the year ending March 31, 1882. The figures opposite to each show the total number of such Logs which they have returned to the Office during the period that they have been observing.

Captain's Name.	Number of "Excellent" Logs.	Ship.
Aldrich, Pelham, R.N. -	4	H.M.S. "Eawn."
Balfour, Lieut. Andrew, R.N. -	5	H.M.S. "Magpie."
Barlow, A. E. - - -	5	S.S. "Rosetta."
Barron, William - - -	14	S.S. "Sultan."
Bennett, Edwin Charles -	8	"Thessalus."
Beresford, Lieut. C. W. De La Poer, R.N. -	6	H.M.S. "Alert."
Berridge, Henry - - -	3	"Superb."
Bourke, Comr. Edmund, R.N., F.M.S. -	2	H.M.S. "Gannet."
Brown, Alfred John - - -	8	"Belleisle."
Brown, James - - -	1	S.S. "Thetis."
Buchan, James - - -	11	"Coppename."
Carpenter, Lieut. Alfred, R.N., F.M.S. -	6	H.M.S. "Magpie."
Crutchley, William Caius, R.N.R. -	2	S.S. "African."
Dart, Leonard C. - - -	1	"Fylde."
Dobson, Charles Meadows -	10	S.S. "Sunbeam."
Dyke, Harry William - - -	3	"Markland."
Ellery, William - - -	12	"Majestic."
Frederick, Lieut. G. C., R.N. -	8	H.M.S. "Fawn."
Freedon, H. v. - - -	4	"W. v. Freeden."
Freeman, Thomas William -	13	S.S. "Bellerophon."
Gordon, James - - -	7	S.S. "City of Agra."
Gray, David - - -	8	S.S. "Eclipse."
Gray, John - - -	8	S.S. "Hope."
Gray, John McDonald, F.M.S. -	12	"Shun Lec."
Gray, Samuel B. - - -	4	"Letterewe."
Heggum, Edward Carl V. -	14	"Blythwood."
Hughes, W. P. - - -	3	"Laomene."
Jones, George Henry - - -	16	S.S. "Lamperts."
Jones, S. Griff - - -	2	"Hermine."
Kidder, John - - -	4	S.S. "Fleurs Castle."
Kidley, W. H. - - -	1	S.S. "Gaelic."
*Ladd, Richard - - -	5	S.S. "Thames."
Lailey, William Nicholson -	2	S.S. "Cipero."
Longley, Herbert - - -	9	S.S. "Yorkshire."

* 1st Officer.

Captain's Name.	Number of "Excellent" Logs.	Ship.
McBride, Andrew - -	1	"Island Belle."
Maclear, John F. L. P., R.N., F.M.S.	7	H.M.S. "Alert."
Metcalfe, John - -	5	S.S. "Oceanic."
Molony, E. J. - -	1	"British Merchant."
Murdoch, Peter - -	3	"Sierra Estrella."
Murray, Alexander - -	2	S.S. "Windward."
Napier, Richard Henry, R.N. -	15	H.M.S. "Magpie."
Nicholson, Malcolm - -	2	"John Rennie."
Olver, William - -	2	"Prince Hassan."
Parry, Moses, F.M.S. - -	4	"Queen of Cambria."
Parsell, Henry - -	3	S.S. "Baltic."
Pearson, Charles William -	19	S.S. "Strathleven."
Peebles, Robert - -	6	"Otago."
Prout, J. C. - -	1	"Cape St. Vincent."
Raeburn, John, R.N.R. - -	5	"Lochee."
Randall, William - -	6	"Iron Cross."
Renaut, Charles Henry - -	11	"Pleione."
Robinson, Thomas - -	1	"Chinsura."
Russell, Charles J. - -	1	"Baroda."
Scott, William - -	9	"Commewyne."
Shearer, George - -	4	"Corona."
Simpson, Alexander - -	12	"Traveller."
Slade, Lieut. E. J. W., R.N. -	1	H.M.S. "Alert."
Smith, John - -	3	"Naiad."
Smith, W. - -	1	"City of Madrid."
Smith, William Charles, F.M.S.	8	S.S. "Gannet."
Smith, William Henry, R.N.R.	15	"Circassian."
Spalding, Hinton - -	2	"Dochra."
Spratly, W. - -	2	S.S. "Rubens."
Swan, John - -	2	"City of Madrid."
Symington, William - -	20	S.S. "Hankow."
Thorne, J. W. - -	3	"British Commodore."
Tizard, Staff-Comr. T. H., R.N.	6	H.M. hired steam-vessel "Knight Errant."
Turner, Edward Wrake - -	9	"Mertola."
Warden, William - -	7	S.S. "Elizabeth Martin."
Waring, William - -	8	S.S. "Gordon Castle."
Wharton, W. J. L., R.N. - -	8	H.M.S. "Fawn."
Wight, Henry Potts - -	10	"Oamaru."
Young, Thomas - -	4	"City of Agra."

List of DOCUMENTS received from SHIPS.

Captain's Name.	Ship.	Tons.	Owriers.	Voyage and Year.	Months of Register.
Alderton, G.	S.S. Australia	2,137	The P. & O. Steam Navigation Co., London.	Home from Bombay, via Suez, 1881	19 days
¹ Aldrich, " Pelham, R.N.	S.S. Khiva	1,506	" "	To Bombay, via Suez, 1881	1
² Anderson, James	Fawn	1,050	" "	From Malta and Mauritius and Delagoa Bay, and surveying in Red Sea, 1881	8
³ Barlow, A. E.	Barque Lady Head	457	Hudson's Bay Co., London	To Vancouver Island and home to 24° N. 37° W., 1880-81	8
Barron, William	S.S. Rosetta	2,136	The P. & O. Steam Navigation Co., London.	To and from Shanghai, via Suez, 1881	3
" "	S.S. Sultan	1,025	W. Liddell, Hull	Trading between Hull and Hamburg, 1881	4
" "	" "	"	" "	" " " " " " " "	4
" "	" "	"	" "	" " " " " " " "	4
Belleville, W. G.	Barque Maritzburg	442	G. H. Rennie, London	Voyage from Calingapatam, 1881	18 days
Bennett, E. C.	Thessalus	1,782	T. Carmichael, Greenock	To Melbourne, Calcutta, Melbourne, and home, 1880-81	11
⁴ Berridge, Henry	Superb	1,451	H. Green, Blackwall	To and from Melbourne, 1881-82	7
⁵ Blackin, R. J.	S.S. Wyberton	1,314	Commercial S.S. Co., London	To Batavia, and thence to Rotterdam, via Suez, 1881	3
" "	" "	"	" "	To Batavia, Point de Galle, Marseilles, and Rotterdam, via Suez, 1881	3
Blomfield, —	Argo	1,490	T. Carmichael, Greenock	From San Francisco to United Kingdom, 1881	2
Bourke, Com. E. G., R.N.	Gannet	1,130	H.M.S.	Surveying off coast of Peru, Pacama, W. coast of Mexico, Vancouver Island, Sandwich Islands, Tahiti, and Coquimbo, 1881	12
Brown, A. J.	Barque Belleisle	388	J. Anderson, London	To Aspinwall, Greytown, Jamaica, New York, and home, 1881	4

LIST of DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage and Year.	Months of Register.
Brown, E.	Barque Moorhill	484	E. Brown, Liverpool	To Buenos Ayres, West Coast South America, and towards home to Lat. 19° N., Long. 36° W., 1879-80	8
Brown, James	S.S. Thetis	492	W. Stephen, Dundee	To St. John's (Newfoundland), Greenland, and home, 1881	4
Buchan, James	Barque Coppename	316	J. C. Pearson, Glasgow	To Surinam, St. Vincent, and home, 1880-81	3
"	"	"	"	To and from Demerara, 1881	3
7 Cairnes, S. R. P., R.N.R.	S.S. Arab	2,044	Union S.S. Co. Lim., Southampton	To and from Cape Town, 1881	2
7 "	"	"	"	To and from Cape Town, &c., 1881	2
7 "	"	"	"	1881-82	2
Campbell, James	Barque Hope	250	T. W. Karran, Castletown	To Rio Grande do Sul, Macan, Rio Grande do Sul, Aracayu, and home, 1880-81	9
8 Carpenter, Alfred, R.N.	Magpie	774	H.M.S.	Surveying in China seas, 1881	4
"	"	"	"		4
Chubb, Richard	Callixene	1,337	J. Gillison, Liverpool	To Rio Janeiro and Port Adelaide, 1879-80	4
Crotty, F. H.	Barque Kenyon	"	J. Poole, Liverpool	To Calcutta, Mauritius, Point de Galle, Calcutta, and home, 1879-81	4
Crowell, S. O.	S.S. Alpha	653	W. Cunard, Halifax, N.S.	Four voyages between Halifax and Jamaica, visâ Bermuda, 1881	10
9 Crutehley, W. C., R.N.R.	S.S. African	2,019	Union S.S. Co., Lim., Southampton	Home from Cape Town, 1881	9
10 "	"	"	"	To and from Cape Town, &c., 1881-82	10
11 "	S.S. Roman	1,174	"	To Cape Town, 1881	1

LIST of DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage and Year.	Months of Register.
Dart, L. C. -	Barquentine Fyde -	365	Fyde Shipping Co., Lim., Blackpool.	To and from Baltimore. To New York, Buenos Ayres, Rio Janeiro, Bahia, Montreal, and home, 1880-81 -	7
Daw, Charles -	S.S. Thetis -	492	W. Stephen, Dundee -	Off the coast of Newfoundland, 1881 -	2
Dobson, C. M. -	S.S. Sunbeam -	1,784	W. E. Woolf, Hull -	To Odessa and home, and to and from Bombay, via Suez, 1880-81 -	4
¹² Dyke, H. W. -	S.S. Sunbeam -	"	"	To and from Odessa, 1881 -	2
Elley, William -	Barque Markland -	920	W. H. De Veber, St. John's, N.B. -	To and from Baltimore (U.S.), 1880 -	3
Fawcett, Samuel -	Majestic -	1,884	T. & R. Brocklebank, Liverpool -	To and from Calcutta, 1880 -	6
¹³ Franklin, E. B. H., R.N. -	Barque Stagbound -	973	F. G. Fry, Liverpool -	To Hong-Kong, Manila, San Francisco, Burrard Inlet, and Shanghai, 1877-78 -	12
Freeden, H. v. -	Conway -	-	Training Ship -	Off Birkenhead, 1881 -	4
Freeman, T. W. -	Brig W. v. Freedom -	-	-	To Buenos Ayres, Taichuano, and home, 1881 -	6
¹⁴ Gill, William -	S.S. Bellerophon -	1,397	Oceanic S.N. Co., Liverpool -	To and from China and Japan, via Suez, 1881 -	4
¹⁵ " -	" -	"	" -	To and from Shanghai, via Suez, 1881 -	3
¹⁴ Gill, William -	S.S. Algeria -	2,193	J. Spence, Liverpool -	Six voyages to, and five from, New York, 1880 -	4
¹⁵ " -	" -	"	" -	Two voyages to and from New York, 1881 -	4
¹⁶ Gordon, James -	S.S. City of Agra -	2,133	G. Smith, Glasgow -	To and from Calcutta, via Suez, 1881 -	2
¹⁷ " -	" -	"	" -	" -	2
¹⁶ Gray, David -	" -	"	" -	" -	2
Gray, John -	S.S. Eclipse -	435	D. Gray, Peterhead -	To and from Greenland, 1881 -	3
Gray, J. McD. -	S.S. Hope -	452	R. Kidd, Peterhead -	" -	7
Gray, S. B. -	Barque Shun Lee -	669	J. Graham, Whitehaven -	To and from Iquique, 1880-81 -	4
" -	Barque Letterwe -	798	D. Irwin, Liverpool -	To and from Adelaide, 1880-81 -	7

LIST of DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage and Year.	Months of Register.
Grey, C.	MacMillan	1,450	John MacMillan, Jun., Dumbarton	From Shanghai to San Francisco and towards home, to Lat. 36° S. Long. 32° W., 1880	4
Hairby, E.	S.S. Maskelyne	1,678	Liverpool, Brazil, and River Plate S.N. Co., Lim., Liverpool	To Monte Video, 1881	14 days.
Hegum, E. Carl V.	Blythswood	1,607	R. Cutlbert, Greenock	To and from Calcutta, 1881-82	7
Hemmings, H. W.	S.S. Victoria	153	The L. and S.W. and L. B. and S.C. Rail. Co.'s, London.	Between Newhaven and Dieppe, 1881-82	4
Hepworth, C. M. W.	S.S. Danube	1,462	Union S.S. Co., Lim., Southampton	To and from Cape Town, &c., 1881-82.	5
Hill, J. A.	S.S. Algeria	2,193	J. Spence, Liverpool	Three voyages to and from New York, 1881-	2
Hoskyn, R. F., R.N.	Flying Fish	940	H.M.S.	From Malta to China and Japan, and surveying in China and Japan Seas, 1880-81	12
Hughes, W. P.	Laomene	1,746	D. Fernie, Liverpool	To and from Calcutta, 1880-81	7
Ivey, Richard	Barque William Hunton	389	T. D. Woodhead, Hull	To Paris, Coosaw, and home, 1881-82	4
Jackson, M.	Barque Cavalier	1,089	A. Cassels, Liverpool	To Rio Janeiro, and New Orleans, and from Havre to Quebec and home, 1880-81	6
Jeffery, A. W.	S.S. Delambre	988	Liverpool, Brazil, and River Plate S.N. Co., Lim., Liverpool.	From Lisbon to Bahia, New York, and home, 1881	2
Jones, G. H.	S.S. Lamperts	2,020	T. Bell, Newcastle-on-Tyne	One voyage home from New York, one to and from Philadelphia; one to and from Bombay, via Suez, 1881	4
"	"	"	"	One voyage to and from Bombay, via Suez; one to and from Baltimore, 1881-82	4
Jones, S. G.	Barque Hermine	538	T. H. Jackson, Liverpool	To Talcahuano, Iquique and home, 1880-81.	9
Jones, William	S.S. Cadoxton	1,140	M. Cope, Cardiff	Home from Galveston, 1880-81	18 days.

LIST of DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage and Year.	Months of Register.
Kidder, John	S.S. Fleurs Castle	2,472	T. Skinner, Glasgow	To China, Japan, New York, via Suez, and Antwerp, 1881	4
Kidley, W. H.	S.S. Gaelic	1,713	Oceanic Steam Navigation Co., Lim., Liverpool.	Two voyages between San Francisco and Hong Kong, via Yokohama, 1880-81	4
"	"	"	"	Two voyages between San Francisco and Hong Kong, via Yokohama, 1881.	4
Lailey, W. N.	S.S. Cipro	908	D. Caw, Glasgow	To Trinidad, Demerara, and home, thence to Trinidad, Demerara, and Belize, 1881	4
"	"	"	"	To and from Trinidad and Demerara, 1881	2
Lawson, James	S.S. Minho	1,491	Royal Mail Steam Packet Co., London.	From Lisbon to Rio Janeiro, back to Lisbon, and home, 1881	2
Longley, Herbert	S.S. Yorkshire	2,273	W. H. Tindall, London	To Genoa, Baltimore (U.S.A.), and home, 1881	2
Lucas, J.	William Le Lacheur	572	J. A. Le Lacheur, London	To and from Guayaquil, 1880-81	6
²¹ Luckhurst, A. H.	S.S. Thames	1,057	H. W. Carter, London	To and from Quebec, 1881	1
McBride, Andrew	Barque Island Belle	313	J. McBride, Grennan, Kirk- maiden, Wigtown.	To Demerara, 1881	1
McDougall, Alexander	Auckland	1,245	The Albion Shipping Co., Lim., Glasgow.	To and from Otago, 1880-81	6
McFee, J. R.	Barque Childers	896	P. G. Carvill, Liverpool	To Portland, Oregon, and towards home to Lat. 36° N., Long. 86° W., 1880-81	9
²² Maclear, J. F. L. P., R.N.	Alert	1,240	H.M.S.	Surveying Coast of Australia and South Pacific, 1881	4
²³ "	"	"	"	Surveying in Torres Straits, 1881	4
²⁴ "	"	"	"	Surveying in Arafura Sea; to Port Darwin and Singapore, 1881-82	4

LIST of DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage and Year.	Months of Register.
Metcalf, John	S.S. Oceanic	3,707	The Oceanic Steam Navigation Co., Lim., Liverpool.	Trading between San Francisco, Hong Kong, and Yokohama, 1880-81	4
"	"	"	"	Two voyages between San Francisco and Hong Kong, via Yokohama, 1881	4
Mitchell, J. A.	Martha	—	"	Two voyages between China, Japan, and Australia, 1879-81	15
Moloney, E. J.	British Merchant	1,696	British Shipowners' Co., Lim., Liverpool.	To Melbourne, San Francisco, and home, 1880-81	8
Murdoch, Peter	Sierra Estrella	1,436	A. M. Anderson, Liverpool	To and from Chittagong, 1880-81	8
"	"	"	"	To Point de Galle, Rangoon, and home, 1881-82	8
Murray, Alexander	S.S. Windward	321	W. Baxter, Peterhead	To and from Greenland, 1881	6
²³ Napier, R. H., R.N.	Magpie	774	H.M.S.	Surveying in China Seas, 1881	3
Nicholson Malcolm	John Rennie	848	T. L. Devitt, London	To and from Adelaide, 1880-81	7
²⁴ Oldham, Lt. & Comr. C. F., R.N.	Lark	—	H.M. Schooner	To Simon's Bay and towards Sydney, 1881	4
Olver, William	Barque Prince Hassan	400	F. Cheusman, Shoreham	To Brazil, New York, and home, 1880-81	7
Orr, W. B.	Barque Peru	683	J. W. Robertson, Dundee	From Lat. 31° N., Long. 17° W. to Auckland and home, 1881	6
Pain, T.	Barque Lady Bowen	892	J. C. Ellis, Newcastle N.S.W.	From Yokohama to Burrard's Inlet, and Sydney, 1881	4
Parry, Moses	Barque Queen of Cambria	865	W. Thomas, Nevill, Carnarvonshire	To and from Adelaide, 1880-81	8
²⁵ Parsell, Henry	S.S. Baltic	2,209	Oceanic Steam Navigation Co., Lim., Liverpool.	Seven voyages to and from New York, 1881	6
"	S.S. Coptic	2,789	"	From Liverpool towards New York, 1881	8 days
Patterson, J. E. C.	Ellen Stuart	1,572	P. Douglas, Liverpool	To and from Calcutta, 1880-81	8
²⁶ Pearson, C. W.	S.S. Strathleven	2,436	W. Burrell, Glasgow	To Natal, Rangoon, and home, via Suez, 1881	3

LIST OF DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage and Year.	Months of Register.
²⁶ Pearson, C. W.	S.S. Strathleven	2,486	W. Burrell, Glasgow	To China, Japan (via Suez), New York, and home, 1881-82	5
Peebles, Robert	Otago	993	Albion Shipping Co., Glasgow	To and from Otago, N.Z., 1881	6
Pollard, Lt. G. N. A., R.N.	Zephyr	438	H.M.S.	To Suez, Seychelles, Batavia, Singapore, &c., 1880-81	4
Prout, J. C.	Cape St. Vincent	1,422	A. P. Lyle, Greenock	To and from San Francisco, 1881-82	8
Quaille, D. W. A.	Berbice	717	R. Kerr, Greenock	To Mauritius, Colombo, Cochin, and home, 1880-81	7
Raeburn, John, R.N.R.	Loheac	1,728	D. Bruce, Dundee	To and from Calcutta, 1880-81	7
Randall, William	Iron Cross	1,508	H. Fernie, Liverpool	To and from Rangoon, 1881	8
Renaut, C. H.	Pleione	1,092	W. Savill, London	Home from Wellington, N.Z., 1881	3
Robinson, Thomas	Chinsura	1,266	T. Brocklebank, Liverpool	To and from San Francisco, 1881	8
Russell, C. J.	Baroda	1,364	R. Brocklebank, Liverpool	To and from Calcutta, 1881	7
Sampson, J. C.	Nicoya	594	J. A. Le Lacheur, London	To and from Punta Arenas, 1880-81	6
Sanderson, J. T.	S.S. Hallamshire	873	W. Young, London	From Gibraltar to New Orleans and Bordeaux, 1879	2
Scott, William	Barque Commewyne	315	J. Grierson, Glasgow	To Surinam, Barbadoes, St. Thomas, and home, 1881	3
Seaton, W. A.	S.S. Deccan	2,157	P. & O. Steam Navigation Co., London.	To and from Calcutta, via Suez, 1881	3
Shand, W. W.	S.S. Cearcense	890	R. Singlehurst, Liverpool	Two voyages from Havre to Brazil and back, 1881	5
Shaw, Gilbert	S.S. Beta	1,087	W. Cunard, London	Three voyages between Halifax and Jamaica, via Bermuda, 1881	2
Shearer, George	Barque Corona	1,210	W. Stephen, Dundee	To Adelaide, San Francisco, and home, 1880-81	9
Simpson, Alexander.	Schooner Traveller	196	A. Simpson, Peterhead	From Peterhead to Ivigtut, Peterhead, Copenhagen, Ivigtut, Harburg, and Peterhead, 1881	6

LIST of DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage and Year.	Months of Register.
Simpson, W.A.	Brig Terrier	144	T. H. Hunt, London	To and from Demerara; from Hermitage Bay (Newfoundland) to Bahia and New York, 1880	6
Smith, J.	Naiaid	1,039	J. B. Walmsley, London	To and from Valparaiso, 1880-81	7
"	"	"	"	From Hamburg to Valparaiso, Talcahuano, and home, 1881-82	7
Smith, J.	Windsor Castle	1,075	H. Green, Blackwall	To and from Sydney, 1881-82	7
¹³ Smith, J. H., R.N.R.	Worcester	-	Training Ship	Off Greenhithe, 1881	4
²⁷ Smith, William	City of Madrid	1,191	G. Smith, Glasgow	From Calcutta to New York and home, 1881	4
Smith, W. C.	Barque Kingdom of Sweden.	788	A. Gosman, London	To Madras, Bimlipatam, and home, 1880-81	8
"	S.S. Gannet	1,187	J. White, Leith	To and from Calcutta, via Suez, 1881-82	3
²⁸ Smith, W. H., R.N.R.	S.S. Circassian	2,356	R. G. Allan, Liverpool	Two voyages to and from Boston, two to and from Quebec, 1881	3
²⁹ Spalding, Hinton	Barque Doehra	966	J. Scott, Hawkhill, Largs	To and from Java, 1880-81	7
Spratly, W.	S.S. Rubens	1,267	Liverpool, Brazil, and River Plate Steam Navigation Co., Lim., Liverpool	To St. Vincent, Monte Video, Rio Janeiro, St. Vincent, and home, 1881-82	2
³⁰ Studdert, Robert	S.S. Cotapaxi	2,583	Pacific Steam Navigation Co., Liverpool	To and from Australia (via Suez) 1881-82	3
Swan, John	City of Madrid	1,191	G. Smith, Glasgow	To Calcutta, 1881	3
Symington, William	S.S. Hankow	3,594	W. Milburn, Newcastle-on-Tyne	To Natal, Mauritius, Bombay, Natal, Singapore, Calcutta, Mauritius, Calcutta, Madras, Colombo, and home, via Suez, 1881	7
"	"	"	"	To Capetown, &c., Bombay, and home, via Suez, 1881-82	4
Tannock, R. S.	Glencairn	1,564	A. Allen, Glasgow	To and from San Francisco, 1880-81	8

LIST OF DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage and Year.	Months of Register.
Taylor, G. C. R.	Barque Huasquina	428	W. Lowden, Liverpool	To Coquimbo and home from Iquique, 1880-81	7
Thorne, J. W.	British Commodore	1,390	British Shipowners Co., Lim., Liverpool.	To Calcutta and New York, 1880-81	9
Thorpe, John	Dallam Tower	1,499	D. Duncan, Rothsay	From Antwerp to Shanghai, and home from San Francisco, 1880-81	7
Tizard, T. H., R.N.	Knight Errant	—	H.M. Hired Surveying Vessel	Surveying on the west coast of the United Kingdom, 1881	4
³¹ Tomlin, P. S.	S.S. Khedive	2,123	P. & O. Steam Navigation Co., London.	To and from Calcutta, via Suez, 1881	2
³¹ " "	" "	"	" "	To and from Melbourne, via Suez, 1881-82	3
Turner, E. W.	Barque Mertola	392	F. T. Barry, London	Three voyages to and from River Guadiana, 1880-81	3
" "	" "	"	" "	Two voyages to and from River Guadiana, 1881-82	4
³² Wait, A. McLean	S.S. German	3,028	Union S.S. Co., Lim., Southampton	Two voyages to and from Cape Town, 1881	3
" Warden, William	S.S. Elizabeth Martin	809	" " A. Currie, Greenock	To and from Cape Town, 1881	2
³³ Waring, William	S.S. Gordon Castle	2,031	" " T. Skinner, London	To and from China and Japan, via Suez, 1880-81	2
³⁴ " "	" "	"	" "	Surveying in the Bosphorus and at Malta, 1879	5
³⁵ Wharton, W. J. L., R.N.	Fawn	"	H.M.S.	To and from Shanghai, 1881-82	3
Wight, H. P.	Oamaru	1,306	The Albion Shipping Co., Lim., Glasgow.	To and from Port Chalmers, 1881	4
Williams, H. II.	Barque Harvest Home	547	W. Just, Liverpool	To Rockhampton, Newcastle (N.S.W.), Portland (Oregon), and home, 1881-82	11
Youlden, II.	Barque Chin Yang	555	J. Ransom, Southampton	To Demerara, Jamaica, and home, 1880-81	4

LIST OF DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage and Year.	Months of Register.
36 Young, Thomas	City of Agra	1,074	W. B. McGavin, Liverpool	From Christiana to Melbourne, and home, 1880-81	7
37 " Young, William	S.S. Colombo	1,231	E. H. Watis, London	To and from Melbourne, 1881-82 One voyage to and from New Orleans, and one to Odessa, Philadelphia, and home, 1878	5 4

In cases distinguished by marginal numbers the Meteorological Registers were kept chiefly by officers, as follows:—

- 1 Kept by Lieutenant E. J. W. Slade, R.N.
 2 Kept by Frederick W. Fry, 1st Mate.
 3 Kept by C. H. S. Tocque, 2nd Officer.
 4 Kept by D. W. Barker, 2nd Officer.
 5 Kept by H. E. Collis, 2nd Officer, and F. Lec, 3rd Officer.
 6 Kept by H. E. Collis, 2nd Officer.
 7 Kept by G. E. Cornwall, 2nd Officer.
 8 Kept by Lieutenant A. Balfour, R.N., assisted by Quarter Masters John Smith, William Parsons, and Sam Stevens.
 9 Kept by Francis Mayoss, 4th Officer, assisted by R. Dowling and T. Q. East, 3rd Officers.
 10 Kept by T. Q. East.
 11 Kept by W. H. Dutton, 4th Officer, assisted by B. H. Dunn, 2nd Officer, and H. Arden, 3rd Officer.
 12 Assisted by H. T. Bone, Chief Officer, and R. Griffith, 2nd Officer.
 13 Kept by the Boys.
 14 Kept by A. W. Watson, 3rd Officer.
 15 Kept by J. S. Carbines.
 16 Assisted by Andrew Kinloch, 2nd Officer.
 17 Assisted by Officers.
 18 Kept by George Rowland, 2nd Officer.
 19 Kept by Lieutenant W. S. Pastard, R.N.
 20 Assisted by H. Smith, 2nd Mate, and J. Metcalf and C. A. Trevor, apprentices.
 21 Kept by Richard Ladd.
 22 Kept by Sub-Lieutenant C. W. de la Poer Beresford, R.N.
 23 Kept by Lieutenant A. Balfour, R.N.
 24 Kept by Lieutenant Alexander Leeper, R.N.
 25 Kept by H. N. Goulden and E. Bailey, 3rd Officers.
 26 Assisted by John Kirkpatrick, 3rd Officer.
 27 Kept by Hugh G. Story, 3rd Mate.
 28 Kept by John Caine, 3rd Officer, and James Cotterill, 4th Officer.
 29 Assisted by Messrs. J. Goodfellow and T. D. Wilkin-son.
 30 Kept by the Officers.
 31 Kept by L. de B. Lockyer, 3rd Officer.
 32 Kept by C. H. Bond, Chief Officer.
 33 Assisted by E. Porter, 1st Officer, and H. L. Roy, 3rd Officer.
 34 Assisted by E. Porter, Chief Officer.
 35 Kept by Lieutenant G. C. Frederick, R.N.
 36 Assisted by W. Johnstone, 2nd Officer.
 37 Assisted by H. A. Pike, 2nd Officer.

MISCELLANEOUS DOCUMENTS.

Barometric curves showing periodic waves, with remarks thereon, noted at the time, for the summer of 1881, in the China Sea, Hainan Island, by Lieutenant A. Carpenter, R.N., H.M.S. "Magpie."

Observations of wind and weather at the Coningbeg Light Ship from January 1 to December 31, 1851.
 Statement of wind and weather at Lighthouses on the west and south-west coast of Ireland during 1851 and 1852.
 Surface temperature observations in the North Sea during 1853-58 and 1872.

APPENDIX IV.

INSTRUMENTS supplied, &c. to the Royal Navy.

Per Account.	Baro- meters.	Ane- roids.	Thermometers.				Hydro- meters.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1881, afloat -	181	380	1,073	143	136	86	132
Issued since -	56	71	254	32	28	20	11
	237	451	1,327	175	164	106	143
Returned since -	64	73	323	27	33	14	13
April 1st, 1882, afloat -	173	378	1,004	148	131	92	130

INSTRUMENTS supplied, &c. for use at Naval Stations.

April 1st, 1881, in use -	77	115	222	21	33	6	16
Issued since -	3	6	51	4	1	1	—
	80	121	273	25	34	7	16
Returned since -	14	7	36	5	4	1	—
April 1st, 1882, in use -	66	114	237	20	30	6	16

DISPOSITION OF ADMIRALTY INSTRUMENTS on April 1st, 1882.

Afloat in Royal Navy -	173	378	1,004	148	131	92	130
In use at stations -	66	114	237	20	30	6	16
In store at M.O. -	113	89	275	69	82	6	102
" Chatham -	3	3	24	3	3	4	4
" Sheerness -	5	8	23	4	2	4	8
" Portsmouth -	5	7	42	6	13	8	23
" Devonport -	4	7	34	4	4	5	20
" Queenstown -	3	2	4	1	1	—	8
" Gibraltar -	1	4	2	—	—	—	4
" Malta -	7	15	68	5	5	1	20
" Halifax -	4	8	12	2	5	—	12
" Bermuda -	2	4	—	2	2	—	15
" Jamaica -	2	1	5	—	1	—	—
" Cape of Good Hope -	4	2	10	8	7	—	31
" Trincomalee -	1	—	—	—	—	—	—
" Hong Kong -	6	8	40	6	10	1	10
" Coquimbo -	3	7	16	2	2	—	23
" Sydney -	3	2	36	1	2	—	—
" Esquimalt -	7	8	18	3	3	—	—
Under repair -	22	—	—	—	—	—	—
Total, April 1st, 1882 -	434	667	1,850	284	303	127	426
Lost, &c. since April 1st, 1881.	5	12	266	13	12	8	3

APPENDIX V.

INSTRUMENTS supplied, &c. to Mercantile Marine.

Per Account.	Baro- meters.	Com- passes.	Thermometers.				Hydro- meters.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1881, afloat -	112	—	696	—	—	119	438
Issued since -	91	—	555	—	—	81	312
	203	—	1,251	—	—	200	750
Returned since -	88	—	624	—	—	86	347
April 1st, 1882, afloat -	115	—	627	—	—	114	403

INSTRUMENTS at Stations, viz., Telegraph Offices, Observatories,
Navigation Schools, &c.

April 1st, 1881, in use -	96	2	250	59	59	41	42
Issued since -	16	—	25	2	2	2	3
	112	2	275	61	61	43	45
Returned since -	11	—	27	1	3	5	5
April 1st, 1882, in use -	101	2	248	60	58	38	40

DISPOSITION of Board of Trade Instruments.

In merchant ships -	115	—	627	—	—	114	403
In use at stations -	101	2	248	60	58	38	40
In store at M.O. -	73	45	109	14	63	17	80
At Liverpool agency -	12	8	59	—	—	13	21
„ Aberdeen „ -	6	—	33	—	—	2	30
„ Glasgow* „ -	2	—	10	—	—	2	9
„ Dundee „ -	3	—	8	—	1	4	2
„ Hull† „ -	5	—	11	—	—	6	11
„ Southampton „ -	4	—	20	—	—	5	20
„ Cardiff „ -	5	—	32	—	—	5	16
Under repair -	6	—	5	—	—	—	—
Total, April 1st, 1882 -	332	55	1,162	74	122	206	632
Lost, &c. since April 1st, 1881 -	3	—	198	—	1	26	85

* Last return dated 1881, September 30.

† „ „ „ June 27.

APPENDIX VI.

LIST of STATIONS reporting Meteorological Observations by Telegraph to the Office on 31st March 1882, with the Names of Observers.

*†Sumburgh Head -	Rev. W. Brand - - -	Minister of Dunrossness.
*†Stornoway - -	A. MacDonald - - -	Schoolmaster.
Wick - - -	J. Sinclair - - -	Watchmaker.
Nairn - - -	W. D. Penny - - -	Schoolmaster.
*†Aberdeen - -	J. McCormack - - -	Telegraph Clerk.
Leith - - -	J. Hutchison - - -	Do.
*†Shields - - -	J. W. Irvine - - -	Do.
Spurn Head - -	J. B. Smith - - -	Assistant Lightkeeper.
†York - - -	W. Keeping, M.A., F.G.S. -	Museum.
Nottingham - -	E. J. Lowe, F.R.S. - - -	Highfield House Observa- tory.
†Ardrossan - -	J. W. Mayes - - -	Telegraph Clerk.
*†Mullaghmore -	K. Kerr - - -	Coastguard Officer.
Donaghadee - -	T. MacGowan - - -	Telegraph Clerk.
Parsonstown - -	G. Phillips - - -	Assistant Observer at Lord Rosse's Observatory.
Barrow-in-Furness -	W. S. Whitworth - - -	Engineer, Barrow-in-Fur- ness Railway.
*†Holyhead - -	J. Tilston - - -	Keeper of Sailors' Home
Liverpool - -	J. Hartnup, junr. - - -	Bidston Observatory.
*†Valencia - -	J. E. Cullum - - -	Superintendent of the Ob- servatory.
Roche's Point - -	W. Kennedy - - -	Telegraph Clerk.
Pembroke - -	Messrs. Blake and Baker -	Lightkeepers.
*†Scilly - - -	W. Thomas - - -	Signalman.
Prawle Point - -	J. John - - -	Coastguard Officer.
†Hurst Castle -	G. G. Appleton - - -	Lightkeeper.
†Jersey - - -	J. Fisher - - -	Signalman.
*†Dover - - -	J. Costello - - -	Telegraph Clerk.
*†London - - -	F. Gaster, F.M.S. - - -	Clerk, Meteorological Office.
Oxford - - -	H. E. C. Bellamy - - -	Radcliffe Observatory.
Cambridge - -	H. Todd - - -	Observatory.
*†Yarmouth - -	G. T. Watson - - -	Secretary, Sailors' Home.
†Hawes Junction -	W. Foster - - -	Station Master.

Note.—Those stations marked with an asterisk (*) report also at 2h. p.m.; and those with a dagger (†) at 6h. p.m.

APPENDIX VII.

REPORTS ON THE INSPECTION OF THE STATIONS IN 1881.

A.—REPORT ON THE INSPECTION OF THE IRISH AND WELSH STATIONS.

I HAVE to report that I have completed the inspection of the Irish and Welsh stations, with the exception of one station (Waterford), which sends returns for the Weekly Weather Report, and of two stations of the Second Order (Londonderry and the Mountjoy Observatory), of which, however, the latter was inspected by Mr. Whipple.

TELEGRAPHIC REPORTING STATIONS.

St. Ann's Head.—Visited August 24. There is nothing calling for remark at this station, except that the observers had a tendency to set the barometer verniers too low, an error I have instructed them to avoid in future.

Holyhead.—Visited September 21. The Stevenson's screen recommended for this station in my last report had not arrived at the time of my visit, but it has been erected in the course of the current month (October). The station was otherwise quite satisfactory.

Parsonstown.—Visited September 23. The observer at this station has been changed, and Mr. G. Phillips now takes the readings. Dr. Bödicker, the astronomical assistant, takes great interest in the meteorological work. The thermometer screen has been raised higher from the ground since my last visit.

Valencia.—Visited October 5. There are no remarks to be made on this station, except that the attendance on our private wire at the Knightstown telegraph office is not as regular as is desirable. The attention of the Post Office authorities has been repeatedly called to this matter.

Roche's Point.—Visited October 6. This station was in a satisfactory condition. The erection of the Stevenson's screen and rain gauge on a plot of ground, kindly granted by Lord Fermoy, has caused a great improvement on the conditions previously existing.

Mount Trenchard.—Visited October 7. This station only supplies temperature and rain returns for the Weekly Weather Report. It was in good order.

Donaghadee.—Visited October 10. The condition of this station was quite satisfactory. Mr. T. MacGowan, the observer, has evidently a great taste for science.

Mullaghmore.—Visited October 12. This station was, as usual, in complete order.

STATIONS OF THE SECOND ORDER.

St. David's.—Visited August 23. This station was in a very satisfactory condition. Dr. Probert, the observer, has offered to take "cirrus" observations, and as Mr. Walker, the former cirrus observer, has left St. Ann's Head, observations from this part of Wales will be valuable.

Dublin, Glasnevin.—Visited October 8. This station was in good order; the erection of the Stevenson's screen has improved the thermometrical indications materially. There is a great want of a good wind vane, and I have drawn the attention of the authorities to this defect.

Dublin, Fitzwilliam Square.—Visited October 8. I have nothing to remark about this station, which is as good as a town station can be in a very confined garden.

Colebrooke.—Visited October 12. The station was in good order.
Markree.—

OBSERVATORIES.

Valencia.—Visited October 5. I am glad to say that the drainage carried out last winter has been thoroughly efficient in drying the foundations of the west wall of the observatory. The only matter at present calling for attention is the state of the sea-retaining wall, some of the "pitching" of which has been loosened by the storms of last winter.

Armagh.—Visited October 11. I have to request permission to order the instrument room to be painted, and to supply some requisite extra furniture.

I append a table of the thermometric comparisons. The sign + shows that the thermometers read higher than the Inspector's Standard, by the values quoted.

TELEGRAPHIC STATIONS.

—	Dry.	Wet.	Spare.	Max.	Min.
St. Ann's Head - -	+0.3	+0.2	+2.1	-0.4	+0.4
Holyhead - - -	0.0	+0.1	-0.5	+0.1	+0.1
Parsonstown - -	+0.8	+0.5	—	+0.3	0.0
Valencia - - -	+0.5	+0.6	—	+1.3	-0.2
Roche's Point - -	+0.5	+0.3	—	+1.1	+0.2
Donaghadee - - -	+0.8	+0.8	+1.0	+0.9	+0.6
Mullaghmore - -	+0.4	+0.4	+0.5	+0.6	+0.3

STATIONS OF THE SECOND ORDER, &c.

St. David's - - -	+0.5	+0.0	—	+0.4	+0.2
Mount Trenchard - -	—	—	—	—	—
Glasnevin - - -	+0.6	+0.7	—	+0.6	-0.8
Dublin, Fitzwilliam Square -	+0.6	+0.5	+0.5	0.0	-0.2
Colebrooke - - -	+0.3	+0.4	—	+0.2	-0.1
Markree - - -	+0.2	+0.1	—	+0.1	-0.6

October 26, 1881.

ROBERT H. SCOTT.

B.—REPORT on the INSPECTION of the SCOTTISH STATIONS.

The barometers at all the stations except Laudale were compared with:—

(a.) Inspector's Standard Barometer No. 588, which had been received from the Meteorological Office since the previous inspection in 1880, and

(b.) A small pocket Aneroid No. 11.

I have the strongest reasons for believing that the above mercurial standard No. 588 was entirely free from air during the whole time of the inspection, and is still at this date in the same satisfactory condition. I have also the pleasure of reporting that the behaviour of this instrument has been all that could be wished during the various tours of inspection, having never gone out of order, though handled and treated, so far as known, just as No. 456 had been.

The following table shows the readings of inspector's standard No. 588, corrected for the index error of the instrument; the readings of aneroid No. 11; and the uncorrected readings of the reporting and check barometers at each of the stations, adding in italic figures the

corrected readings of those barometers, the errors of which I happen to know:—

TELEGRAPH REPORTING STATIONS.	Inspector's Barometer, No. 588.	Attached Thermometer.	Aneroid, No. 11.	Reporting Barometer.	Attached Thermometer.	Check Barometer.	Attached Thermometer.	REMARKS.
Landale -	-	-	29·495	29·610	60·6	-	-	No. 376 at height of 33 feet.
Do. -	-	-	29·505	-	-	29·611	59·1	No. 375 at height of 25 feet.
Stornoway -	29·930	56·0	29·875	29·926	56·0	29·926	55·5	—
Nairn -	29·793	60·6	29·690	29·794	60·9	29·793	60·4	—
Inverness -	29·639	63·6	29·545	29·640	63·8	—	—	—
Wick -	29·562	57·9	29·470	29·564	57·7	—	—	No. 568 in shop.
Do. -	29·508	59·0	29·425	—	—	29·506	59·2	No. 569 in house.
Sandwick -	29·429	60·0	29·310	29·445	61·0	—	—	—
Dunrossness -	29·617	58·3	29·555	29·614	58·8	29·614	58·8	—
Aberdeen -	29·465	61·6	29·380	29·463	61·7	—	—	No. 537 in Telegraph Office.
Do. -	29·432	59·2	29·330	—	—	29·436	59·3	No. 538 at house, Braemar Place.
Leith -	30·126	61·7	30·080	30·125	62·1	—	—	No. 561 in Telegraph Office.
Do. -	30·049	57·3	30·020	—	—	30·045	57·0	No. 562 at house.
Ardrossan -	29·828	53·2	29·805	29·824	53·3	—	—	No. 564 in Ardrossan.
Do. -	29·798	55·1	29·770	—	—	29·792	55·2	No. 563 at house, Salt-coats.

This comparison can only be regarded with the greatest satisfaction. In no case where a comparison of "corrected" readings is made does the difference between inspector's standard and the station barometers exceed 0·004 inch.

An examination of the column under "Aneroid No. 11" shows that the action of this aneroid during the period of inspection was extremely irregular. I am not aware that any accident happened to the instrument between the inspections of 1880 and 1881, but it is now evident that its readings are too irregular and uncertain for any reliance to be placed on them during the extended period of an inspection.

THE OBSERVATORIES.

1. *Aberdeen.*—The following are the readings of the standard barometer No. 1149, with which the eye observations are made, and inspector's standard No. 588:—

	Self.	—	Mr. Boswell.	—
Inspector's Standard, No. 588 (corrected) -	inches. 29·416	59·7	inches. —	—
Observer's Standard, No. 1149 (corrected) -	29·420	60·0	29·420	60·0
Aneroid, No. 11 -	29·325	—	—	—

2. *Glasgow.*—A new barometer (Adie No. 1722) was added to the observatory on September 17, 1881, being brought from London and placed in position by Mr. Whipple. The following are the readings of the inspector's standard No. 588, the new observatory standard No. 1722, and the old standard:—

	Self.		Mr. McLean.	
	inches.	°	inches.	°
Inspector's Standard, No. 588 corrected.	29·429	47·4	—	—
New observer's Standard, No. 1722 „ -	29·430	47·7	29·430	47·7
Old observer's Standard uncorrected.	29·422	47·8	29·421	47·8
Aneroid, No. 11 - - - -	29·430	—	—	—

The new observer, Mr. Urquhart, made the same readings as Mr. McLean, the old observer. From this comparison it is probable that the error of the old standard was 0·008 inch too low, a result which would bring the observations made with the instrument into correspondence with those made at surrounding stations.

Mr. Urquhart, who shows considerable intelligence, on being asked to set and read the vernier, set it as near as I could estimate, 0·010 inch too high, which surprised me, as his reading exactly agreed with the reading I had made and noted. The explanation was seen at once on examining the ivory point which was just as much above the surface of the mercury in the cistern as the vernier was above the mercury in the tube. The proper method of setting the ivory point and the vernier was very particularly explained, after which Mr. Urquhart set both correctly, and read the instrument, giving the same reading exactly as by the first method he used.

It is probable, though the remark is made with some reservation, that the above method of setting the instrument has been for some time the common practice, and if so the limit of the observational error may be set down at 0·003 inch, perhaps only on rare occasions amounting to so much.

The following are the differences between the readings of the same instrument by inspector on the one hand, and by observer and assistant on the other:—

		Observer.	Assistant.
Telegraph Reporting Station	Laudale - - -	0·000	—
	Stornoway - - -	-0·005	—
	Nairn - - -	-0·002	-0·004
	Inverness - - -	0·000	—
	Wick - - -	0·000	0·000
	Sandwick - - -	0·000	0·000
	Dunrossness - - -	0·000	—
	Aberdeen - - -	0·000	0·000
	Leith - - -	-0·001	—
	Ardrossan - - -	0·000	—
Observatories	Aberdeen - - -	0·000	—
	Glasgow - - -	0·000	0·000

Mr. Sutherland, the observer at Stornoway, and Miss Penny, the assistant observer at Nairn, had their attention drawn to their rather low readings; and after the proper method of setting the vernier had been explained, readings of the barometers were again made in each case, with correct results.

Thus as regards the Scottish stations of the Meteorological Council, I have the gratifying report to make that none of the barometers differ from the standard carried round the stations during the inspection of 1881 more than 0·004 inch, and that part, if not the whole, of this difference may be due to the attached thermometer not strictly repre-

senting the temperature of the whole instrument, though every care was taken to hang the two barometers together long enough to obtain this result approximately; and that the errors of setting the vernier and reading off do not exceed -0.002 inch.

THERMOMETERS.

The following table gives the results of the comparisons made with inspector's standard thermometer, No. 2420, and the thermometers at the different stations and observatories, the readings of the standard being corrected for instrumental errors, none of the Kew corrections for the station thermometers, however, being allowed for in preparing the table:—

STATIONS.	Standard No. 2420, Corrected.	Dry Bulb.	Wet Bulb.	Spare T.	Max.	Min.	Time in Water in Minutes.	Change of Temp.	Notes.
Laudale	59.6	+0.2	+0.2	—	+0.3	+0.1	105	+0.2	Increase mostly first hour, water often stirred.
Stornoway	56.2	+0.6	+0.5	—	-0.2	-0.4	90	+0.3	
Nairn	61.7	+0.2	+0.7	+0.7	+0.1	+1.0	100	+0.2	
Inverness	59.1	+0.1	+0.2	—	-0.1	0.0	95	+0.2	
Wick	58.5	+0.4	+0.4	—	+0.1	+0.2	90	uniform	
Sandwick	54.6	+0.3	0.0	—	+0.5	-0.4	190	+0.6	
Dunrossness	56.4	+0.4	+0.4	—	+0.4	-0.4	170	-0.1	
Aberdeen	59.4	+0.4	+0.5	+0.5	+0.5	+0.1	105	-0.2	
Leith	56.2	+0.3	+0.5	—	+1.5	-0.1	60	+0.3	
Ardrossan	48.2	+0.2	+0.1	+0.3	0.0	-0.3	130	uniform	
OBSERVATORIES.					Max. T. No. 10579	Min. T. No. 10	Min. T. 150. No. 5433		
Glasgow	47.1	+0.3	0.0		+0.1	+0.2		-0.2	
Aberdeen	56.7	0.0	+0.6		+0.5	+0.2	Min. 120	uniform	These are the Kew errors.

The method of making these thermometric comparisons is the same in all cases, and may be explained by the comparison made of the Glasgow thermometers in October last. The comparison is made in a room with no fire at the time, if it be possible to obtain such a room. A hand-basin is filled two-thirds with water, and if this water be not very approximately at the same temperature as that of the room itself, it is brought to it by pouring in warmer or colder water as may be required. The water is frequently stirred. The bulbs are placed as close together in the water as possible, and none of them is allowed to be in contact with the bottom of the basin. After the readings are taken and noted down, a frequent practice is to again compare each thermometer with the standard *seriatim*, holding the two in the hand with their bulbs in contact and stirring the water with them for a short time. The cloth is in every case removed from the wet bulb thermometer, and care is taken to see that the mercury of the maximum thermometer is properly shaken home, and the better to secure this, means are taken to provide rather for an increase than a lowering of the temperature of the water during the comparison.

The whole of the comparisons during the tour of inspection were made with standard thermometer No. 2420. I did not use in the comparisons at the Stations No. 710 which had been forwarded to me at Kirkwall, to replace the second standard I carry with me, which had

been unfortunately broken, because these two standards, Nos. 2420 and 710, did not agree on being compared together. Thus, on comparing a few weeks ago the thermometers used last summer by Mr. Wragge on the top of Ben Nevis, I used both standards, Nos. 2420 and 710. They read the same, viz., $49^{\circ}\cdot3$, to which applying the Kew corrections for each the corrected readings are:—

Standard No. 2420 was $49^{\circ}\cdot0$.

Standard No. 710 was $49^{\circ}\cdot3$.

In the above comparison the thermometers were in the water together upwards of a day, the temperature of which varied but little, and the two thermometers did not perceptibly differ from each other on any of the five or six occasions they were read together. As regards the comparison at the Aberdeen Observatory, it has been remarked under the column *Notes*, that each of the thermometers gave readings exactly agreeing with the standard No. 2420, after the Kew corrections had been applied. The difference between the corrected readings of the two thermometers, viz., No. 2620 and No. 710 is the same, viz., $0^{\circ}\cdot3$ from 40° to 80° .

HYGROMETERS.

These are all in a satisfactory condition, and attention appears to be given to change the cloth when required. The only exception is in the case of Ardrossan, where the cloth was of too thick and heavy a texture, so as to result in an undue sluggishness of the instrument. This will be rectified in future.

In all cases the method of manipulating the wet bulb during frosts was again dwelt upon at length, so as to secure, as far as possible, greater uniformity among these observations.

BOX FOR THERMOMETERS.

At Laudale the bulbs of the dry, wet, and minimum thermometers were 3 ft. 9 ins. above the grass. I gave orders to raise them to 3 ft. 11 ins., it not being possible without a new stand to raise them to 4 ft.

At Nairn these bulbs were 3 ft. 10 ins. above the grass. Orders were given to raise them to 4 ft., which can easily be done.

At all the telegraphic reporting stations good positions have been secured for the protected thermometers, and they are all practically at the same uniform height of 4 ft. from the ground. These are, therefore, good climatological stations, and the observations of temperature made at them may be used for climatological purposes and inquiries.

RAIN GAUGES.

At every reporting station except Laudale the rim of the rain gauge is 12 inches above the ground. Orders were given to lower this gauge to 12 inches.

At Leith the rim was distinctly distorted from the circular form, but was set right after the squeeze was made. The cutting down of the shrubs close to this gauge, referred to in my special report, has materially improved the situation of this instrument.

At Dunrossness the rain gauge was a good deal out of order, but a new one was daily expected. The observations made, however, with the old gauge are not likely to have been materially in error.

The rim of the registering rain gauge at King's College, Aberdeen, was deformed, so that the longest diameter was 0·10 inch longer than the shortest. Of course no attempt was made to rectify it; otherwise the instrument appeared to be in excellent order.

A new rain gauge, 8 inches in diameter, has been added since the inspection of 1880. Its rim is 2 feet above the ground, or the height of the registering rain gauge.

CHANGES OF INSTRUMENTS DURING YEAR.

The only noteworthy change in the position of instruments during the year has been the removal of the thermometers and rain gauge at Ardrossan from the grounds of the "Eglinton Arms" Hotel to the grounds of the Public Baths. The new position is preferable to the old one. A small plan of the new station, with the position of the instruments, accompanies this report. The position is, it will be observed, close to the sea, and on three sides surrounded by it. As compared with the last position, it has the additional advantage of being quite removed from the shipping in the harbour and all public works.

NEW STATION IN INVERNESS.

All the instruments at this station are very good, and Mr. Fraser, the observer, reads them accurately, and is very anxious to make his observations good.

The barometer is kept in his shop in the town, at a height of 40 feet above mean sea level; and the thermometers and rain gauge in the garden attached to his mother's house, which is one of a large number of small gardens attached to the houses of Charles Street, Hill Terrace, and King's Mill. The position, though somewhat confined, may be characterised as tolerably good.

(Signed) ALEXANDER BUCHAN,
Inspector Scottish Stations.
Dec. 26, 1881.

C.—REPORTS ON THE INSPECTION OF THE ENGLISH STATIONS.

TELEGRAPHIC REPORTING STATIONS.

London (Brixton) (visited June 1st).—I found everything at this station, as usual, in excellent order.

Yarmouth (visited June 2nd and 3rd).—The reporting barometer reads $\cdot 007$ in. too low, and the check barometer as much as $\cdot 009$ in. too high. The minimum thermometer reads too low. The instruments were found to be not very clean. The rain gauge was not quite firm or level; this was rectified; but the instrument has an indifferent exposure.

Scilly (St. Mary's).—I took to this station, on June 16, two new barometers with uncontracted tubes, 597 and 598; but on the following day, an injury having been done to my standard by some one in the hotel, I was under the necessity of taking one of them (597) with me as a standard. The old barometer (which I have for the present left in its place at the station) this year, as on previous occasions read too high. The new reporting barometer (596) read $\cdot 015$ in. too low as compared with my old standard, and $\cdot 007$ in. lower than the instrument which I have since adopted as a standard. The anemometer worked well, and the other instruments were found to be in good order, but the wet bulb and maximum thermometers read high.

Prawle Point (inspected June 20th).—Two new barometers (585 and 586) had been sent to this station since my visit of last year. The instruments were all in admirable order. The observer, Mr. J. Johns,

had been in the habit of setting the vernier too low, producing a mean error of $-.005$ in., but this, I think, will not again occur.

Hurst Point (visited June 22nd).—Being in possession of a barometer with uncontracted tube for comparison, and the weather being less squally than on the occasion of my last year's visit, the examination of the new barometers at this station was made under favourable circumstances. As a result I recommended the substitution of the check barometer 565 for the previous reporting barometer 596, which I found to read low as compared with both my standards. The observer had been in the habit of setting the vernier too low, producing an error of about $-.005$ in. He has also, I think, at times over-estimated the force of the wind.

From inquiries, as well as observation, I think that the sea disturbance visible at Hurst commonly represents the disturbance beyond the Needles rather inadequately.

The mean angle of deviation in all instances of northward and north-eastward gradients is so abnormally great at this station, that I may be permitted to express my opinion that in these instances the report from Hurst should not be employed for the arrow on the daily weather maps. The extreme deviation appears to be very local.

Jersey (Noirmont) (visited June 24th).—The instruments were all in very good order. The observer now sets the vernier correctly, but the barometers could be read with far greater facility if they were provided with short in place of the long arms. In accordance with the observer's wishes, I marked out a new site for the out-door instruments, 19 yards south of their previous position. The exposure in their new site is perfect, and the altitude is the same, to within 2 or 3 inches, as before. A vane has been erected and works freely.

Spurn Head (inspected August 16th).—Everything in perfect order at this admirably exposed station. The only drawback here is the almost perpetual drifting of the sand which very frequently coats the wet bulb, and at times chokes the rain gauge.

York (August 17th).—The instruments were in good order, but the barometer reads slightly too low. There has been no improvement in the work at this station since the resignation of Mr. Purvis and the appointment of Mr. Keeping.

North Shields (visited August 18th).—The instruments were in fairly good order with the exception of the rain gauge, which on the day of my arrival was found to leak seriously. A new rain gauge has been sent to the station for temporary use.

The greatness of the mean angle of deviation, except with the south-westward gradients at this station, makes a remark similar to that which I have made on the Hurst observations applicable to those at Shields. The abnormally large deviation is local, and an arrow showing the wind at Shields points most commonly as much as two points of the compass to the right of an arrow representing the wind prevailing over district 2 (England N.E.)

Hawes Junction (August 20th).—The instruments were in excellent order. A new observer, Mr. W. Foster, has been at this station since July 1st. At the time of my visit he read the instruments slowly, but correctly.

If the altitude of this station above mean sea level, as previously determined, be assumed to be correct, the barometric pressures reported have been, on the average, about $.01$ in. lower than they should be, as reduced to sea level by the usual tables. The variations, however, between the pressures at this station, thus reduced, and the hypothetical pressures calculated from the reports of the neighbouring stations, are of greater amplitude than I should have anticipated.

Barrow-in-Furness (visited August 21st).—The reporting barometer at this station read, on the average, as much as .038 in. higher than the barometer (597) which I employed as a standard, and .051 in. higher than a good Fortin (1149).

The thermometer screen has been slightly shifted since my visit in 1880. Its position is not quite satisfactory.

I still consider that the observations of sea disturbance made at this station must be supplemented by a large element of conjecture.

The mean angle of deviation of the winds at Barrow-in-Furness is, especially with westward and south-westward gradients, remarkably small. Whether this phenomenon is purely local, or extends over any considerable portion of the Lancashire or Cumberland coast I do not at present know. As far as I can learn, it is noticeable at all hours and seasons. The reports from the station appear to be made with much care and accuracy.

The following table shows the differences between the readings of the barometers and thermometers at the above stations, and the readings of the inspector's standards, the former being uncorrected, and the latter corrected for index errors. In the barometric comparisons corrections have been applied, where necessary, for differences in the temperature of the mercury, and for differences of level of the cisterns. In the thermometric comparisons the instruments have all been compared in water, with the necessary precautions. Several comparisons were usually made, and the mean result recorded.

STATION.	Barometers.			Thermometers.				
	Height of Mercury.	Reporting.	Check.	Temp. of Water.	Dry Bulb.	Wet Bulb.	Max.	Min.
Barrow - - -	29.74	+ .038	- .013	60°	+0°·2	+0°·2	0°·0	-0°·1
Hawes Junction - -	28.67	- .005	*	51°	-0°·1	+0°·2	-0°·1	-0°·2
Hurst Castle - - -	29.84	- .016	+ .002	58°	+0°·1	+0°·2	+0°·1	-0°·3
Jersey - - -	30.09	+ .007	+ .006	58°	+0°·2	+0°·3	+0°·1	-0°·1
London - - -	30.19	+ .003	*	64°	+0°·2	-0°·1	-0°·1	-0°·1
Prawle - - -	29.42	.060	- .002	56°	+0°·2	0°·0	0°·0	-0°·3
Seilly - - -	29.75	- .007	+ .011	58°	+0°·3	+0°·4	+0°·5	-0°·1
Shields - - -	29.63	- .006	- .001	59°	0°·0	+0°·1	-0°·2	-0°·3
Sparn - - -	29.61	- .002	- .004	60°	0°·0	0°·0	0°·0	0°·0
Yarmouth - - -	30.21	- .007	+ .009	62°	+0°·2	0°·0	+0°·1	-0°·6
York - - -	29.39	- .006	*	59°	+0°·1	+0°·1	+0°·1	-0°·8

STATIONS furnishing MONTHLY and WEEKLY REPORTS.

Geldeston (visited June 2nd).—No change has been made in the position of the instruments, except that the rain gauge has been shifted, and the Stevenson's screen turned round, in accordance with previous advice. The sunshine recorder has a very fair exposure, being sheltered, I think, for only 32 hours (approximately) of possible sunshine in the year. The barometer reads correctly, and the other instruments were found to be in good order. The returns from this station are very full and accurate, and the observer is greatly interested in his work.

Chigwell Row (visited June 6th).—The observations are conducted with a fair amount of accuracy. Since my previous visit a margin of turf has been laid down round the screen, but of inadequate dimensions. The barometer gave correct readings. The minimum thermometer, though containing no spirit in the upper end, had, when the Kew corrections had been applied, a rather large *minus* error.

Cooper Hill (visited June 7th).—The out-door instruments at this station are well exposed, and were found to be in good order. The black bulb *in vacuo* reads correctly at 55° as compared with my standard,

and also read correctly when the last comparison was made in February 1879; but according to the correction of the Kew certificate, should read 2° too high. The reporting barometer had never been corrected at Kew, but a correction of $-.015$ in., uniform throughout the scale, had hitherto been applied. Finding, after two comparisons, that with this correction the instrument gave readings which were $.017$ in. too low, I recommended that the instrument (which is a very good one) should be sent to Kew. This has since been done.

North winds at this station are said to be deflected so as to blow from N.W., the locality being somewhat sheltered, and the observations reported are those of the movements of low clouds.

It is unfortunately difficult to obtain a full series of 9 p.m. observations at this place.

Plymouth (June 19th).—The observer was absent at the time of my visit. I, however, obtained access to the thermometers, and compared them in water. The maximum reads high. With the growth of the tree on the S.E. of the rain gauge, the latter becomes more and more seriously sheltered.

Totnes (visited June 20th).—The instruments at this new station were in excellent order, and the observer seems to be careful and attentive. The rain gauge is slightly sheltered on the N.E. The surrounded country is wooded and broken, and I should expect westerly winds to be deflected, so as, perhaps, to blow from W.N.W.

Jersey, St. Aubin's.—I visited this admirably conducted station on June 24th, and found everything in perfect order.

Leicester (August 10th).—The instruments were found to be in a tolerably satisfactory state. The grass minimum has, at 60° a serious error of $+1^{\circ}.1$. The observer in reading the barometer made a nearly uniform error of $-.004$ in., which arose from his wrong adjustment of the fiducial point.

York (visited August 17th).—The reports from this station show no improvement, the meteorological observations being still left in the hands of the gardener of the Museum grounds, who is not able to make the reductions correctly.

Durham (visited August 17th).—No change of any kind has been made since my last visit. The instruments were in fairly good order.

Seaham Harbour.—At the time of my visit, August 18th, the instruments were found in better order than on previous occasions. The barometer, which has an inconvenient site, is rather roughly read by Mr. Aird.

Aysgarth (August 19th).—This station is situated on a small hill sloping to Bishop Dale on the S.E., with moorland rising to between 900 and 1,000 feet above the level of the station, about three miles to S.E. A little behind the house and garden the hill slopes down to the Ure, above which, on the N.W., rises moderately high moorland. To the E.N.E. the valley is comparatively wide. The winds are therefore likely to be considerably affected by the hilly ground; and the extremes of temperature, especially the minima, are not likely to be quite so great as those experienced in the lowest parts of up-land valleys like that of the Ure in this district. The barometer reads correctly. The thermometers used for the reports are in a modified form of Stevenson's screen, large, and zinc-louvred. The observer informs me that the instruments in this screen read, when there is hot sunshine, from $0^{\circ}.3$ to $0^{\circ}.5$ lower than in the usual Stevenson pattern, one of which stands close to the observer's screen. After numerous comparisons of many thermometers, I recommended the substitution of another dry bulb as the observers standard, in place of the one previously used, the Kew corrections of the latter not being now reliable. The dry bulb men-

tioned below in the thermometer table is the one adopted since my visit. A small (5-inch) rain gauge had been hitherto employed. This, with the observer's advice and approval, I exchanged for a large gauge, and further altered the position about 9 yards, on account of some trees on the N.W.

It is needless to say that the work at this station is admirably conducted.

Prestwich (visited August 23rd).—The out-door instruments at this station have a good exposure. Unfortunately, there is little likelihood of getting satisfactory records from the present observer. The barometer at 29.35 had a large error, +.032.

The following table gives the errors of the thermometers as compared with my standard, both *without* and (where any could be obtained from the observers) *with* the corrections previously applied to them. Where these latter corrections have been obtained directly from the Kew certificates the errors entered are marked with an asterisk. All the comparisons were made in water.

THERMOMETER TABLE (Stations furnishing Monthly and Weekly Reports).

—	Dry Bulb.		Wet Bulb.		Maximum.		Minimum.		Solar Radiation.		Gross Minimum.	
	Uncor.	Cor.	Uncor.	Cor.	Uncor.	Cor.	Uncor.	Cor.	Uncor.	Cor.	Uncor.	Cor.
Aysgarth -	0.0	0.0*	+0.3	+0.1*	+0.1	0.0*	-0.4	-0.4*	0	0	0	0
Beccles (Geldston)	+0.2	+0.2*	+0.3	+0.2*	+0.2	-0.1*	-0.1	-0.3*	-0.1	—	—	—
Chigwell Row	+0.1	-0.2*	+0.2	0.0*	-0.1	-0.1*	-1.0	-0.7*	—	—	—	—
Cooper's Hill	0.0	-0.1	0.0	-0.2	+0.1	+0.3	-0.1	+0.1	+0.1	-0.1	+0.2	+0.2
Durham -	+0.1	+0.1	+0.1	+0.1	0.0	+0.1	-0.4	+0.1	-0.1	—	-0.1	+0.1
Jersey (St. Aubin's)	0.0	—	0.0	—	0.0	—	-0.2	—	—	—	+0.1	—
Leicester -	0.0	—	+0.2	—	+0.1	—	0.0	—	+0.1	—	+1.1	—
Plymouth	+0.1	—	+0.1	—	+0.5	—	-0.4	—	—	—	—	—
Prestwich	0.0	-0.2*	+0.3	+0.1*	+0.3	-0.1*	+0.1	-0.1*	—	—	0.0	—
Totnes -	+0.2	0.0*	+0.3	+0.1*	-0.2	-0.2*	0.0	+0.1*	—	—	-0.4	-0.3*
Seabam -	+0.6	—	+0.5	—	-0.4	—	+0.1	—	—	—	—	—
York -	+0.1	—	+0.1	—	0.0	—	-0.2	—	—	—	—	—

The table shows (for the most part) what I regard as a remarkable agreement in the readings of the instruments.

In September, when just about to finish the work of inspection, I was seized with a very prolonged and dangerous illness, from which I am only now convalescent. Several stations, the inspection of which was of immediate importance, were visited during my illness by Mr. Scott and by Mr. Gaster.

The uncontracted barometer, M.O. 597, which, as previously mentioned, I have hitherto retained, I intend to take to its original destination, Scilly, in the early spring, and I shall be grateful if I may then be supplied with a similar instrument as a standard. At many of the most important stations the reporting barometers are now of this pattern, and in squally weather it is impossible fairly to test these instruments by one of a more sluggish nature. In such weather I can employ the old standard (which I have repaired) at the stations where the barometers have contracted tubes. As regards carriage, in careful hands (and an instrument to be used as a standard should pass into no other), the one class of barometer is as convenient, or inconvenient as the other.

(Signed) W. CLEMENT LEY.

I HAVE the honour to report that I visited the telegraphic reporting station at *Cambridge* on the 21st of November last.

I found the instruments in good order, and have no fault to find with the general condition of the station.

St. Leonard's was visited November 28. This is a station of the Second Order and the observer is Dr. H. Colborne, F.M.S. He is a most careful and competent person. The time of my visit was unfortunate, for the thermometer screen had been blown down and the minimum instrument broken by the gale of November 26th.

The garden is rather small, but in other respects the exposure is as good as can be usually obtained in a town.

The following are the errors of the thermometer as determined by me:—

	Cambridge.	St. Leonard's.
Dry - -	+0·4	+0·3
Wet - -	+0·3	+0·3
Maximum - -	-0·1	+0·5
Minimum - -	-0·3	-
Grass Minimum	-	-0·6

ROBERT H. SCOTT.

February 3, 1882.

SIR, Meteorological Office, February 3, 1882.
IN accordance with your instructions, I inspected the following stations in December last:—

1. Stations of Second Order.

Oscott.—Observer, Rev. J. MacElmail, St. Mary's. When I arrived the observer was out, and did not return until after dark, when the instruments were examined as carefully as they could be under the circumstances. The barometer is a Fortin's Standard, and a very good instrument. It is not in a good light, but a lighted taper is always used when observing. The vernier is properly set, and the corrections are carefully applied. There was no opportunity for comparing the instrument with the one I had with me as a standard, but it has been carefully verified at Kew.

Thermometers (compared in air) agreed well together, and with the Inspector's standard. The dry, wet, maximum, and minimum are in a *Stow's* stand (somewhat similar in principle to a Stevenson), and are, as a rule, carefully read.

Rain-gauge is a 5-inch gauge, and its rim is 1 foot from the ground.

The instruments are admirably exposed; and (except in regard to the temperature) the observer appears to be very intelligent and painstaking.

Uppingham.—Observer, Rev. G. H. Mullins. The exposure at this station is very good. The whole of the instruments are also good; they are most carefully read and corrected.

Telegraphic Reporting Stations.

Dover.—Observer, J. Costello.

The positions of the instruments at this station are still bad throughout. The thermometers in their present position cannot record at all accurately the diurnal range of temperature, and the station is completely sheltered from winds blowing from between W., round by N., to E.N.E.

I think that, if possible, some endeavour should be made to remedy these defects.

I am, &c.
(Signed) FREDC. GASTER.

BAROMETERS.

Stations.	Reporting Barometer.		Standard.		Notes.
	Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	
Oscott (St. Mary's College).	29·377	49	—	—	No facility for mounting standard. Reporting barometer had a contracted tube; standard uncontracted. The standard was left at Dover to be used as a "check" barometer.
Uppingham - -	29·112	51	29·119	51	
Dover (S.E. Railway Station).	30·293	48	30·302	49	

THERMOMETERS.

Instruments.	Errors of Thermometers.			Notes.
	Oscott.	Uppingham.	Dover.	
Inspector's standard (corrected).	35·3	45·0	43·2	The instruments at Oscott were verified in air; those at Uppingham and Dover in water.
Dry bulb - - -	+ 0·3	0·0	0·0	
Wet bulb - - -	+ 0·3	- 0·1	- 0·2	
Maximum - - -	+ 0·2	+ 0·4	+ 0·4	
Minimum - - -	0·0	+ 0·1	- 0·2	
Solar radiation thermometer	+ 0·5	—	—	
Terrestrial radiation - -	0·0	—	—	

In the above table, the plus (+) sign shows that the instrument read higher than the standard; the minus (-) sign that it read lower.

REPORTS ON THE INSTRUMENTS AT THE OBSERVATORIES, 1881.

I beg respectfully to submit to the Meteorological Council the following report upon the present condition of the instruments at their self-recording observatories, visited on the days named.

Aberdeen, September 21-23.—All the instruments at this observatory were in good order. The barograph and thermograph clocks were cleaned, but not those of the anemograph or rain gauge, which did not require it.

The standard thermometers were compared and found to have the following corrections at 56°:

Dry, No. 158, 0°·0. Wet, No. 395, -0°·5

Armagh, September 26-28.—The barograph, thermograph, and anemograph at this observatory were all in good order, and were treated as usual. The prickler of the latter instrument was corrected for a slight time displacement.

The standard thermometers were compared and found to require the following corrections:

Dry bulb, No. 391, -0°·5. Wet bulb, No. 392, -0°·4.

The rain gauge was cleaned and the capacity of its receiver tested. This was found to be 0·139 inch only when measured by the jar, but on the latter being tested, it was found that 0·2 cubic inches of water by weight read 0·204 inch in the jar. It is therefore evident that both receiver and jar are at present slightly incorrect, but I cannot say whether the difference is sufficient to account for the difference of one inch in the total annual rainfall in 1880, stated to have been for Dr. Robinson's gauge 32·65 inches, and for the Beckley 33·65 inches.

The barograph was in good order and merely required cleaning, and the same was the case with the thermograph. The wet bulb trace was defective, and was improved by scraping some of the black off the tube. The condition of the wet bulbs was unsatisfactory. I accordingly put on new muslin covers to both.

The corrections to the standard thermometers were determined to be, for the Dry, No. 383, $-0^{\circ}\cdot3$, and for the Wet, No. 383, $-0^{\circ}\cdot1$.

The anemograph was found to be in fair order except that both fans had worked loose on the spindle and were striking the base plate of the instrument as they revolved; the defect was rectified by putting in packing pieces and steadying pins.

The oil used for lubrication had very greatly thickened, and the sensitiveness of the instrument was somewhat impaired. This was easily restored by cleaning and fresh oil.

The rain gauge was in good order with the exception that the clock line was broken; this was repaired and the clock cleaned. The shrubs in the garden in which the instrument is placed appear to have grown somewhat in the way of a free exposure of the gauge.

Glasgow, September 17, 19, and 20.—The new standard barometer, Adie, 1,722, having been safely conveyed to the observatory by me, was placed in the transit room, on the opposite side of the north-west window to that already occupied by the old standard, precautions having been taken to shield it from the sun's rays. On Monday, the 19th, I made a set of comparisons between the two instruments, with the following results:

NEW STANDARD CORRECTED.		OLD STANDARD.		ERROR OF OLD STANDARD.		Observer.
Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	
29·6265	54·5	29·6152	55·5	-0·0113	+1·0	G. M. W.
29·6265	54·5	29·6160	55·7	-0·0105	+1·2	J. Maclean.

I also examined the thermometers in use, and found their corrections to be as follows, deduced from readings of Kew standard thermometer:—

At 52° : dry standard, No. 472, $-0^{\circ}\cdot3$; wet standard, No. 403, $0^{\circ}\cdot6$; max. M.O., No. 10, $-0^{\circ}\cdot1$; max. M.O. No. 10,579, $0^{\circ}\cdot0$; min., 5,433, $+0^{\circ}\cdot2$; min., No. 1,222, $+0^{\circ}\cdot5$.

I had both barograph and thermograph clocks cleaned, and being again troubled with the stoppage of the former on being put together after cleaning, looked into the matter, and found that the defect was due to some faulty repairs executed many years ago, which require certain screws to be left slack when the light stop action is fitted on to the clock. This being now detected and noted, it is hoped stoppage from this

cause may not occur again. The lenses and other parts of the instrument were in perfect order.

Both anemograph and rain-gauge were found in good order, only requiring the usual cleaning and oiling operations to be performed.

The condition of the muslin covers and threads of the wet bulbs was not quite satisfactory, but I was assured that they received the frequent attention necessary at Glasgow.

Kew.—All the self-recording instruments are in good order, and nothing is required in the way of repair or renewal.

Mr. Hicks is constructing a Stonyhurst discharging apparatus, which it is intended to fix experimentally on the Beckley gauge at Kew before applying it to the new gauge he is now constructing for the Hong Kong Observatory.

Holyhead, October 7.—The anemograph at this station was inspected. It was found to be maintained in excellent order. Two blades of one of the fans are somewhat corroded, but will not require renewal during the present year.

The cause of the occasional backward slipping of the velocity pencil was pointed out to Mr. Williams, and suggestions made to prevent its recurrence.

Radcliffe Observatory, Oxford, July 21.—The barograph, thermograph, and rain gauge were found all in good order, and giving excellent results. The velocity trace of the anemograph is irregular and unsatisfactory, from defects in the instrument, which is an old one, constructed on the 1858 model. The minimum thermometers had small quantities of alcohol in their chambers, and they were set right.

Stonyhurst, September 15.—The barograph, thermograph, and anemograph were all examined and found to be in excellent order, as was also the rain gauge, with this exception, the enamel of the funnel is cracked, and chips frequently break off, occasionally choking the tube. A new copper funnel would obviate this defect.

Valencia, October 3-5.—The only defective instrument at this Observatory is the anemograph. Owing to the exposure, wear, and tear, the working parts have become much deteriorated, and now it is evident that renewal is necessary in places.

Three out of four of the cups are showing signs of yielding, one of the stays is broken but has been temporarily repaired with wire. The fans are also partially loosened in the joints and the whole is much corroded. The top bearing also is defective, for being leaky it will not retain the oil poured into it. Two of the four bolts which fix the cover of the box containing the reducing gear are broken off in their holes, and will have to be drilled out. I was unable to do this on the occasion of my visit, but it has since been effected.

The recording apparatus was cleaned, the lifter put in order, and the clock oiled.

The rain gauge had its spindle packed to prevent the excessive back-leash, and the capacity of its receiver was tested against the measure used, and found correct.

The other instruments were in good order, merely the usual cleaning and oiling being required.

The corrections to the standard instruments were found to be, for the dry, No. 339, $-0^{\circ}5$, and for the wet, No. 398, $-0^{\circ}4$.

G. M. WHIPPLE.

Kew Observatory, October 27, 1881.

APPENDIX VIII.

METHOD OF DEALING WITH TELEGRAPHIC WEATHER INTELLIGENCE.

The operations connected with the preparation and issue of the Daily Weather Report, Forecasts, and Storm Warnings have not been materially changed during the year, and remain as follow:—

The Office receives, when the telegraphic communications are perfect, fifty-three reports every morning, thirteen every afternoon (except on Sundays), and nineteen each evening. The interruptions which have occurred at times in the communication with Sumburgh Head and Stornoway have again been of a serious description, both cables having been broken for several months. The suspension of the afternoon reports on Sundays is due to the fact that almost all the telegraphic circuits are closed at the hours at which the messages would be transmitted.

The foreign reporting stations, 23 in number, extend along the entire western coast of the Continent, from Bodö in lat. 67° N. to Corunna in lat. 43° N., and include four stations on the coast of the Baltic, and one in the Mediterranean. The information is received in accordance with arrangements made with the various Meteorological organisations in France, Holland, Germany, Denmark, Norway, and Sweden.

At the British stations the morning observations are taken at 8 a.m. Greenwich time, and most of the telegrams arrive in London at about 9 o'clock, when the Intelligence Department of the Post Office extracts from them the portions required for its wind and weather reports. They are then transmitted to the Meteorological Office by its private wire, where the majority of them usually arrive between 9 a.m. and 10 a.m.

As fast as the reports come in the information is entered on a chart, which shows for each station at 8 a.m. the barometrical and thermometrical readings, with their respective alterations during the preceding 24 hours, the direction and force of the wind, and the state of the weather, together with any changes of importance which may have been noticed in the course of the preceding day. From this chart, which is preserved in the Office, other charts are then drawn for publication in the newspapers, as described further on.

If necessary, telegraphic intelligence of storms or of atmospherical disturbance is immediately sent to our own coasts and to foreign countries. A brief telegraphic resumé of the weather is despatched shortly after 11 a.m. to the Harbour Authorities in Jersey and also to the Marine Ministry in Paris, by which department it is afterwards transmitted to Florence for the benefit of the Italian Naval Service. Another telegraphic message of about 75 words is sent to the Underwriters' Association, Liverpool, containing reports of the pressure, wind and weather at 14 stations on the coasts of the British Islands; and a third message of about the same length is forwarded to the Central News for despatch to the provinces. The last of these messages consists of a brief statement of the general condition of the weather in Western Europe, as shown by the reports for the morning.

It is, however, not only at 11 a.m. that storm warnings are issued to the coasts, for a constant watch is kept during the day, and whenever on the receipt of the regular or of special telegrams the condition of the weather appears to be threatening, cautionary messages are at once issued to such parts of the coast as are thought to be menaced by a gale.

During the year 1881, there were prepared each morning, afternoon, and evening, Forecasts of the weather, for one day in advance; these were drawn up for eleven districts in the British Islands, and issued to subscribers, to certain Clubs, and to many of the London and Provincial newspapers in accordance with the arrangements referred to on p. 12. The districts for which the Forecasts were prepared were those into which the returns for the Weekly Weather Report are divided (*see* p. 97), with the addition of Scotland, N., viz. :—

- | | |
|-----------------------------------|--------------------------------------|
| 0. Scotland, N. | 4. Midland Counties. |
| 1. " E. | 5. England, S. |
| 2. England, N.E. | 6. Scotland, W. |
| 3. " E. | 7. England, N.W. (with
N. Wales). |
| 8. England, S.W. (with S. Wales). | |
| 9. Ireland, N. | |
| 10. " S. | |

The demand for these Forecasts is still considerable, and efforts are being made to increase their accuracy. At the commencement of 1881, however, some changes were made with regard to the issue of those drawn up in the afternoon and evening, to which reference is made further on.

About an hour and a quarter is occupied in the preparation and transmission of the provincial and foreign telegrams, and in the drawing up of the "Remarks" and 11 a.m. Forecasts for the London newspapers, so that the MS. copies for the "Times" and other papers are ready for issue soon after 11 a.m.

The Charts prepared daily for newspaper publication are as follows :—

- | | | | |
|-----------------------------|---|-------------------|-----------------------|
| For the "Times," - | - | two daily, viz. : | for 8 a.m. and 6 p.m. |
| For the Patent Type-found- | } | one | ,, for 8 a.m. |
| ing Company, on behalf of | | | |
| the "Shipping Gazette," | | | |
| and for distribution to the | | | |
| provincial press | - | | |

The 8 a.m. charts are sent out at about 10.15 a.m. and the 6 p.m. chart at about 8.30 p.m.

The draft of the Daily Weather Report (in its enlarged and improved form), with two charts attached, is drawn on transfer paper which is ready by noon, when it is at once sent to the lithographer to be printed. The copies for delivery by hand in London are issued by the lithographer at about 1.30 p.m., while the remainder are received at the Meteorological Office at about 3.30 p.m., whence they are transmitted by post to the subscribers and others.

In addition to the charts referred to above, the Patent Type-founding Company are supplied with various diagrams showing the changes in pressure, temperature, rainfall, wind, and weather for the London district. These are engraved *daily* for the "Daily Chronicle," *weekly* for the "Observer," "Graphic," "Lloyd's Weekly London Newspaper," and the "Agricultural Gazette," and *monthly* for the "Miller." They are all accompanied by remarks on the phenomena exhibited.

At about 3 p.m. the observations taken at eleven home stations at 2 p.m. are received, and those for two foreign stations (Skudesnaes and Rochefort) come in afterwards. Copies of these reports are issued, together with the 8 a.m. report, to certain newspapers and subscribers. Two copies of the "Remarks" (8 a.m. and 2 p.m.) are sent to the Type-founding Company for issue to provincial newspapers for publication, in order to explain the 8 a.m. charts. The telegram of 200 words which used to be prepared and transmitted soon after 6 p.m. to Intelligence Department of the Post Office for the Central News and

the Press Association for publication in the next morning's provincial newspapers has been discontinued, the 8.30 p.m. remarks being preferred.

Thus it will be seen that the demand for the earlier information has again decreased considerably owing to the greater facility offered for the spread of the later (8.30 p.m.) reports and forecasts, as explained in the last Annual Report.

At 7 to 7.30 p.m. the nineteen evening (6 p.m.) reports arrive and are charted and discussed for the morning daily papers in accordance with the arrangement referred to on p. 37. The forecast and remarks are usually ready by 8.30 p.m., but in bad weather, owing to the delay of the reports and the additional care which is necessary in dealing with them, it is frequently 9 p.m. before they are issued. The "Times" still publishes the daily map showing the distribution of pressure, the winds, temperature, and rainfall at 6 p.m., the importance of which can hardly be overestimated.

It will be seen that the official charts for 2 p.m. and for 6 p.m. are still much less complete than that for 8 a.m. That for 2 p.m. is drawn on the information received from eleven home stations, supplemented by two foreign ones, whenever the latter arrive in time to be used. The material for the 6 p.m. charts is now supplied by reports from fifteen stations in the United Kingdom, supplemented by four from continental stations, but the latter frequently arrive late at the very time when they are most wanted, *i.e.*, during bad weather.

The Sunday duty is still conducted as follows:—Two of the clerks attend on Sunday morning at the Central Telegraph Station from 8.30 a.m. to about 10.15 a.m. By an arrangement with the Post Office these clerks are supplied with the telegrams immediately they arrive in London. They are examined and charted, with the view of issuing, when necessary, warnings of coming storms, to our own and neighbouring coasts. It is necessary that promptitude should be observed in this service, as the observations must be dealt with and the warnings issued so that the latter may reach the coast before the telegraph offices close for the day, which is usually at about 10 a.m. No work of any kind is transacted for the newspapers on Sunday mornings, the main object of the service being to give prompt information of storms to our coasts; but a telegram is sent to Paris and Jersey in the same way as on week days, and there is the ordinary interchange of messages with foreign countries. At 6 p.m. the same clerks attend at the Meteorological Office to receive the evening reports and to prepare the 8.30 p.m. Forecasts, and another opportunity is thus offered for the correction or extension of any warnings which may have been issued in the morning.

Daily Weather Report.

No change has been made in the form of the Daily Weather Report since 1st January 1881. The information now published fills four pages of foolscap paper, and is arranged as follows:—

Page 1 contains at present only the title and date of the report; p. 2 contains (1) a map of North-western Europe, showing for 8 a.m. on the date of publication the distribution of pressure, the prevalent winds, and the sea disturbance, with necessary explanations; together with a table showing the mean pressure of the atmosphere for the month; (2) a similar map showing the distribution of temperature, the weather at each station, and the distribution of rainfall during the past 24 hours; together with tables of mean temperature and rainfall at a large number of stations over the United Kingdom.

Page 3 contains (1) remarks on the principal features exhibited by the reports for the day; and (2) the forecasts drawn up for each district at 11 a.m. relating to the weather likely to be experienced during the 24 hours ending at noon on the day after that of publication.

Page 4 contains the whole of the reports from which the above charts, remarks, and forecasts have been drawn, together with the 2 p.m. and 6 p.m. reports of the previous day.

The standing portion of the report (the maps, &c.) is printed in blue, while the information for each day is in black. The whole report is consequently much clearer than it used to be, and no delay has been caused in its publication by the improvements referred to.

Weekly Summary.

Soon after the end of each week a copy of the Weekly Weather Report (Appendix XV., p. 97), printed on large paper, is issued as a supplement to the Daily Weather Report, giving an account of the changes which have been observed in the weather from day to day, together with a brief general statement showing what have been the more prominent features in the weather conditions during the whole period.

In this manner the main meteorological features of the week are presented as a connected story, and additional facility is afforded for future reference.

Correction and Addition List.

Additional steps are taken to insure accuracy in the Daily Weather Report. At the close of each month a return is received from nearly all of the telegraphic reporting stations, containing a copy of all the observations which have been transmitted to London by wire during the month. These schedules are used for checking the daily telegrams, for the preparation of the average and other values of the different elements, and also as evidence in the case of legal proceedings; and about the middle of every month a lithographic sheet has for many years past been issued with the Daily Weather Report, containing corrections for all discrepancies which have been discovered, and supplying any observations which have been omitted in the published reports. Since the 1st January 1882 there have been added to this monthly sheet the mean values for pressure, temperature, and humidity, together with the total rainfall, and the prevalence of various kinds of weather and of winds from each of the eight principal points during the month, for each telegraphic reporting station within our islands.

Weekly Weather Report.

The Weekly Weather Report is a publication which has appeared since the beginning of February 1878. A specimen will be found as Appendix XV., p. 97. The Report now consists of the average and extreme temperatures and the rainfall values and the total amount of bright sunshine in each week, for ten districts in Great Britain and Ireland, together with the difference between them and their respective mean values for the corresponding weeks in previous years. These statistics are now given on page 1 of the publication, the corresponding values for *each station** being given on page 4. In addition to the telegraphic reports, and the returns from the self-recording observatories, weekly

* The sunshine values are furnished for only a limited number of carefully selected stations.

returns from 35 volunteer observers are used in preparing this report, the names of the observers at each station being as under—

Names of Stations.		Names of Authorities.
Alnwick Castle	- - -	Major F. Holland, for the Duke of Northumberland, K.G.
Arlington (N. Devon)	- - -	J. Carter, for Lady Bruce-Chichester.
Bawtry (Hesley Hall)	- - -	B. J. Whitaker.
Birmingham (Oscott)	- - -	Rev. J. MacElmail, St. Mary's College.
Blackpool	- - - <i>MS</i>	C. T. Ward, F.M.S.
Brookeborough	- - -	Mr. Ferguson, for Sir Victor Brooke, F.L.S.
Cheadle	- - - <i>MS</i>	J. C. Philips, F.M.S.
Churchstoke	- - - <i>MS</i>	P. Wright, F.C.S., F.M.S.
Cirencester	- - -	The Royal Agricultural College.
Douglas (Isle of Man)	- - -	A. W. Moore, F.M.S., Cronkbourne.
Dublin	- - -	J. W. Moore, M.D., F.M.S.
Durham	- - -	G. A. Goldney, the Observatory.
Foynes	- - -	T. J. Carey, for Lord Montcagle.
Geldeston	- - -	E. T. Dowson, F.M.S.
Hastings (St. Leonards)	- - -	H. Colborne, F.M.S.
Hereford	- - - <i>MS</i>	T. A. Chapman, M.D., F.M.S.
Hillington	- - - <i>MS</i>	Rev. H. E. B. Ffolkes, M.A., F.M.S.
Laudale (Loch Sunart)	- - -	A. Fletcher, for T. H. G. Newton, F.M.S.
Leicester	- - -	J. C. Smith, the Museum.
Llandudno	- - - <i>MS</i>	J. Nicol, M.D., F.M.S.
Londonderry	- - -	J. Conroy, F.M.S.
Loughborough	- - -	W. Berridge, F.M.S.*
Manchester (Prestwich)	- - -	H. R. O. Sankey, M.D.
Markree Castle (Sligo)	- - -	E. Salles, for Colonel Cooper, F.R.A.S.
Marlborough	- - - <i>MS</i>	Rev. T. A. Preston, M.A., F.M.S.
Plymouth	- - -	J. Merrifield, F.R.A.S.
Rothamsted	- - -	Rainfall by Sir J. B. Lawes, Bart., LL.D., F.R.S., and J. H. Gilbert, Ph.D., F.R.S., temperature by T. Wilson, F.M.S.
*Shrewsbury	- - - <i>MS</i>	Rev. E. V. Pigott, F.M.S.
Silloth	- - -	Rev. F. Redford, F.R.S.E.
Southampton	- - -	J. T. Cook, R.E., Ordnance Survey Office.
Strathfield Turgiss	- - - <i>MS</i>	Rev. C. H. Griffith, F.M.S.
Waterford	- - -	J. Neale.

The returns marked "*MS*" are supplied through the Meteorological Society (London).
 * Mr. Berridge has, since 1st May 1882, been appointed telegraphic reporter in lieu of E. J. Lowe, Esq., Nottingham, resigned.

This report is prepared on Wednesday in every week, and is ready for sale early on Saturday morning, but the summary on its first page appears in the "Times," "Daily News," and some other papers on Thursday morning.

ISSUE OF FORECASTS.

Descriptions of the actual state of the weather, and forecasts *for not more than one day in advance*, are prepared at the Meteorological Office as under:—

On Week Days.

- (1.) At 11 a.m. (from the morning reports), for the 24 hours ending at noon on the day following the date of issue. This issue is intended especially for the early editions of the evening papers, for the clubs, and for exhibition at certain selected stations. See p. 12.
- (2.) At 3.30 p.m. (from the morning and afternoon reports), for the day following that of issue. This set of Forecasts is not

INQUIRIES as to the WEATHER.

INQUIRIES PERSONALLY OR BY MESSENGER.—Any person applying at the Meteorological Office between 11 a.m. and 8 p.m. on week days, and between 6.30 p.m. and 8 p.m. on Sundays, can be supplied in writing with the latest information in the possession of the Office and with the latest forecast issued for any specified district, on payment of one shilling for each inquiry.

INQUIRIES BY LETTER.—Application may be made by letter, enclosing thirteen pence in stamps if the reply is to be *by post*, and two shillings in stamps if the reply (not exceeding twenty words) is to be *by telegraph*.

INQUIRIES BY TELEGRAPH.—Any person may obtain *by telegraph* from the Meteorological Office the latest information as to the weather in any district of the United Kingdom by payment of a fee of 1s., in addition to 2s., the cost of the message to the Meteorological Office and the reply. The telegram containing the inquiry must not exceed 20 words in length, and must be addressed to the

METEOROLOGICAL OFFICE,
LONDON.

Application may also be made for similar information to be sent either *by telegraph* or *post* on some future specified day.

CHECKING OF FORECASTS.

In order to test the accuracy of the forecasts they have been compared carefully with the weather reported in the various districts on the days to which they referred, and the results of this checking have been already given in the Report (p. 13).

In carrying out this comparison the portions of the forecasts which referred to wind have been carefully separated from those relating to weather. The final results of the comparison will be found in Appendix XII., p. 90.

CHECKING OF STORM WARNINGS.

The testing of the warnings is conducted in the following manner: The intelligence issued is compared with the weather experienced on the coasts, as indicated by the various self-recording anemometers, by the telegraphic reporters, and by the several gentlemen who have volunteered to observe for the Office, and whose names will be found in App. XVII.

In order to render the information in the possession of the Office as to the weather experienced on our coasts still more complete, the Council have, as in preceding years, made application to the various Light-house Boards, and have obtained from them the original log-books from some of the most exposed lightships and lighthouses. They would here express their cordial thanks for the co-operation so readily granted to them by these Boards.

The result of the checking for 1881 will be found on p. 16.

The coasts are subdivided into nine districts, as will be seen in the table. Two large tracts of coast are entirely omitted: The west of Ireland from the Shannon to Malin Head, and the West of Scotland from the Mull of Cantyre to Cape Wrath. No warnings are issued to any place within the limits indicated, except to Galway, and

the amount of information as to the weather received from the omitted tracts of coast is, as yet, very scanty.

It should be remembered that in analysing the reports, all observations of the wind in which the force *exceeded* 7 (a "moderate gale") or the velocity exceeded 40 miles an hour, have been quoted as instances of the occurrence of a gale; but it has not been considered that the signal was hoisted late or was hauled down too soon, unless the force of 9 (a "strong gale") or the velocity of 50 miles an hour, was reached prior to the issue of the order to hoist, or subsequent to the issue of the order to lower.

In the Summaries all cases in which the signal has been shown to be late by a single report either of force 9, or of a velocity of 50 miles an hour, have been specially noted.

APPENDIX IX.

LIST of PERSONS, PLACES, &c. to which the Daily Weather Report is supplied, free of cost.

Newspapers :

- *Echo.
- *Evening News.
- *Globe.
- Knowledge.
- Lloyd's Shipping List.
- Mark Lane Express.
- Morning Advertiser.
- New York Herald.
- †Observer.
- *Pall Mall Gazette.
- Plymouth Daily Mercury (Press Association).
- *St. James' Gazette.
- Shipping and Mercantile Gazette (with special daily chart).
- Standard (Morning and Evening).
- Times (1st and 2nd editions).

For Exhibition at following Seaports :

Banff.	Cowes.
Barrow-in-Furness.	Cromer.
Belfast.	Cullercoats.
Blackpool.	Deptford Yard.
Bo'ness.	Dover.
Boscastle.	Exeter (2 copies).
Bournemouth.	Falmouth.
Brighton.	Glasson Dock.
Briton Ferry.	Great Grimsby (2 copies).
Broughty Ferry.	Groomsport.
Buckie.	Hastings.
Budehaven.	Hayle.
Caernarvon.	Holyhead.
Cork.	Kingstown.

* "Remarks" only.

† Saturdays only.

For Exhibition at following Seaports—cont.

Morecambe.	Queenstown.
Lancaster.	Scarboro'.
Leith.	Silloth.
Lowestoft.	Southport.
Margate.	Teignmouth.
Nairn.	Ventnor (2 copies).
Newquay.	Weston-super-Mare.
Penarth.	Whitehaven.
Plymouth.	Wick.
„ G. W. Docks.	Wisbech.
Port Dinorwic.	Worthing.
Porthcawl.	Yarmouth.

In exchange for Observations :

Aird, G. H., Seaham.
 Barnstaple Meteorological Committee.
 Bellingham, J. G., Saffron Walden.
 Cambridge Observatory.
 Chatham, The Instructor in Surveying.
 Clark, J. E., York.
 Clouston, Rev. C., LL.D., Sandwick, Orkney.
 Colborne, H., M.R.C.S., F.M.S., St. Leonard's-on-Sea.
 Cooper, Col., F.R.A.S., Markree, nr. Sligo.
 Conroy, J., F.M.S., Londonderry.
 Cooper, W. F., Sheffield.
 Dowson, E. T., F.M.S., Geldeston, Beccles.
 Durham, University Observatory.
 Fernley Observatory, Southport.
 Greenwich Observatory.
 Leicester Museum.
 Liverpool Observatory.
 Lowe, E. J., F.R.S., Nottingham.
 McCormack, J., Aberdeen.
 Mackay, Rev. W. P., M.D., Hull.
 Miller, S. H., F.R.A.S., Lowestoft.
 Moore, A. W., F.M.S., Isle of Man.
 Moore, J. W., M.D., F.M.S., Dublin.
 Mullins, Rev. G. H., F.M.S., Uppingham.
 Neale, J., Waterford.
 Netley, Army Medical School.
 Northumberland, Duke of, Alnwick.
 Ordnance Survey Office (Southampton).
 Prestwich Asylum, near Manchester.
 Propert, W. P., LL.D., F.M.S., St. David's.
 Radcliffe Observatory, Oxford.
 Richards, W. H., Penzance.
 Rosse, Earl of, F.R.S., Parsonstown.
 Royal Horticultural Society.
 Royal Indian C.E. College, Staines.
 Rugby Natural History Society.
 St. Mary's College, Oscott.
 Vibert, J. E., M.A., St. Aubin's, Jersey.
 Yorkshire Philosophical Society.

Government Offices :

Admiralty : 12 copies.
 Aldershot, Garrison Library.
 Army Medical Department.
 Board of Trade : 3 copies.
 "Britannia," H.M.S., Dartmouth.
 Commons, House of.
 Devonport Dockyard : 2 copies.
 " " Commander-in-Chief.
 " " Captain of Steam Reserve.
 " " Master Attendant.
 Greenwich, R.N. College.
 "Indus," H.M.S., Devonport.
 Ireland, Royal College of Science.
 Lords, House of.
 Mann, J. R., Osborne.
 Medical Department of the Navy.
 "Nankin," H.M.S., Milford Haven.
 Portland, Senior Naval Officer.
 Portsmouth, Commander-in-Chief.
 " " Dockyard.
 " " R. N. College Observatory.
 Registrar General.
 " " of Seamen.
 "Resistance," H.M.S., Rock Ferry.
 Royal Military Academy.
 Sandhurst Staff College.
 Science and Art Department : 2 copies.
 Sheerness, Commander-in-Chief.
 " " Dockyard.
 War Office, Adjutant General, Horse Guards.
 " " Commander-in-Chief.

Societies, &c. :

Association of Underwriters, Liverpool.
 Do. Lloyd's.
 British Museum.
 Buchan, A., F.R.S.E., Edinburgh.
 Crossley, L. J., F.M.S., Halifax.
 Griffith, Rev. C. H., F.M.S., Strathfield Turgiss.
 Meteorological Council : 4 copies.
 " " Society, London.
 Observatories : 7 copies.
 Reuter's Telegram Company.
 Richards, Vice-Adm., Sir G. H., F.R.S., London.
 Royal Society.
 Rundell, W. W., F.M.S.
 Scottish Meteorological Society.
 Trinity House.

Foreign Places :

Algiers, Meteorological Service.
 Bombay, Observatory.
 Brussels, Royal Observatory.
 Calcutta, Meteorological Department.

Foreign Places—cont.

Christiania, Meteorological Institute.
 Constantinople, Imperial Meteorological Observatory.
 Copenhagen, Meteorological Institute.
 Cracow, Observatory.
 Florence, Meteorological Office.
 Freeden, W. H. v., Bonn.
 Hamburg, Seewarte.
 Hébert, M., Draguignan.
 Leipzig, Observatory.
 Lisbon, Observatory.
 Madrid, Royal Observatory.
 Melbourne, Observatory.
 Meudon, French Balloon Corps.
 Nice, Société de Médecine.
 Paris, Meteorological Observatory, Montsouris.
 " Meteorological Society.
 " Ministry of Marine.
 " Observatory.
 " M. Harold Tarry.
 Rome, Meteorological Institute.
 San Fernando, Observatory.
 St. Petersburg, Central Physical Observatory.
 Stockholm, Meteorological Institute.
 Tiflis, Physical Observatory.
 Toronto, Meteorological Office.
 Upsala, University Observatory.
 Utrecht, Royal Meteorological Institute.
 Vienna, Imperial Meteorological Institute.
 Washington, Smithsonian Institution.
 " United States Naval Observatory.
 " Chief Signal Officer, War Office.
 Zürich, Central Meteorological Institute.

APPENDIX X.

FISHERY BAROMETERS.

LIST of PLACES supplied with FISHERY BAROMETERS.

Shetland Isles.—Sandsair, Lerwick.

Orkney Isles.—Burray. Kirkwall.

Scotland, east coast.—Stroma, Keiss, Staxigoe, Wick, Sarclet, Lybster, Dunbeath, Portmahomack, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Roseheart, Pitullie, Inverallochy, Pointlaw, Port Erroll, Findon, Portlethen, Muchals, Stonehaven, Arbroath, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

England, east coast.—Berwick, Beadnell, North Shields, South Shields, West Sunderland, Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn, Wells, Gorleston, Harwich, Brightlingsea, Wivenhoe, Margate, Deal, Kingsdown, Dover.

England, south coast.—Bognor, Portsea, Ryde and Ventnor (2) (Isle of Wight), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh-Salterton, Cawsand, Charlestown, Mevagissey, Gorranhaven, Devoran, Portscath, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn, Mousehole.

England, south-west coast.—St. Ives, Hayle, Padstow, Port Isaac, Boscastle, Fremington, Burnham, Highbridge.

Wales.—Briton Ferry, Swansea, Angle, Milford, Abersoch.

England, north-west coast.—Fleetwood, Morecambe, Maryport.

Isle of Man.—Douglas, Port St. Mary, Peel.

Scotland, south-west coast.—Port Patrick, Stranraer.

Ireland, east coast.—Cushendall, Belfast, Bangor, Donaghadee, Strangford, Ardglass, Carlingford, Greenore, Dundalk, Malahide, Howth, Kingstown (2), Bray.

Ireland, south coast.—Dunmore, Dungarvan, Kinsale, Castletownsend, Crookhaven.

Ireland, west coast.—Port Magee, Valencia, Dingle, Tralee, Tarbert, Kilcredane, Barna, Ballyglass, Elly Bay, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Portnoo, Burton Port, Bunbeg.

Ireland, north coast.—Dunfanaghy, Rathmullen, Buncrana, Greencastle, Portrush, Portstewart.

Scotland, west coast.—Tarbert, Campbeltown, Carradale, Portree (Isle of Skye), Plockton.

Hebrides, Stornoway, Cromore, Babyle, Obb, Ness.

SUMMARY OF INSTRUMENTS ON SERVICE.

England and Wales	-	-	-	-	-	66
Scotland	-	-	-	-	-	50
Ireland	-	-	-	-	-	42
						<hr/>
						158
						<hr/>

APPENDIX XI.

TELEGRAPHIC WEATHER INTELLIGENCE.

The following stations are supplied with telegraphic information of storms free of expense, and signal "cones" have been furnished to most of them, all further expenses attendant on the maintenance and

repair of the apparatus being borne locally. The stations are situated, 81 in England and Wales, 37 in Scotland, 14 in Ireland, 3 in the Isle of Man, and 3 in the Channel Islands.

NORTH.	WEST.	SOUTH.	EAST.
SCOTLAND. EAST COAST.	ENGLAND, N.W.	ENGLAND, S.W.	ENGLAND, E.
Boddam.	Ramsey.	Ilfracombe.	Berwick-on-Tweed.
Lerwick.	Douglas.	Barnstaple.	Tynemouth.
Scalloway.	Castletown.	Boscastle.	S. Shields.
Kirkwall.	Silloth.	Port Isaac.	Sunderland.
Holborn Head.	Maryport.	Newquay.	Middlesborough.
Wick.	Workington.	Hayle.	Redcar.
Inverness.	Whitehaven.	Scilly.	Whithy.
Nairn.	Barrow.	St. Sennen.	Filey.
Burghead.	Morecambe.	Penzance.	Hull.
Lossiemouth.	Fleetwood.	Falmouth.	Goole.
Buckie.	Blackpool.	Pendennis.	Grimsby.
Portsoy.	Lytham.	Mevagissey.	Boston.
Banff.	Southport.	Plymouth.	Sutton Bridge.
Fraserburgh.	Runcorn.	Teignmouth.	Lynn.
Peterhead.	Liverpool.	Exeter.	Sheringham.
Aberdeen.	*Hawarden.	Exmouth.	Cromer.
Stonehaven.	Mostyn.		
Montrose.	ENGLAND, W.		
Broughty Ferry.	Port Penrhyn.		
St. Andrews.	Holyhead.		
Dundee.	Port Dinorwic.		
Grangemouth.	Carnarvon.	ENGLAND, S.	ENGLAND, S.E.
Bo'ness.	*Aberystwith.	Guernsey.	Yarmouth.
Anstruther.	Milford.	St. Helier's, Jersey.	Southwold.
Pittenweem.	Pembrey.	Gorcy, Jersey.	Ipswich.
Burntisland.	Swansea.	Weymouth.	Harwich.
Granton.	Llanelly.	Poole.	Chatham.
Leith.	Briton Ferry.	Cowes.	Sheerness.
Fisherrow.	Porthcawl.	Ventnor.	Faversham.
Dunbar.	Penarth.	Portsmouth.	
Eyemouth.	Cardiff.	Littlehampton.	
	Newport.	Brighton.	
	Weston-super-Mare.	Newhaven.	
	Burnham.	Hastings.	
		Rye.	
	IRELAND, E.	Dover.	
	Belfast.	Margate.	
	Howth.		
FIRTH OF CLYDE.	Kingstown.		
Glasgow.			
Greenock.	IRELAND, S. and W.		
Rothsay.	New Ross.		
Campbelton.	Dunmore East.		
Girvan.	Dungarvan.		
Ballantrae.	Youghal.		
	Queenstown.		
	Passage.		
	Cork.		
	Kinsale.		
	Tralee.		
	Limerick.		
	Galway.		

* Telegrams (only) exhibited.

Circular No. 717.

TELEGRAPHIC WEATHER INTELLIGENCE.

Board of Trade, February 14th, 1874.

THE Board of Trade have been informed by the Meteorological Committee that they are now prepared to re-introduce the use of Admiral FitzRoy's signals (cones and drum) with slightly modified significations, and that the change will take effect on and after 15th March 1874.

The signals to be used will consist of:—

- 1°. Cone, point downwards for Southerly gales; S.E. round by S. to N.W.
- 2°. Cone, point upwards for Northerly gales; N.W. round by N. to S.E.
- 3°. Drum, *with cone*, to indicate the probable approach of a *very heavy gale* from the direction indicated by the cone.*

The drum will not be used without the cone.

The signals are to be kept hoisted *during the daylight only*, until 48 hours have elapsed from the time *the telegram was despatched*, unless countermanded. At night, lanterns may be used wherever the local authorities deem it desirable to do so, as pointed out in the explanatory pamphlet† sent herewith, copies of which are supplied for gratuitous distribution.

It will be seen from the pamphlet in question that the meaning of the signals is that an atmospherical disturbance exists (which will be explained in the telegram), and will probably, but not *necessarily*, cause a gale at the place warned, *from the direction* indicated by the signal.

The Meteorological Office will supply the canvas shapes and lanterns to such places as require them, on loan, but in all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as flagstaff and gear, oil, &c., and also to the keeping of the apparatus in repair, painting, &c., as directed by the Circular No. 278, dated 30th November 1867.

THOMAS GRAY.

* The "drum" is not in use at present.

† The "explanatory pamphlet" referred to is a circular entitled "Telegraphic Weather Intelligence," printed in large type on four pages, so as to be posted up on a board.

APPENDIX XI A.

OPINIONS RESPECTING THE VALUE OF STORM SIGNALS.

IN December 1881 a circular was issued to the local authorities in charge of storm signals requesting information as to the condition of the signals, and the general opinion as to the utility of the warnings. The following are the replies received as to the utility of the signals :—

NORTH LIST.

Boddam	-	-	No circular sent; signals recently supplied.
Lerwick	-	-	" " "
Scalloway	-	-	" " "
Kirkwall	-	-	" They are very serviceable, especially to fishermen, who appreciate them highly."
Holborn Head (Thurso).		-	" They would be of great use if the flagstaff were moved to Pennyland, or one put up there, viz., between Thurso and Scrabster."
Wick	-	-	" The general opinion is that they are very valuable."
Inverness (South Kessock).		-	" The warnings are most useful, and much appreciated."
Nairn	-	-	No reply.
Burghead	-	-	" Very serviceable."
Lossiemouth	-	-	Same reply as Inverness.
Buckie	-	-	" Very generally appreciated."
Portsoy	-	-	" The seafaring class has learned by experience to esteem the value of the storm signal as a boon."
Banff	-	-	Same reply as Inverness.
Fraserburgh	-	-	" The warnings are much appreciated by the seafaring community and the public generally."
Peterhead	-	-	" The general opinion here is that the warning is of great service, inasmuch as it often prevents vessels and boats from going to sea, and the consequences which would probably result thereby."
Aberdeen	-	-	" The signals are hoisted at the dock entrance at Aberdeen, and the opinion is that they are certainly useful."
Stonehaven	-	-	" The opinion is that the signals and warnings are of great utility, and are acted upon."
Montrose	-	-	" The masters of this port are unanimous in saying that the warnings are of great value to them. The fishermen belonging to the village of Ferryden find them of the greatest value to them, as the signals can be seen from any door or window in their village, which saves them crossing the river Southesk to examine the telegrams."
Broughty Ferry	-	-	" The warnings are of very great use to the fishermen and others."
St. Andrew's	-	-	" The general opinion is that the warnings are useful, but the storm occasionally comes before receipt of the telegram."
Dundee	-	-	" The warnings are considered of great service to the seafaring and fishing community."
Grangemouth	-	-	No reply.
Bo'ness	-	-	" The general opinion as to the utility of the warnings is that they are truthful, observed, given effect to, and appreciated."
Anstruther	-	-	" They are regarded as of great utility, and much prized by the fishermen, who regulate themselves by them."
Pittenweem	-	-	" The warnings are highly approved of, and the fishermen are very grateful for the trouble taken in attending to them, and since the Eyemouth disaster a strict attention is paid to them. Only a short time ago two boats which had left the harbour under sail for the deep-sea fishing, on seeing the cone being hoisted returned to port, and as it happened, saved themselves a fruitless voyage (to say the least) of some 50 or 60 miles out and in."

NORTH LIST—*cont.*

- Burntisland - - "The general opinion, I believe to be, is that the warnings are of great utility."
- Granton - - "I think the general opinion is that the signals are useful. From my own observation the telegrams often come after the gale has arrived, but when the signal is hoisted it serves to guide shipmasters and others."
- Leith - - "The warnings are of great value."
- Fisherrow - - "I understand that comparatively little attention was in former times paid to the signal, but since the recent severe and disastrous gales the fishermen give it more heed."
- Daubar - - "The general opinion here is that the warnings should be continued."
- Eycmouth - - "The general opinion of the fishermen is that they would not like to see it done away with."
- Glasgow - - No reply.
- Greenock - - "There is no doubt whatever as to the utility and value of the warnings. They exert a preparatory and prudential influence on all those coming within its scope, and the only drawback in connexion therewith is that the signal is oftentimes thought to be kept too long on 'sign.'"
- Rothesay - - "The general opinion, so far as can be gathered, is that the warnings are *very useful*."
- Campbelton - - "The general opinion is that the cone is useful and should not be dispensed with."
- Garvan - - "On the whole the utility of the warnings is not great."
- Ballantrae - - "Recognised as being of great practical value and are highly appreciated."

WEST LIST.

- Ramsay - - "The sailors and fishermen belonging to this port highly value the storm signals. The cone is so placed that vessels anchoring in the bay can avail themselves of the warnings."
- Douglas - - "General opinion that they are useful and reliable warnings."
- Castletown - - No reply.
- Silloth - - "The warnings are much valued both by the masters of steamers and sailing vessels; they have become indispensable. The telegrams are sometimes long in reaching us; last Friday's [23 Dec. 1881], for instance, which I enclose, was 2 hrs. 40 min. Had it come in due course the captains of out-going vessels on that day would have seen the warnings."
- Maryport - - "I am led to believe that the seafaring people frequenting the port are influenced in their movements to a considerable extent by the exhibition of the signals."
- Workington - - "The general opinion respecting the hoisting of the cone is that the warning given by the Meteorological Office is correct."
- Whitchaven - - "They are valuable and reliable on our coast."
- Barrow-in-Furness - - "The general opinion is that these signals do not give sufficient notice of storms, &c. The gale is frequently here as soon as the telegram."
- Morecambe - - "I think it is generally held that the warnings are reliable and useful, both for the mariners and the fishermen."
- Fleetwood - - "We rely most on messages noting Valencia gales. Vessels don't go to sea on notification of these gales. The general opinion is that the advices are most useful and strictly regarded by both fishermen, coasters, and foreign-going ships."
- Blackpool - - "I am glad to state that the signals are of great service during the summer season to the numerous passenger steamers and sailing boats on the coast in the arrangement of their trips as well as to the large number of visitors to the town. The hoisting of a storm signal has

WEST LIST—cont.

- many times during the season had the effect of making five or six large steamers weigh anchor and proceed to Fleetwood Harbour; distance, 7 miles."
- Lytham - - "The signal warnings are very much appreciated both by masters of vessels and fishermen and by the inhabitants of Lytham."
- Southport - - No reply.
- Runcorn - - "Viewed as generally reliable and of service to captains of vessels."
- Liverpool - - "It is considered that the signals have some utility, though it is not thought that they are of great value."
- Hawarden - - "The messages at Hawarden are duly attended to. The telegram is exposed regularly in a conspicuous place and the warnings are much appreciated."
- Mostyn - - No opinion expressed.
- Port Penrhyn - - "The general opinion is very favourable, but the warnings often reach here after a gale is far spent."
- Holyhead - - "When the signal is up a number of masters of wind-bound vessels and others call at the station to read the telegram and see what the barometer is doing. I think the signals are of great service in drawing attention to probable changes in the weather, and thus causing masters of vessels to act with caution. I believe this to be the prevalent opinion here."
- Port Dinorwic - - "Mariners take a great interest in the warnings, but this port being situated midway between the two entrances to the Menai Straits, viz., Carnarvon and Beaumaris, greater importance is attached to the signals at these two stations in consequence."
- Carnarvon - - "They are appreciated, and the reports and charts much studied."
- Aberystwith - - "The telegrams are always consulted. We consider it a great boon to the town."
- Milford - - "The explanatory telegrams are regularly exhibited in a box with other meteorological information, and are much valued by the masters of vessels and others frequenting the harbour, who have at all times free access thereto."
- Pembrey - - "The general opinion is decidedly that the warnings are of great utility."
- Swansea - - "I cannot say at the moment what is the general opinion as to the utility of the warnings."
- Llanelly - - "Very good."
- Briton Ferry - - "The general opinion is favourable as to the utility of the warnings given."
- Porthcawl - - "General opinion of the warnings, particularly from Valencia, useful."
- Penarth - - "In the opinion of masters of ships visiting this dock, and of our Channel pilots, the storm signals are very useful as notes of warning; though unfortunately many masters do not regard them sufficiently."
- Cardiff - - "The general opinion as to the utility of the warnings is favourable, but fault is found when the storm signals are hoisted and the gale never reaches us. When it is so, I generally haul the signal down."
- Newport (Mon.) - - "The warnings are of great utility, and, as a rule, very accurate."
- Weston-super-Mare - - No reply.
- Burnham - - "Very good."
- Belfast - - "Favourable."
- Howth - - "Coasting vessels and fishermen take great notice of the warning."
- Kingstown - - "The signals are much appreciated by masters of vessels coming to Kingstown."
- New Ross - - No reply.

WEST LIST—cont.

- Dunmore East - "The warnings are a great benefit to the fishermen of the locality; generally they will not proceed to sea when the cone is hoisted. It is also an advantage to vessels proceeding to sea from the port of Waterford, as they have to pass the flagstaff when the signal is hoisted, and the chief officer of coastguard at Dunmore East states that he has often seen vessels put back to Passage when the cone is hoisted. But it frequently occurs that a telegram leaving London after 7 p.m. will not be delivered at Dunmore East until between 8 and 9 o'clock on the following morning, so that generally the depression has passed before any warning can be given."
- Dungarvan - "The public opinion of the storm warnings is that they are generally correct, but they are sometimes late."
- Youghal - "That the general opinion as to the utility of the warnings held by seafaring men and those interested, is that it is a great boon, particularly as the pole on which the cone is hoisted occupies a prominent position, and a view of it is to be had from any part of the harbour."
- Queenstown - "Appreciated."
- Passage - "I have been an old shipmaster, and my opinion, and I believe the general opinion, is that the signals are of the greatest utility."
- Cork - "They are approved of by the seafaring public."
- Kinsale - "Very useful; vessels don't go to sea when the cone is hoisted."
- Tralee - "They are considered on many occasions to be most useful."
- Limerick - "They are considered very useful, though the port is so far inland."
- Galway - "The harbour-master finds the warnings of considerable value, and well founded in the large majority of cases."

SOUTH LIST.

- Ilfracombe - "The general opinion is that the warnings are of great service to the boatmen, Channel pilots, and coasting sailors frequenting the harbour and neighbourhood."
- Barnstaple - "General opinion is favourable; signals appreciated."
- Boscastle - "General opinion is the warnings are of great value."
- Port Isaac - "They [the fishermen] do not much notice the warnings unless from Valencia."
- Newquay - "The warnings are much appreciated by the inhabitants generally, although from our situation on the shores of the Atlantic, S.W. gales often reach us as soon as the warnings. The desideratum is a floating station some 300 miles W. of Valencia."
- Hayle - "Masters of vessels at this port, as a general rule, take but little notice of the warnings."
- St. Mary's (Scilly) - "Most seamen have a favourable opinion of the warnings, and the greater number of vessels remain in the roads till the cone is hauled down, especially in winter."
- St. Senuen - "Not appreciated as they ought to be, but intense ignorance must be taken into account."
- Penzance - "Of very great service, not only to mariners, but also to the large number of fishermen in the place and those who come from Plymouth, Dartmouth, Yarmouth, Lowestoft, &c."
- Falmouth - "The warnings are very much attended to, and in a crowded port like Falmouth are of great service."
- Mevagissey - "In most cases all very satisfactory."
- Devonport :—
 (Commander-in-Chief.) "The warnings have been found generally accurate and of great value, especially when studied in conjunction with local indications of wind and weather and the readings of the barometer."
 (Admiral Superintendent.) "They are considered very useful in giving warning to vessels on leaving the port, as to the probable weather and winds that may be expected."

SOUTH LIST—cont.

- Plymouth - - " Nearly all the captains are in favour of the signals."
 Teignmouth - - " Most valuable."
 Exmouth - - " Most useful to the fishermen and others."
 Guernsey - - " The signals are generally appreciated."
 St. Helier's (Jersey) - " The public seem to take great interest in it."
 Gorey (Jersey) - " The general opinion is amongst all seafaring men that the telegrams are very useful, and especially fishermen take much notice of them, and all are thankful for the same."
 Weymouth - - " Not much regard is paid, the code often being hoisted when the worst of the weather is past and again often hoisted when the bad weather has not arrived here . . . The signal no doubt is good when masters of vessels in Portland Roads are undecided whether they shall weigh or not, owing to the appearance of the sky. When the cone is hoisted in such a case no doubt it decides them to hold on."
 Poole - - " The opinion is in favour of the signal, and every master-mariner and seaman thinks it a very good boon to have them."
 Cowes (R.Y.S.) - " The general opinion is that the warnings are of the greatest utility."
 Ventnor - - No reply.
 Portsmouth - - Do.
 Littlehampton - " The opinion is that the warnings are a valuable indication of the weather."
 Brighton - - " The warnings are appreciated by the public and fishermen, and appear to carry conviction as to their general utility."
 Newhaven - - " Serviceable."
 Hastings - - " Favourable."
 Rye - - " The general opinion is that the warnings are of service, and should be continued."
 Dover - - " I think that the signals are more and more appreciated as the intelligence of the seafaring class increases."
 Margate - - " Very satisfactory both to shipping in the Margate Roads and to the boatmen of Margate."

EAST LIST.

- Berwick - - " They are of great service to the seafaring men of the port, and great reliance is put on them by the same."
 Tynemouth - - " These signals have been and will be an inestimable boon to our seafaring population."
 South Shields - - No reply.
 Sunderland - - Do.
 Middlesborough - " Our experience is that these signals are of the greatest importance."
 Redcar - - " The pilots and fisherman of Redcar take great notice of the warnings."
 Whitby - - " The warnings are considered of *great utility*, to the seafaring population in particular."
 Filey - - " It is not of much service as it can't be seen by ships passing outside Filey Bay, and the fishermen as a rule do not notice it."
 Hull - - " Small craft and sailing vessels, with the exception of fishing smacks, take notice of the warnings and frequently remain in port. Steamers, however, take but little notice of the warnings, and generally proceed to sea in spite of them."
 Goole - - No reply.
 Grimsby - - " That the warnings are occasionally late, but that their receipt induces many captains to act with greater caution than they otherwise would."
 Boston - - " Of much use to the fishermen and the small coasting vessels. The larger ships do not come up to Boston, but lie in the roadstead."

EAST LIST—*cont.*

Sutton Bridge (Wisbech).	-	"The general opinion of the signal is satisfactory."
Lynn	-	"A good deal of interest is taken in these warnings by the mercantile and seafaring community; they are considered reliable and of public utility."
Sheringham -	"	"Very little notice is taken of them."
Cromer -	-	"The general opinion regarding the signal is that it is very useful at Cromer, especially to the fishing population here."
Great Yarmouth	-	"That they are a great benefit to the masters of vessels."
Southwold -	-	"Very much appreciated by the seamen and fishermen of this place."
Ipswich -	-	"Highly appreciated."
Harwich -	-	"Universally approved of."
Chatham (Dockyard)	"	"The general opinion as to the utility of the warning is favourable."
Sheerness (Dock- yard).		No opinion given.
Faversham -	-	"It is of great service, there being great traffic in and out of the East Swale, especially for vessels which use the Swale as a roadstead, of which there are a great many. It is also very useful for vessels bound to the Downs by the 'overland' (or inside) passage from London."

APPENDIX XII.

REPORT ON THE COMPARISON OF THE FORECASTS WITH THE WEATHER
SUBSEQUENTLY EXPERIENCED, for the 12 Months, April 1881 to
March 1882.

The letters used have the following signification:—

a = complete success.		c = partial failure.
b = partial (more than half) success.		d = total failure.

The checking has been conducted on the same system as that employed during 1881, *i. e.*, each forecast has been considered under the separate headings of "Wind" and "Weather," but for this year the results of the 8 p.m. Forecasts only have been published.

The first column gives the percentage of success in "Wind," the second in "Weather," and the third the average of the two.

The Summary for the whole year is given at page 13.

DISTRICTS.	APRIL 1881.				MAY 1881.				JUNE 1881.			
	Percentages.				Percentages.				Percentages.			
	Wind.	Weather.	Average.	a + b	Wind.	Weather.	Average.	a + b	Wind.	Weather.	Average.	a + b
SCOTLAND, N.	a	30	37	34	26	36	31		30	53	42	
"	b	60	37	48	52	42	47		46	37	41	
"	c	7	13	10	13	19	16	78	16	7	12	83
"	d	3	13	8	9	3	6		8	3	5	
SCOTLAND, E.	a	23	50	37	39	62	51		30	30	30	
"	b	60	20	40	29	29	29		57	53	55	
"	c	7	27	17	19	6	12	80	10	13	12	85
"	d	10	3	6	13	3	8		3	4	3	
ENGLAND, N.E.	a	23	40	32	45	52	49		40	37	39	
"	b	54	24	39	42	36	39		40	40	40	
"	c	10	33	21	13	9	11	88	10	16	13	79
"	d	13	3	8	—	3	1		10	7	8	
ENGLAND, E.	a	30	46	38	42	33	38		27	30	29	
"	b	53	24	39	39	58	48		60	46	53	
"	c	7	27	17	13	9	11	86	10	16	13	82
"	d	10	3	6	6	—	3		3	8	5	
MIDLAND COS.	a	23	40	32	42	42	42		40	34	37	
"	b	54	40	47	39	48	44		43	43	43	
"	c	16	13	14	13	10	11	86	13	16	15	80
"	d	7	7	7	6	—	3		4	7	5	
ENGLAND, S.	a	43	37	40	52	58	55		37	33	35	
"	b	43	47	45	26	39	33		53	37	45	
"	c	11	16	14	13	3	8	88	7	27	17	80
"	d	3	—	1	9	—	4		3	3	3	
SCOTLAND, W.	a	27	40	34	36	39	38		34	40	37	
"	b	30	27	28	26	48	37		43	37	40	
"	c	30	30	30	29	13	21	75	10	16	13	77
"	d	13	3	8	9	—	4		13	7	10	
ENGLAND, N.W.	a	27	37	32	42	58	50		33	30	32	
"	b	44	43	44	36	26	21		40	44	42	
"	c	13	18	13	13	13	13	81	20	23	21	74
"	d	16	7	11	9	3	6		7	3	5	
ENGLAND, S.W.	a	37	33	35	36	36	36		20	27	24	
"	b	50	37	41	42	48	45		50	30	40	
"	c	10	30	20	16	13	15	81	20	23	21	64
"	d	3	—	1	6	3	4		10	20	15	
IRELAND, N.	a	40	40	40	36	52	44		30	41	36	
"	b	40	40	40	36	23	30		46	13	44	
"	c	17	13	15	19	16	17	74	10	—	5	80
"	d	3	7	5	9	9	9		11	16	15	
IRELAND, S.	a	34	43	39	26	45	36		20	37	29	
"	b	46	27	36	42	33	38		57	40	48	
"	c	13	23	18	23	16	19	74	13	13	13	77
"	d	7	7	7	9	6	7		10	10	10	

SUMMARY.

BRITISH ISLES	a	31	40	36	38	47	43		31	36	34	
"	b	48	33	40	37	39	38		49	41	45	
"	c	13	22	18	17	11	14	81	12	15	13	79
"	d	8	5	6	8	3	5		8	8	8	

DISTRICTS.	JULY 1881.				AUGUST 1881.				SEPTEMBER 1881.			
	Percentages.				Percentages.				Percentages.			
	Wind.	Weather.	Average.	a+b	Wind.	Weather.	Average.	a+b	Wind.	Weather.	Average.	a+b
SCOTLAND, N.	a	23	49	36	19	42	31		37	37	37	
"	b	55	32	41	45	28	35		53	40	47	
"	c	19	13	16	36	23	30	66	7	18	11	84
"	d	3	6	4	—	9	4		3	7	5	
SCOTLAND, E.	a	26	45	36	29	29	29		40	30	35	
"	b	30	23	31	35	55	45		54	47	51	
"	c	25	26	25	26	10	18	74	3	16	9	86
"	d	10	6	8	10	6	8		3	7	5	
ENGLAND, N.E.	a	29	39	34	26	20	26		37	30	34	
"	b	45	39	42	45	55	50		53	33	43	
"	c	23	16	20	16	16	16	76	10	30	20	77
"	d	8	6	4	13	8	8		—	7	3	
ENGLAND, E.	a	42	36	39	3	29	16		40	33	37	
"	b	26	29	23	71	45	58		44	40	42	
"	c	29	16	22	23	19	21	74	13	20	16	79
"	d	3	19	11	3	7	5		3	7	5	
MIDLAND COS.	a	29	29	29	20	23	25		37	37	37	
"	b	42	49	46	26	45	35		53	36	45	
"	c	19	19	19	42	19	31	60	10	20	15	82
"	d	10	3	6	6	13	9		—	7	3	
ENGLAND, S.	a	23	45	34	22	29	26		28	37	33	
"	b	48	45	47	68	42	55		52	30	41	
"	c	16	—	8	10	23	16	81	13	30	21	74
"	d	13	10	11	—	6	3		7	3	5	
SCOTLAND, W.	a	13	52	33	23	26	25		10	27	19	
"	b	58	16	37	42	45	43		67	46	56	
"	c	19	22	20	19	13	16	68	20	20	20	75
"	d	10	10	10	16	16	16		3	7	5	
ENGLAND, N.W.	a	36	32	31	29	39	34		20	37	29	
"	b	29	49	39	48	35	42		54	36	45	
"	c	25	16	21	13	19	16	76	23	20	21	74
"	d	10	3	6	10	7	8		3	7	5	
ENGLAND, S.W.	a	16	29	23	32	61	47		30	53	42	
"	b	45	45	45	42	26	34		44	27	35	
"	c	26	19	22	19	10	14	81	23	17	20	77
"	d	13	7	10	7	3	5		3	3	3	
IRELAND, N.	a	32	55	44	23	42	33		23	33	28	
"	b	32	26	29	39	42	40		47	53	50	
"	c	26	10	18	19	13	16	73	30	17	19	78
"	d	10	9	9	19	3	11		—	7	3	
IRELAND, S.	a	26	48	37	13	45	29		27	40	34	
"	b	39	23	31	55	39	47		43	30	36	
"	c	19	23	21	19	13	16	76	17	23	20	70
"	d	16	6	11	13	3	8		13	7	10	
SUMMARY.												
BRITISH ISLES	a	27	42	35	22	36	29		30	36	33	
"	b	42	34	38	47	41	44		52	38	45	
"	c	22	16	19	22	16	19	73	15	20	18	78
"	d	9	8	8	9	7	8		3	6	4	

DISTRICTS.	OCTOBER, 1881.				NOVEMBER, 1881.				DECEMBER, 1881.			
	Percentage.				Percentage.				Percentage.			
	Wind.	Weather.	Average.	a + b.	Wind.	Weather.	Average.	a + b.	Wind.	Weather.	Average.	a + b.
SCOTLAND, N.	a	27	37	32	33	57	45		29	65	47	
"	b	47	43	45	57	30	43		62	23	43	
"	c	16	17	17	10	10	10	77	9	6	7	90
"	d	10	8	6	—	3	2		—	6	8	
SCOTLAND, E.	a	30	40	35	27	37	32		32	32	32	
"	b	43	27	35	57	40	49		62	45	54	
"	c	17	10	14	16	16	16	70	3	23	13	86
"	d	10	23	16	—	7	3		3	—	1	
ENGLAND, N.E.	a	40	37	39	33	17	25		19	29	24	
"	b	37	33	35	57	60	59		58	45	52	
"	c	16	13	14	10	20	15	74	19	26	22	76
"	d	7	17	12	—	3	1		4	—	2	
ENGLAND, E.	a	44	40	42	27	27	27		32	23	28	
"	b	33	44	39	63	37	50		48	48	48	
"	c	20	13	16	10	16	13	81	20	26	23	76
"	d	3	3	3	—	20	10		—	3	1	
MIDLAND COS.	a	27	30	29	16	13	15		23	33	28	
"	b	36	50	43	84	46	65		65	48	57	
"	c	30	17	23	—	31	15	72	9	16	12	85
"	d	7	3	5	—	10	5		3	3	3	
ENGLAND, S.	a	43	40	42	40	17	29		23	28	25	
"	b	37	37	37	53	43	48		45	45	45	
"	c	13	16	14	7	13	10	79	32	19	25	70
"	d	7	7	7	—	27	13		—	10	5	
SCOTLAND, W.	a	23	33	30	20	27	24		16	23	20	
"	b	47	37	40	60	40	50		65	52	58	
"	c	20	17	19	20	23	21	74	13	19	16	78
"	d	10	13	11	—	10	5		6	6	6	
ENGLAND, N.W.	a	30	43	37	30	30	30		29	35	32	
"	b	47	24	35	57	23	40		52	29	40	
"	c	16	23	20	13	27	20	72	19	23	21	72
"	d	7	10	8	—	20	10		—	13	7	
ENGLAND, S.W.	a	30	43	37	30	23	27		19	29	24	
"	b	50	20	35	44	33	38		65	48	57	
"	c	7	30	18	23	31	27	65	10	13	11	81
"	d	13	7	10	3	13	8		6	10	8	
IRELAND, N.	a	33	27	30	33	30	32		29	39	34	
"	b	54	40	47	57	43	50		52	39	46	
"	c	10	27	19	7	27	17	82	6	16	11	80
"	d	3	6	4	3	—	1		13	6	9	
IRELAND, S.	a	33	33	33	30	50	40		26	48	37	
"	b	43	34	39	53	30	42		48	29	39	
"	c	17	23	20	10	17	13	72	10	13	11	76
"	d	7	10	8	7	3	5		16	10	13	

SUMMARY.

BRITISH ISLES	a	33	37	35		29	30	30		25	35	30	
"	b	43	35	39		58	39	48		56	41	49	
"	c	17	19	18	74	12	21	17	78	14	18	16	79
"	d	7	9	8		1	10	5		5	6	5	

DISTRICTS.	JANUARY, 1882.				FEBRUARY, 1882.				MARCH 1882.				
	Percentages.				Percentages.				Percentages.				
	Wind.	Weather.	Average.	a+b.	Wind.	Weather.	Average.	a+b.	Wind.	Weather.	Average.	a+b.	
SCOTLAND, N.	a	28	39	33		33	38	35		57	63	60	
"	b	48	32	40	73	46	50	48	83	33	23	28	88
"	c	26	6	16		14	11	12		7	10	9	
"	d	—	23	11		7	3	5		3	4	3	
SCOTLAND, E.	a	19	29	24		36	32	34		53	30	42	
"	b	62	80	46	70	54	25	40	74	33	43	38	80
"	c	19	6	12		7	29	18		3	20	11	
"	d	—	35	18		3	14	8		11	7	9	
ENGLAND, N.E.	a	26	23	25		39	29	34		27	16	22	
"	b	61	45	53	78	50	46	48	82	50	57	53	75
"	c	13	23	18		12	25	18		16	29	18	
"	d	—	9	4		—	—	—		7	7	7	
ENGLAND, E.	a	29	23	26		32	39	36		47	37	42	
"	b	39	27	33	59	50	43	46	82	33	46	40	82
"	c	23	30	27		18	7	13		13	10	11	
"	d	9	20	14		—	11	5		7	7	7	
MIDLAND COS.	a	23	30	27		32	39	36		40	33	37	
"	b	55	32	43	70	43	46	44	80	33	37	35	73
"	c	16	29	22		21	11	16		20	20	20	
"	d	6	9	8		4	4	4		7	10	8	
ENGLAND, S.	a	23	19	21		21	36	29		40	50	45	
"	b	69	57	63	84	63	39	51	80	43	30	37	82
"	c	8	14	11		12	18	15		17	16	16	
"	d	—	10	5		4	7	5		—	4	2	
SCOTLAND, W.	a	19	36	28		25	32	29		33	50	42	
"	b	62	36	49	77	54	50	52	81	53	27	40	82
"	c	10	19	14		21	14	17		14	20	17	
"	d	9	9	9		—	4	2		—	3	1	
ENGLAND, N.W.	a	19	26	23		21	32	27		23	33	28	
"	b	69	52	60	83	61	50	55	82	51	46	50	78
"	c	9	9	9		14	14	14		16	14	15	
"	d	3	13	8		1	4	4		7	7	7	
ENGLAND, S.W.	a	33	40	37		29	50	40		33	33	33	
"	b	52	33	42	79	54	32	43	83	46	40	43	76
"	c	9	23	16		10	18	14		14	27	21	
"	d	6	4	5		7	—	3		7	—	3	
IRELAND, N.	a	42	45	44		32	32	32		40	40	40	
"	b	55	55	45	89	50	61	56	88	54	37	46	86
"	c	—	17	8		14	7	10		3	16	9	
"	d	3	3	3		4	—	2		3	7	5	
IRELAND, S.	a	40	43	42		25	39	32		37	37	37	
"	b	53	37	45	87	50	43	47	79	33	43	38	75
"	c	7	7	7		18	14	16		23	20	22	
"	d	—	13	6		7	4	5		7	—	3	

SUMMARY.

BRITISH ISLES	a	27	32	30		30	36	33		39	38	39	
"	b	57	38	47	77	52	44	48	81	42	39	41	80
"	c	13	17	15		14	15	15		13	18	15	
"	d	3	13	8		4	5	4		6	5	5	

APPENDIX XIII.

CHART SHOWING DISTRICTS.



Meteorological Office, 116, Victoria Street,
London, S.W.

FORECASTS OF WEATHER
For the 24 hours ending at
Noon on Tuesday, 16th May 1882.

(Issued at 11 a.m. on the previous day.)

DISTRICTS.

0. SCOTLAND, N.	-	} North-easterly winds, fresh or strong; fair but cloudy, rather cold.
1. Do. E.	-	
2. ENGLAND, N.E.	-	
3. Do. E.	-	} North-easterly and Easterly breezes, moderate and fresh; wind cold and weather cloudy, but probably fair and dry.
4. MIDLAND COUNTIES	-	
5. ENGLAND, S. (with London and Channel.)	-	
6. SCOTLAND, W. (and I. of Man.)	-	} Easterly winds, moderate; fair and bright.
7. ENGLAND, N.W. (and N. Wales.)	-	
8. ENGLAND, S.W. (and S. Wales.)	-	Easterly winds, fresh and strong; cloudy but fair.
9. IRELAND, N.	-	} Easterly and South-easterly winds, fresh; fair, hazy, warm.
10. Do. S.	-	

GENERAL	-	
WARNINGS	-	None issued.
		By Order, ROBERT H. SCOTT, Secretary.

APPENDIX XIV.

LIST of STATIONS from which DAILY SYNCHRONOUS OBSERVATIONS
(at Oh. 43m. p.m. G. M. T.) have been received in 1881.

Stations.	Observers.	Remarks.
ENGLAND AND WALES.		
Bolton - - -	Rev. T. Mackereth, F.R.A.S.	—
Bradford - - -	J. McLandsborough, F.R.A.S., F.M.S.	—
Cardington - - -	J. McLaren.	—
Chatham, School of Military Engineering.	G. A. Pickles, L.-Corp., R.E.	—
Falmouth Observatory -	The Staff.	—
Greenwich Observatory -	The Staff, for the Astronomer Royal.	—
Guernsey - - -	A. Collenette, F.M.S.	—
Kew Observatory - - -	The Staff.	—
Leicester (Museum) - -	J. C. Smith.	—
Liverpool Observatory (Bidston).	J. Hartnup, Jun.	—
Oscott (St. Mary's Col.)	Rev. J. MacElmail.	—
Oxford, Radcliffe Obs. -	The Staff.	—
Plymouth - - -	J. Merrifield, LL.D., F.R.A.S.	—
Sheffield - - -	W. F. Cooper.	—
Silloth - - -	Rev. F. Redford, M.A., F.R.S.E.	—
Stonyhurst Observatory -	The Staff.	—
Strathfield Turgiss - -	Rev. C. H. Griffith, M.A., F.M.S.	—
Truro (Royal Institution)	W. Newcombe.	—
SCOTLAND.		
Aberdeen Observatory -	The Staff.	—
Glasgow Observatory - -	The Staff.	—
Orkneys (Sandwick Mause).	Rev. C. Clouston, LL.D.	—
IRELAND.		
Armagh Observatory - -	S. Call, for Dr. Robinson [since dead].	—
Galway, Queen's College	M. J. O'Donoghue.	—
Valencia Observatory - -	The Staff.	—
BRITISH COLONIES, POSSESSIONS, &c.		
Barbados, W. I. - - -	Surgeon-Maj. in charge.	—
Gibraltar - - -	Surgeon Gen. in charge.	—
Malta - - -	A. King.	—
Nassau (Bahamas) - - -	C. L. Duncombe.	—
Natal - - -	Surgeon-Maj. in charge.	—
Scutari, British Cemetery	Serg. W. H. Lyne, R.E.	—
Sierra Leone - - -	Surgeon-Maj. in charge.	—

SUMMARY.

England and Wales - - -	18
Scotland - - -	3
Ireland - - -	3
Colonies and British Possessions - - -	7
Total	31

APPENDIX XV.

WEEKLY WEATHER REPORT.

ISSUED BY THE METEOROLOGICAL OFFICE, LONDON.

PUBLISHED BY J. D. POTTER, 31 POULTRY, AND 11 KING STREET, TOWER HILL,
AND E. STANFORD, 55 CHARING CROSS.

VOL. V. No. 20.]

WEEK ENDING MONDAY, MAY 22, 1882.

[Price 2d.
Annual subscription,
post paid. 12s. 6d.]

I.—SUMMARY OF TEMPERATURE, RAINFALL, AND DURATION OF SUNSHINE IN THE UNITED KINGDOM, FOR AGRICULTURAL AND SANITARY PURPOSES.

Explanation of the Map.—The United Kingdom has been divided into Meteorological districts, ten of which are included in the following Summary. They are separately numbered and shaded on the Map, and are similarly numbered in the letterpress, where also they are named.

The black dots show the positions of the stations furnishing the reports on which the Summary is based. The names of the Stations are given in the following list under those of the districts to which they severally belong.

1. SCOTLAND, E.—Nairn, Aberdeen, Leith.
2. ENGLAND, N.E.—Alnwick Castle, Shields, Durham, Scarborough, York, Spurn Head.
3. ENGLAND, E.—Hillington, Yarmouth, Goldeston, Cambridge, Rothamsted.
4. MIDLAND COUNTIES.—Bawtry (Hesley Hall), Loughborough, Leicester, Birmingham, (Oscott), Cheadle, Churchstoke, Hereford, Cirencester, Oxford.
5. ENGLAND, S.—London, Marlborough, Strathfield Turgiss, Dover, Hastings, (St. Leonard's), Southampton, Hurst Castle.
6. SCOTLAND, W.—Laudale (Loch Sunart), Glasgow, Ardrossan, Silloth (Cumberland), Douglas (Isle of Man).
7. ENGLAND, N.W.—Barrow-in-Furness, Stonyhurst, Blackpool, Manchester, Liverpool Observatory (Bidston), Llandudno, Holyhead.
8. ENGLAND, S.W.—Pembroke, Arlington (N.Devon), Cullompton, Falmouth, Plymouth, Prawle Point.
9. IRELAND, N.—Londonderry, Mullaghmore, Markree Castle, Brookeborough, Armagh, Donaghadee.
10. IRELAND, S.—Dublin, Parsoustown, Waterford, Roche's Point, Valencia, Foynes.



Explanation of Summary.—*The words "Mean for the Week," under *Temperature*, signify the mean Temperature in the corresponding week derived from the 20 years observations (1861-80), calculated for the Meteorological Office; the corresponding words under *Rainfall* signify the mean Rainfall obtained from the 10 years observations 1866-75. † Each value in this column (Average of Mean Temperatures for each Day) is the numerical mean of the values in the two columns immediately preceding it. A "Rainy Day" is one on which at least a hundredth of an inch has fallen.

DISTRICTS	Temperature. (In Degrees Fahrenheit.)					Rainfall. (Amounts in tenths of an inch.)			Bright Sunshine.			
	Highest observed.	Lowest observed.	Averages for the Week.			Number of Rainy Days.*	Rainfall for the Week.	More or less than the Mean* for the Week.	Number of Hours recorded.	Percentage of pos- sible Duration.		
			Of Highest each day.	Of Lowest each day.	Of Mean for each day.†						Above or below the Mean* for the Week.	
Principal Wheat- producing Districts.	1. SCOTLAND, E. -	76	33	57	40	48	1 below.	0	—	4 less.	75	63
	2. ENGLAND, N.E. -	71	30	57	41	49	2 below.	0	—	4 less.	81	72
	3. ENGLAND, E. -	73	31	61	40	51	2 below.	1	1	3 less.	87	79
	4. MID. COUNTIES	73	30	64	40	52	1 below.	1	2	3 less.	69	62
	5. ENGLAND, S. -	74	33	63	44	53	1 below.	1	less than 3	4 less.	75	68
Principal Grazing, &c. Districts.	6. SCOTLAND, W. -	72	33	64	43	54	3 above.	1	less than 3	5 less.	81	72
	7. ENGLAND, N.W. -	71	31	63	43	53	0 (average).	1	1	3 less.	80	72
	8. ENGLAND, S.W. -	66	35	60	45	52	1 below.	2	2	3 less.	72	66
	9. IRELAND, N. -	72	33	64	44	54	2 above.	2	2	3 less.	84	75
	10. IRELAND, S. -	71	34	62	45	53	0 (average).	2	3	3 less.	76	68

General Remarks.

Weather was exceedingly fine and dry during the greater part of the week, but after Sunday the 21st it became cloudy and unsettled. On the 22nd thunderstorms were experienced over the inland parts of England and Ireland.

Temperature has been above the mean in "Scotland, W." and "Ireland, N." but a little below it in nearly all other districts. The maxima, which slightly exceeded 70° in most places, but reached 76° at Nairn, were registered on the 18th in the northern parts of the country, and on the 21st or 22nd in most other districts. The minima occurred during the early part of the period, and on the morning of the 16th or 17th the sheltered thermometer fell to freezing point or below it at York, Durham, Hillington, Bawtry, Cheadle, Churchstoke, and Blackpool, while ground frosts were reported from many other places.

Rainfall has been less than the mean in all districts. In "Scotland, E." and "England, N.E." there has been none at all.

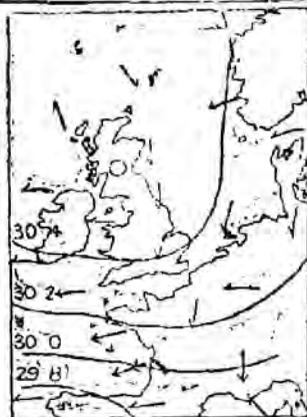
Bright sunshine has been very general, the percentages ranging from 62 in the "Midland Counties" to 79 in "England, E." At York and Goldeston the number of hours exceeded 80 per cent. of the possible duration.

Depressions observed.—During the first half of the week an anticyclone covered nearly the whole Kingdom, and the winds were exceedingly light and variable, except in the extreme S., where they were easterly. On Friday the 19th, the anticyclone began to move away towards Scandinavia, and decided easterly or south-easterly winds spread over the country, but no definite depression made its appearance until Sunday, when disturbances commenced to advance towards our S.W. coasts. On Monday the distribution of pressure was becoming somewhat irregular.

II.—SUMMARY OF WEATHER IN WESTERN EUROPE during the Week ending May 22, 1882.

Synoptic Weather Charts.—8 a.m.

BAROMETER AND WIND.



CLOUD, RAIN, SEA, AND TEMPERATURE.



Weather during the 24 hours succeeding the date of the Charts.

Tuesday, May 16.

Weather dull in the N. of Scandinavia, exceedingly fine and bright in nearly all parts of western Europe. Very fine generally all day, but slight showers occurring in the S.E.

Temperature changed very little, but risen at most of our eastern stations; readings ranging from 54° at Valencia to 44° at Nairn. Maxima rather low on our E. coasts, but between 55° and 63° elsewhere.

Wind moderate to fresh from N. over Scotland, the countries to the eastward of the North Sea, and the greater part of England, but fresh from E. over France, the Channel, and Ireland. Little change later.

Sea rough at the mouth of the Channel.

Barometer rising in nearly all places. Large area of high pressure over these Islands, with low readings over N. Spain and over the Baltic. Rising slowly during the day.

Wednesday, May 17.

Weather again cloudy in parts of Scandinavia and fine and bright elsewhere. Fine, though slightly hazy all day, and no rain falling.

Temperature fallen in the S.E. of England and S. of France, risen elsewhere; readings ranging from 55° in the S.W. to 46° at York. Maxima higher than on 16th, varying between 55° and 67°.

Wind still moderate and fresh from E. over the Channel and W. of France, but lighter and more variable elsewhere. Little change during day.

Sea nearly smooth.

Barometer rising slightly except on our N. coasts and in Norway. Large anticyclone over these Islands, with low pressures over N. Spain and the N. of Scandinavia. Slight decrease during day.

Thursday, May 18.

Weather again very fine over the whole of these Islands and their neighbourhood, and cloudy or dull in parts of Norway and Sweden. Fine hazy and dry weather holding all day.

Temperature risen slightly, and readings ranging from 60° at Aberdeen to 46° at Spurn Head. Maxima again higher, varying between 55° in the S.E. and 70° over central England and Scotland.

Wind light and variable over the greater part of these Islands, but moderate to strong easterly breezes reported from France and the Channel and a fresh southerly wind at Stornoway. Easterly and south-easterly breezes prevailing during the day.

Sea rather rough at Scilly, nearly smooth elsewhere.

Barometer falling slightly, but change very uniform. Anticyclone still shown over these Islands, with low pressures in the extreme N. and extreme S. Falling all day.

Friday, May 19.

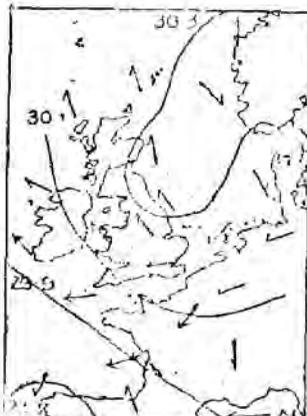
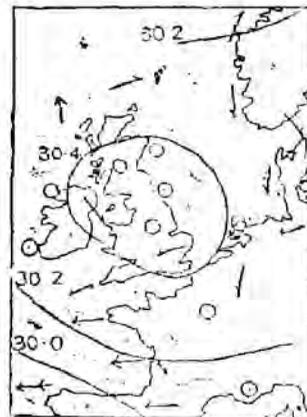
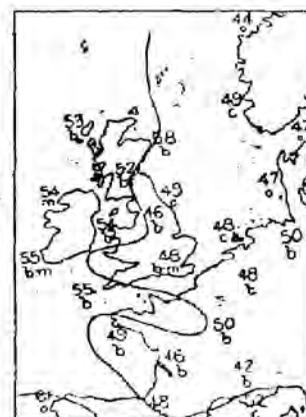
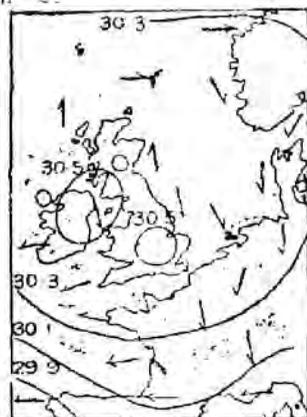
Weather very fine in nearly all places, but rain reported from Biarritz and from Budó. Very fine and dry all day.

Temperature fallen over the central and northern parts of England and the E. of Scotland, risen or changed little elsewhere. Readings ranging from 60° at Ardrossan to 48° at Shields. Rising during day, and maxima varying between 55° at Yarmouth and 76° at Nairn.

Wind easterly over France and our southern districts, but drawing into S.E., and S. in the S. and W. Moderate or fresh in force. Wind increasing a little in force but not changing in direction later.

Sea rough at Valencia and Prawle Point.

Barometer falling except in Sweden, the change being considerable at Valencia. Anticyclone shown over North Sea and depression over N. Spain. Falling steadily all day.

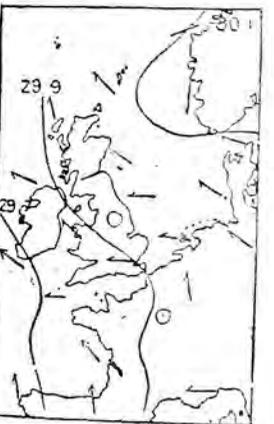
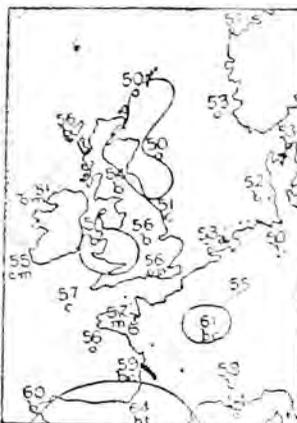
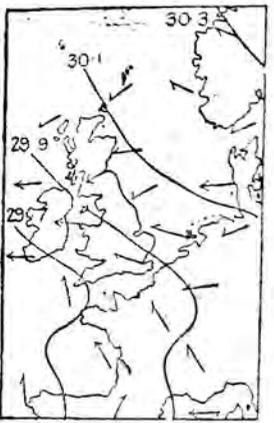
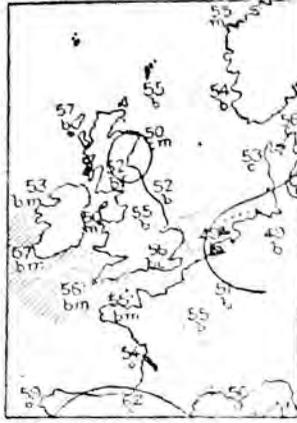
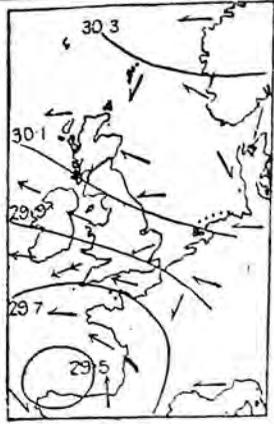


Synoptic Weather Charts.—8 a.m.

Weather during the 24 hours succeeding the date of the Charts.

BAROMETER AND WIND.

CLOUD, RAIN, SEA, AND TEMPERATURE.



Saturday, May 20.

Weather cloudy or dull in the S. and S.W. of France, but fine and bright elsewhere, though with slight haze in several places. Becoming dull and showery on our S.W. coasts later, but continuing fine generally.

Temperature risen a little in the E. of England, fallen a few degrees elsewhere. Readings ranging from 57° at Valencia to 48° at Leith, and maxima in afternoon varying between 53° at Nairn and 65° in London.

Wind easterly on nearly all coasts, blowing lightly in the N., strongly in the S., and with the force of a gale at Scilly. Fresh or strong breezes blowing all day.

Sea rough on our S.W. coasts and at Yarmouth and Toulon.

Barometer falling except in Scandinavia—quickly over France. Anticyclone lying over the N. of Norway and Sweden and depression over Bay of Biscay. Falling all day.

Sunday, May 21.

Weather cloudy or dull on our S.W. coasts, fine and bright elsewhere. Dull with slight showers during the day in the W., but fine generally. Thunder showers occurring over France.

Temperature risen over France and some of our eastern stations, fallen in most other places. Readings ranging from 57° at Scilly to 69° at Nairn, and maxima in afternoon varying between 69° at Cambridge and 55° at Sumburgh Head.

Wind southerly over France and the Channel, easterly elsewhere; moderate in force generally, but blowing freshly in the W. Little change later.

Sea rough at Mullachmore and Valencia, moderate to smooth elsewhere.

Barometer rising in France, falling in most other districts. Anticyclone still lying over the N. of Scandinavia with area of low pressure over our S.W. coasts and the Bay of Biscay. Slight rise occurring except in the N.W. during the day.

Monday, May 22.

Weather still fine and bright over the whole of Scotland and the E. and S.E. of England, but dull elsewhere, with rain in Ireland. Fine in the N. and E. all day, but dull, showery, and thundery in the W.

Temperature risen at the majority of stations and ranging from 63° at Dover to 49° at Wick. Rising during day, and maxima between 70 and 75° at our inland and southern stations.

Wind south-easterly and easterly on nearly all coasts, light or moderate generally, but fresh over the Bay of Biscay and at Valencia. Moderate breezes between S. and E. all day.

Sea rough at Valencia.

Barometer falling slowly in nearly all places, and quickly in N. Norway. Readings still highest over Scandinavia and lowest off our S.W. coasts, but decrease greater all day over Norway and Sweden than elsewhere.

Explanation of Charts.—The two Charts for each day show the general condition of the weather over Western Europe at 8 a.m. In the left-hand Chart the height of the barometer is expressed by "isobars," the value of each line being given in figures. The prevalent winds are shown by arrows, which are drawn flying *with the wind*, the force being indicated thus: \Rightarrow = a heavy gale; \rightarrow = a gale; \dashrightarrow = a fresh to strong breeze; \longleftarrow = a light to moderate breeze; and \odot = a calm. In the right-hand Chart the weather is indicated as follows: $-b$ = blue sky; c = detached clouds; o = overcast; m = misty (hazy); f = foggy; q = squally; r = rain; h = hail; s = snow; l = lightning; and t = thunder. The general distribution of temperature is shown by "isotherms," and the readings at certain places are given in figures. Diagonal lines = rough sea, the shading being proportional to the disturbance.

VALUES for each STATION in SCOTLAND, N. and the CHANNEL ISLANDS.

DISTRICTS.	NAMES OF STATIONS.	Temperature. (In Degrees Fahrenheit.)					Rainfall.			Bright Sunshine		
		Highest observed.	Lowest observed.	Averages for the Week.			Number of Rainy Days.	Rainfall in the Week.	Difference from the Mean for the Week.	Number of Hours recorded.	Percentage of possible Duration.	
				Of Highest each day.	Of Lowest each day.	For whole of each day.						
SCOTLAND, N.	Sumburgh Head	58	36	51.9	42.0	48.5	+1.9	1	0.01	-0.29	*	*
	Stornoway	72	37	62.7	41.7	52.2	+1.1	0	—	-0.59	*	*
	Wick	59	32	56.6	38.6	47.6	-0.1	1	0.02	-0.26	*	80
CHANNEL ISLANDS	Scilly (St. Mary's)	60	41	58.0	48.3	53.2	-1.0	1	0.03	-0.25	*	*
	Jersey (Noirmont)	67	45	61.1	48.1	51.6	-0.4	1	0.21	-0.20	77	72

The above observations made in "Scotland N." and the "Channel Islands" are not included in the Summary on page 1.

BAROMETER AND WIND.

CLOUD, RAIN, SEA, AND TEMPERATURE.

Saturday, May 20.

Weather cloudy or dull in the S. and S.W. of France, but fine and bright elsewhere, though with slight haze in several places. Becoming dull and showery on our S.W. coasts later, but continuing fine generally.

Temperature risen a little in the E. of England, fallen a few degrees elsewhere. Readings ranging from 57° at Valencia to 48° at Leith, and maxima in afternoon varying between 53° at Nairn and 65° in London.

Wind easterly on nearly all coasts, blowing lightly in the N. strongly in the S., and with the force of a gale at Scilly. Fresh or strong breezes blowing all day.

Sea rough on our S.W. coasts and at Yarmouth and Toulon.

Barometer falling except in Scandinavia—quickly over France. Anticyclone lying over the N. of Norway and Sweden and depression over Bay of Biscay. Falling all day.

Sunday, May 21.

Weather cloudy or dull on our S.W. coasts, fine and bright elsewhere. Dull with slight showers during the day in the W., but fine generally. Thunder showers occurring over France.

Temperature risen over France and some of our eastern stations, fallen in most other places. Readings ranging from 57° at Scilly to 46° at Nairn, and maxima in afternoon varying between 60° at Cambridge and 52° at Sumburgh Head.

Wind southerly over France and the Channel, easterly elsewhere; moderate in force generally, but blowing freshly in the W. Little change later.

Sea rough at Mullaghmore and Valencia, moderate to smooth elsewhere.

Barometer rising in France, falling in most other districts. Anticyclone still lying over the N. of Scandinavia with area of low pressure over our S.W. coasts and the Bay of Biscay. Slight rise occurring except in the N.W. during the day.

Monday, May 22.

Weather still fine and bright over the whole of Scotland and the E. and S.E. of England, but dull elsewhere, with rain in Ireland. Fine in the N. and E. all day, but dull, showery, and thundery in the W.

Temperature risen at the majority of stations and ranging from 65° at Dover to 49° at Wick. Rising during day, and maxima between 70° and 75° at our inland and southern stations.

Wind south-easterly and easterly on nearly all coasts, light or moderate generally, but fresh over the Bay of Biscay and at Valencia. Moderate breezes between S. and E. all day.

Sea rough at Valencia.

Barometer falling slowly in nearly all places and quickly in N. Norway. Readings still highest over Scandinavia and lowest off our S.W. coasts, but decrease greater all day over Norway and Sweden than elsewhere.

Explanation of Charts.—The two Charts for each day show the general condition of the weather over Western Europe at 8 a.m. In the left-hand Chart the height of the barometer is expressed by "isobars," the value of each line being given in figures. The prevalent winds are shown by arrows, which are drawn flying with the wind, the force being indicated thus: \gg = a heavy gale; \gg = a gale; \gg = a fresh to strong breeze; \gg = a light to moderate breeze; and \odot = a calm. In the right-hand Chart the weather is indicated as follows:—b = blue sky; c = detached clouds; o = overcast; m = misty (hazy); f = foggy; q = squally; r = rain; h = hail; s = snow; l = lightning; and t = thunder. The general distribution of temperature is shown by "isotherms," and the readings at certain places are given in figures. Diagonal lines = rough sea, the shading being proportional to the disturbance.

VALUES for each STATION in SCOTLAND, N. and the CHANNEL ISLANDS.

DISTRICTS.	NAMES OF STATIONS.	Temperature.				Rainfall.			Bright Sunshine			
		(In Degrees Fahrenheit.)				Number of Rainy Days.	Rainfall in the Week.	Difference from the Mean for the Week.	Number of Hours recorded.	Percentage of possible duration.		
		Highest observed.	Lowest observed.	Averages for the Week.							Inches.	Inches.
		Of Highest each day.	Of Lowest each day.	For whole of each day.								
SCOTLAND, N.	Sumburgh Head	58	36	54.9	42.0	48.5	+1.9	1	0.01	-0.29	*	*
	Stornoway	52	37	62.7	41.7	52.2	+4.1	0	—	-0.59	94	80
	Wick	56	32	50.6	38.6	47.6	-0.1	1	0.02	-0.26	*	*
CHANNEL ISLANDS	Scilly (St. Mary's)	60	41	58.0	48.3	53.2	-1.0	1	0.03	-0.25	*	*
	Jersey (Noirmont)	67	45	61.1	48.1	54.6	-0.4	1	0.21	-0.20	77	72

The above values for the Channel Islands are not included in the Summary on page 1.

The data from which the summary on page 1 has been calculated, are as follow :

DISTRICTS.	NAMES OF STATIONS.	Temperature. (In Degrees Fahrenheit.)						Rainfall.			Bright Sunshing	
		Highest observed.	Lowest observed.	Averages for the Week.			Difference of Daily Average from Mean for the Week.	Number of Rainy Days.	Rainfall in the Week.	Difference from the Mean for the Week.	Number of Hours recorded.	Percentage of possible duration.
				Of Highest each day.	Of Lowest each day.	For whole of each day.‡						
1. SCOTLAND, E.	Nairn	76	33	54.9	40.6	47.8	- 1.6	0	—	- 0.39	73	85
	Aberdeen	63	34	57.6	39.4	48.0	- 1.3	0	—	- 0.42	73	85
	Leith	64	37	58.9	40.0	48.5	- 1.1	0	—	- 0.39	73	85
2. ENGLAND, N.E.	Alnwick Castle	56	33	53.4	40.0	46.7	- 3.4	0	—	?	68	80
	Shields	57	36	53.4	41.3	47.4	- 3.5	0	—	- 0.40	68	80
	Durham	69	30	61.0	37.6	49.3	- 1.0	0	—	- 0.41	98	83
	Scarborough	57	39	54.1	43.8	49.0	- 2.0	0	—	- 0.42	98	83
	York	71	32	65.7	38.7	52.2	- 0.0	1	0.01	- 0.39	98	83
Spurn Head	57	42	53.9	45.6	49.8	- 1.7	0	—	?	98	83	
3. ENGLAND, E.	Hillington	71	31	63.3	37.9	50.6	- 1.3	0	—	- 0.40	85	77
	Yarmouth	68	40	55.0	45.7	50.4	- 2.5	0	—	- 0.41	91	85
	Geldeston	65	31	59.2	41.3	50.3	- 2.6	0	—	- 0.29	82	75
	Cambridge	73	34	65.6	37.4	51.5	- 1.7	0	—	- 0.39	82	75
	Rothamsted	67	33	61.0	38.3	49.7	- 3.5	2	0.43	0.00	82	75
4. MIDLAND COUNTIES	Bawtry (Hesley Hall)	71	32	65.7	38.6	52.2	- 0.5	0	—	- 0.40	69	82
	Loughborough	71	33	66.1	40.7	53.4	+ 0.7	1	0.10	- 0.40	69	82
	Leicester	73	35	68.0	39.6	52.8	+ 0.2	1	0.05	- 0.49	69	82
	Birmingham (Oscott)	70	33	63.7	39.5	51.6	- 0.7	2	0.15	- 0.37	61	55
	Cheadle	68	32	62.6	39.6	51.1	- 0.2	2	0.17	?	61	55
	Churchstoke	67	30	62.3	37.0	49.7	- 2.4	1	0.22	?	73	86
	Hereford	67	35	63.3	40.1	51.7	- 1.5	1	0.20	- 0.22	73	86
	Cirencester	67	35	62.6	40.8	51.7	- 1.1	1	0.32	- 0.18	72	85
Oxford	68	36	63.1	40.1	51.6	- 1.9	1	0.21	- 0.19	72	85	
5. ENGLAND, S.	London†	74	37	65.6	43.0	54.3	- 0.0	2	0.05	- 0.35	73	87
	Marlborough	67	34	62.5	39.0	50.8	- 1.9	1	0.02	- 0.45	71	85
	Strathfield Turgiss	72	33	66.5	39.1	52.8	- 0.8	1	0.03	- 0.29	80	79
	Dover	66	44	59.7	48.3	54.0	- 0.0	1	0.01	- 0.35	80	79
	Hastings (St. Leonard's)	65	41	60.8	45.8	53.3	- 0.3	1	0.03	- 0.32	80	79
	Southampton	68	37	63.6	43.4	53.5	- 0.6	1	0.02	?	80	79
	Hurst Castle	63	40	61.1	46.7	53.9	- 0.5	1	0.04	?	80	79
6. SCOTLAND, W.	Laudale (Loch Sunart) †	72	38	64.6	45.2	54.9	+ 4.9	0	—	?	90	80
	Glasgow	70	40	61.2	43.1	53.7	+ 3.4	0	—	- 0.59	90	80
	Ardrossan	67	40	62.9	43.1	53.0	+ 1.9	0	—	- 0.59	90	80
	Silloth (Cumberland)	70	33	66.2	40.0	53.1	+ 1.4	0	—	- 0.40	90	80
	Douglas (Isle of Man)	70	36	62.7	43.1	52.9	+ 1.7	1	0.07	- 0.32	82	73
7. ENGLAND, N.W.	Barrow-in-Furness	70	38	63.0	41.7	54.2	+ 2.0	1	0.05	?	87	73
	Stonyhurst	69	35	64.1	40.2	52.2	+ 0.6	1	0.01	- 0.55	80	71
	Blackpool	70	31	61.9	38.3	50.1	- 2.6	1	0.01	- 0.39	80	71
	Manchester	68	35	63.6	40.1	51.9	- 0.3	1	0.03	- 0.37	80	71
	Liverpool Obs [‡] (Bidston)	71	38	63.4	43.9	53.7	+ 0.9	1	0.19	- 0.16	80	71
	Llandudno	65	38	61.0	44.3	52.7	- 0.4	1	0.15	- 0.21	73	86
Holyhead	67	41	61.9	46.0	54.0	+ 1.0	1	0.05	- 0.30	73	86	
8. ENGLAND, S.W.	Pembroke	62	42	58.4	46.3	52.4	- 1.0	2	0.57	+ 0.10	67	81
	Arlington (N. Devon)	64	38	61.1	42.7	51.9	- 0.8	1	0.02	?	74	88
	Cullompton	66	35	63.7	40.5	52.1	- 1.6	1	0.01	?	74	88
	Plymouth	59	44	56.5	48.4	52.5	- 1.2	3	0.27	- 0.32	69	84
	Plymouth	66	39	62.0	43.9	53.0	- 1.4	1	0.05	- 0.33	76	72
	Prawle Point	60	40	56.9	46.1	51.5	- 2.1	2	0.08	?	76	72
9. IRELAND, N.	Londonderry	72	36	68.3	41.5	54.9	+ 3.7	2	0.23	- 0.16	73	70
	Mullaghmore	63	48	62.6	49.7	56.2	+ 4.6	1	0.07	?	73	70
	Markree Castle	70	33	62.5	40.8	51.7	- 0.2	1	0.10	- 0.48	73	70
	Brookeborough	72	35	65.1	42.6	54.4	+ 2.5	2	0.18	?	80	80
	Armagh	68	38	62.5	43.7	53.1	+ 1.1	2	0.25	- 0.08	80	80
	Donaghadee	63	37	59.4	44.7	52.1	- 0.2	2	0.15	?	80	80
10. IRELAND, S.	Dublin	65	38	60.9	46.4	53.7	+ 1.3	1	0.14	- 0.35	83	72
	Parsonstown	71	34	64.3	42.7	53.5	+ 0.9	1	0.41	- 0.12	71	84
	Waterford	67	37	61.6	45.0	52.3	- 0.9	3	0.63	+ 0.11	71	84
	Roche's Point	61	40	59.6	45.3	52.5	- 1.2	2	0.18	- 0.35	76	72
	Valencia	67	37	62.0	45.9	54.0	+ 1.1	2	0.09	- 0.55	76	69
	Foynes	65	42	62.9	43.4	53.2	+ 1.2	2	0.41	?	76	69

Stations marked fR are in connection with the Meteorological Society.

An asterisk is inserted in all places for which the information is not usually received.

† For London the Sunshine values are the means of observations made in the City (Banhill Row), at Hampstead, and the Kew Observatory.

‡ As the annual rainfall at Laudale is evidently much greater than at the other stations in "Scotland, W.", and as no average for the years 1866-75 can be obtained, the weekly amounts are not used in calculating the "Difference from the mean for the Week" in that district.

§ Each value in this column is the numerical mean of the values in the two columns immediately preceding it.

SUMMARY OF RAINFALL AND TEMPERATURE for the FIRST QUARTER of the YEAR (January to March).

Vol. V., No. 13a. (Issued as part of the Weekly Weather Report for the year 1882.)

YEARS.	PRINCIPAL WHEAT-PRODUCING DISTRICTS.							PRINCIPAL GRAZING, &c. DISTRICTS.					MEAN FOR ALL THE GRAZING, &c. DISTRICTS.	BRITISH ISLANDS GENERALLY.
	0. SCOTLAND, N.	1. SCOTLAND, E.	2. ENGLAND, N.E.	3. ENGLAND, E.	4. MIDLAND COUNTIES.	5. ENGLAND, S.	MEAN FOR ALL THE WHEAT-PRODUCING DISTRICTS.	6. SCOTLAND, W.	7. ENGLAND, N.W.	8. ENGLAND, S.W.	9. IRELAND, N.	10. IRELAND, S.		
1864	14.5	11.3	10.2	10.8	10.8	11.4	11.4	15.4	13.4	16.9	13.7	10.8	14.3	11.7
1865	10.7	9.5	5.4	5.7	6.1	8.5	8.0	9.9	11.1	15.2	11.8	10.7	11.7	9.7
1866	19.1	11.7	4.5	5.1	6.7	7.5	9.2	17.6	13.3	11.9	13.0	10.5	13.3	11.1
1867	11.8	8.9	6.2	6.2	7.7	9.0	8.3	11.4	12.2	14.0	12.1	12.1	12.1	10.1
1868	6.4	6.7	4.8	3.9	5.1	6.0	5.5	8.8	9.0	10.7	8.6	9.7	9.4	7.2
1869	9.4	6.9	3.8	3.9	4.8	6.1	5.8	11.7	8.7	10.6	10.7	9.4	10.1	7.8
1870	5.2	11.2	7.8	6.1	9.8	10.1	8.9	15.2	14.0	19.5	12.7	13.1	14.9	11.6
1871	7.9	7.2	5.3	5.4	7.1	8.4	6.9	10.6	9.6	14.1	8.8	11.9	10.9	8.7
1872	11.5	6.5	3.5	3.1	5.7	4.4	5.5	8.6	11.0	12.5	8.4	7.7	9.6	7.5
1873	8.4	7.0	3.9	3.7	5.8	6.7	5.9	9.8	8.7	12.6	7.1	10.2	9.7	7.6
Means for 10 years, 1866 to 1875	10.8	8.7	5.1	5.1	6.8	7.8	7.4	11.8	11.1	13.7	10.7	10.7	11.6	9.3
1876	13.4	9.5	6.3	6.7	8.2	7.5	8.6	12.1	12.0	10.9	10.0	10.0	11.0	9.7
1877	11.9	9.8	7.1	7.6	8.3	10.7	9.2	11.2	15.4	14.2	13.4	11.4	13.7	11.3
1878	9.3	4.3	4.9	4.6	3.8	4.9	5.3	11.0	7.3	6.2	8.2	7.9	8.1	6.6
1879	5.5	7.0	3.2	6.3	6.2	8.3	6.4	8.5	6.7	11.2	6.7	11.4	8.9	7.5
1880	7.4	5.3	3.1	3.3	4.2	4.6	4.7	9.1	6.2	6.7	7.6	9.9	7.9	6.1
1881	9.4	7.4	6.2	5.9	6.7	6.8	7.1	9.4	8.6	9.8	7.7	8.7	8.8	7.9
1882	10.5	5.3	3.1	4.1	5.8	3.7	5.4	11.5	7.8	7.1	8.1	9.8	8.9	7.0
Means for 17 years, 1866 to 1882	10.3	8.0	5.1	5.2	6.5	7.3	7.1	11.4	10.3	11.9	9.9	10.4	10.8	8.9
1866	38.3	38.8	39.1	40.9	40.4	41.9	39.9	40.0	40.6	43.4	39.9	40.3	40.8	40.3
1867	36.9	37.2	36.8	38.6	38.2	39.2	37.8	37.7	38.6	41.4	38.1	39.9	39.1	38.4
1868	40.7	41.7	41.1	41.1	41.9	42.0	41.5	42.3	42.4	44.4	42.1	44.3	43.1	42.2
1869	40.0	40.3	40.6	41.1	41.2	42.0	40.9	42.0	42.1	45.1	42.9	44.6	43.3	42.0
1870	37.9	37.4	37.1	37.4	38.0	38.2	37.7	38.6	38.7	41.3	39.8	41.6	40.0	38.7
1871	40.0	39.7	38.8	39.2	40.1	40.3	39.7	40.0	40.0	43.3	41.6	43.1	41.7	40.6
1872	40.9	40.9	41.3	42.5	42.9	43.7	42.0	42.9	43.3	46.1	42.4	44.5	43.8	42.8
1873	39.6	38.4	38.5	38.9	39.1	39.9	39.6	39.2	39.7	42.6	39.8	41.0	40.5	39.6
1874	41.7	41.8	41.3	40.4	41.0	42.0	41.4	42.3	41.8	45.0	42.8	45.2	43.4	42.3
1875	39.5	39.0	38.8	38.6	39.2	40.2	39.2	39.8	40.2	42.9	41.6	44.6	41.8	40.4
Means for 10 years, 1866 to 1875	39.5	39.5	39.4	39.9	40.2	40.9	39.9	40.5	40.7	43.6	41.0	42.9	41.8	40.7
1876	38.7	38.3	39.2	39.6	38.9	40.0	37.0	39.5	39.8	42.1	40.1	43.3	41.0	39.9
1877	38.4	38.8	40.4	41.7	41.8	43.1	40.5	41.8	41.9	44.4	41.4	45.2	42.8	41.6
1878	39.4	40.1	40.8	40.6	41.8	41.7	40.7	41.9	42.2	44.2	42.5	45.1	43.2	41.8
1879	35.8	34.2	35.9	36.5	36.4	37.8	33.1	36.5	36.8	40.8	33.0	40.5	38.5	37.2
1880	40.6	39.8	39.5	39.2	39.9	40.5	39.9	41.3	40.6	43.5	42.2	44.1	42.3	41.0
1881	34.4	33.5	34.3	36.1	35.8	38.2	35.4	35.3	36.6	39.9	37.5	39.8	37.8	36.3
1882	41.8	42.9	42.8	42.1	42.6	43.5	42.6	43.7	43.5	44.9	44.8	46.0	44.6	43.0
Means for 17 years, 1866 to 1882	39.0	39.0	39.2	39.7	40.0	40.8	39.6	40.2	40.5	43.3	41.0	43.1	41.7	40.5

TABLE showing the DATES of the DRIEST and WETTEST, and the COLDEST and WARMEST corresponding QUARTERS for the 17 years, 1866 to 1882.

		WHEAT DISTRICTS.		GRAZING, &c. DISTRICTS.		GENERALLY.	
		Year	inches.	Year	inches.	Year	inches.
Rainfall	Driest	1881	4.7	1881	7.9	1880	6.1
	Wettest	1866	9.6	1872	14.9	1866	11.7
Temperature	Coldest	1881	35.4	1881	37.8	1881	36.5
	Warmest	1882	42.6	1882	44.6	1882	43.0

SUMMARY OF RAINFALL AND TEMPERATURE for the FIRST QUARTER of the YEAR (January to March).

Vol. V., No. 13a. (Issued as part of the Weekly Weather Report for the year 1882.)

YEARS.	PRINCIPAL WHEAT-PRODUCING DISTRICTS.					PRINCIPAL GRAZING, &c. DISTRICTS.									
	0. SCOTLAND, N.	1. SCOTLAND, E.	2. ENGLAND, N.E.	3. ENGLAND, E.	4. MIDLAND COUNTIES.	5. ENGLAND, S.	MEAN FOR ALL THE WHEAT-PRODUCING DISTRICTS.	6. SCOTLAND, W.	7. ENGLAND, N.W.	8. ENGLAND, S.W.	9. IRELAND, N.	10. IRELAND, S.	MEAN FOR ALL THE GRAZING, &c. DISTRICTS.	BRITISH ISLANDS GENERALLY.	
1866	ins. 14.8	ins. 11.3	ins. 5.8	ins. 7.4	ins. 7.1	ins. 11.4	ins. 9.6	ins. 15.4	ins. 13.4	ins. 16.9	ins. 11.7	ins. 12.0	ins. 14.3	ins. 11.7	
1867	10.7	9.5	5.4	5.7	8.1	8.8	8.0	9.9	11.1	15.2	11.8	10.7	11.7	9.7	
1868	10.1	11.7	4.9	5.4	6.7	7.5	9.2	17.6	13.3	11.9	15.0	10.5	13.3	11.1	
1869	11.8	8.9	6.2	6.2	7.7	9.0	8.3	11.4	12.2	14.0	12.1	12.1	12.4	10.1	
1870	6.4	6.7	4.8	3.9	5.1	6.0	5.5	8.8	9.0	10.7	8.6	9.7	9.4	7.2	
1871	9.4	6.9	3.8	3.9	4.8	6.1	5.2	11.7	8.7	10.0	10.7	9.4	10.1	7.8	
1872	8.2	11.2	7.8	6.1	9.8	10.1	8.9	15.2	14.0	19.5	12.7	13.1	14.9	11.6	
1873	7.9	7.2	5.3	5.4	7.1	8.4	6.9	10.0	9.6	14.1	8.8	11.9	10.9	8.7	
1874	11.5	6.5	3.5	3.1	5.7	4.4	5.8	8.6	11.0	12.5	8.4	7.7	9.6	7.5	
1875	8.4	7.0	3.9	3.7	5.8	6.7	5.9	9.8	8.7	12.6	7.1	10.2	9.7	7.6	
Means for 10 years, 1866 to 1875	10.8	8.7	5.1	5.1	6.8	7.8	7.4	11.8	11.1	13.7	10.7	10.7	11.6	9.3	
1876	18.4	9.5	6.3	6.7	8.2	7.5	8.6	12.1	12.0	10.9	10.0	11.0	11.0	9.7	
1877	11.9	9.8	7.1	7.6	8.3	10.7	9.2	14.2	15.4	14.2	13.4	11.4	13.7	11.3	
1878	9.3	4.3	4.9	4.6	3.8	4.9	5.3	11.0	7.3	6.2	8.2	7.9	8.1	6.6	
1879	5.5	7.0	5.2	6.3	6.2	8.3	6.4	8.5	6.7	11.2	6.7	11.4	8.9	7.5	
1880	7.4	5.3	3.1	3.3	4.2	4.6	4.7	9.1	6.2	6.7	7.6	9.9	7.9	6.1	
1881	9.4	7.4	6.2	5.9	6.7	6.8	7.1	9.4	8.6	9.8	7.7	8.7	8.8	7.9	
1882	10.5	5.3	3.1	4.1	5.8	3.7	5.4	11.5	7.8	7.1	8.1	9.8	8.9	7.0	
Means for 17 years, 1866 to 1882	10.3	8.0	5.1	5.2	6.5	7.3	7.1	11.4	10.3	11.9	9.9	10.4	10.8	8.9	
1866	38.3	38.8	39.1	40.9	40.4	41.0	39.9	40.0	40.6	43.4	39.9	40.3	40.8	40.3	
1867	36.9	37.2	36.8	38.6	38.2	39.2	37.8	37.7	38.6	41.4	38.1	39.9	39.1	38.4	
1868	40.7	41.7	41.1	4.4	41.9	42.0	41.5	42.3	42.4	44.4	42.1	44.3	43.1	42.2	
1869	40.0	40.3	40.6	41.1	41.2	42.0	40.9	42.0	42.1	45.1	42.9	44.6	43.3	42.0	
1870	37.9	37.4	37.1	38.0	38.2	37.7	37.8	38.7	41.3	39.8	41.6	41.6	40.0	38.7	
1871	40.0	39.7	39.8	39.2	40.1	40.3	39.7	40.0	40.0	43.3	41.6	43.4	41.7	40.6	
1872	40.9	40.9	41.3	42.3	42.9	43.7	42.0	42.9	43.3	46.1	42.4	44.5	43.8	42.8	
1873	39.0	38.4	38.5	38.9	39.1	39.9	39.0	39.2	39.7	42.6	39.8	41.0	40.5	39.6	
1874	41.7	41.8	41.3	40.4	41.0	42.0	41.4	42.3	41.8	45.0	42.8	45.2	43.4	42.3	
1875	39.5	39.0	38.8	38.6	39.2	40.2	39.2	39.8	40.2	42.9	41.6	44.6	41.8	40.4	
Means for 10 years, 1866 to 1875	39.5	39.5	39.3	39.9	40.2	40.9	39.9	40.5	40.7	43.6	41.0	42.9	41.8	40.7	
1876	38.7	38.3	39.2	39.0	38.9	40.0	39.0	39.5	39.8	42.4	40.1	43.3	41.0	39.9	
1877	38.4	38.8	40.4	41.7	41.8	43.1	40.7	40.5	41.8	44.9	41.4	45.2	42.8	41.6	
1878	38.4	40.1	40.8	40.6	41.8	41.7	40.7	41.9	42.2	44.2	42.5	45.1	43.2	41.8	
1879	35.8	34.2	35.9	36.5	36.4	37.8	35.1	36.5	36.8	40.8	35.0	40.5	38.5	37.2	
1880	40.6	39.8	39.5	39.2	39.9	40.5	39.0	41.3	40.6	43.5	42.2	44.1	42.3	41.0	
1881	34.4	33.5	34.3	36.1	35.8	38.2	35.4	35.3	36.6	39.9	37.5	39.8	37.8	36.3	
1882	41.8	42.9	42.8	42.1	42.6	43.5	42.6	43.7	43.5	44.9	44.8	46.0	44.6	43.0	
Means for 17 years, 1866 to 1882	39.0	39.0	39.2	39.7	40.0	40.8	39.6	40.2	40.5	43.3	41.0	43.1	41.7	40.5	

TABLE showing the DATES of the DRIEST and WETTEST, and the COLDEST and WARMEST corresponding QUARTERS for the 17 years, 1866 to 1882.

	WHEAT DISTRICTS.		GRAZING, &c. DISTRICTS.		GENERALLY.	
	1880 -	1866 -	1880 -	1872 -	1880 -	1866 -
Rainfall { Driest	inches. 4.7	9.6	inches. 7.9	14.9	inches. 6.1	11.7
Temperature { Coldest	35.4	35.4	37.8	37.8	36.5	36.5
Temperature { Warmest	42.6	42.6	41.6	41.6	43.0	43.0

NOTES.

1.—Rainfall.

The mean values for the Rainfall in the various districts given in this Table for the years 1866 to 1877 were obtained from observations made at the following stations:—

Districts.	Stations.	Districts.	Stations.
0. SCOTLAND, N.	Loch Broom. Helmsdale. Sandwick Mause.	5. ENGLAND, S.	Bridport. Selborne. Maidstone. London (Camden Town).
1. SCOTLAND, E.	Inverness. Aberdeen. Ballater. Logierait. Stirling. Hawick.	6. SCOTLAND, W.	Dumfries. Ayr. Castle Toward.
2. ENGLAND, N.E.	N. Shields. York. Grimsby. Boston.	7. ENGLAND, N.W. and N. WALES.	Llandudno. Manchester. Skipton.
3. ENGLAND, E.	Fakenham. Reccles. Witham. Bury St. Edmunds. Yarmouth. Cambridge. Bury St. Edmunds.	8. ENGLAND, S.W. and S. WALES.	Barnstaple. Bodmin. Haverfordwest. Bhayader.
4. MIDLAND COUNTIES	Leicester. Derby. Tenbury. Shiffnal. Cirencester. Banbury. Hitchin.	10. IRELAND, S.	Cork. Waterford. Killaloe. Portarlington. Monkstown, Co. Dublin.

(The values were obtained mainly from Symons' Monthly Meteorological Magazine, supplemented by some of the values contained in the Reports of the Rainfall Committee of the British Association, 1868-1876.)

2.—Temperature.

The Temperature values for the years 1866 to 1877 have been obtained from the following stations:—

Districts.	Stations.	Districts.	Stations.	
0. SCOTLAND, N.	Sandwick Manse. Stornoway. Dunrobin.	7. ENGLAND, N.W. and N. WALES.	Stonyhurst. Bradford. Leeds. Eccles. Liverpool. Llandudno.	
1. SCOTLAND, E.	Culloden. Aberdeen. Perth. Leith.			
2. ENGLAND, N.E.	Bywell. N. Shields. Hull.	8. ENGLAND, S.W. and S. WALES.	Gloucester. Taunton. Barnstaple. Truro. Helston.	
3. ENGLAND, E.	Royston. Holkham. Norwich. Wisbeach. Somerleyton.			
4. MIDLAND COUNTIES	Derby. Nottingham. Cardington. Oxford.	9. IRELAND, N.	1866 to 1873. 1874 to 1877.	Belfast. Milltown (Banbridge). Armagh.† Athlone.* Moville. Milltown. Armagh. Donaghadce.
5. ENGLAND, S.	London (Camden Town). Weybridge. Strathfield Turgiss. Osborne. Bournemouth. Worthing. Greenock.	10. IRELAND, S.	1866 to 1873. 1874 to 1877.	Dublin.* Curragh Camp. Buttevant.* Cork. Valencia.† Kingstown. Parsonstown. Cork. Roche's Point. Valencia.
6. SCOTLAND, W.	Cockermouth. Silloth. Carlisle.			

(The values were obtained mainly from the returns published quarterly by the Registrar General and those published by the Scottish Meteorological Society, in their Quarterly Journal, and the reports of the Army Medical Department, besides the records of the two Irish observatories, Valencia and Armagh. The returns for Cork were furnished by R. Caulfield, Esq., LL.D.)

For the years 1878 to 1882 the means are obtained from the observations published in the Weekly Weather Report.

* Did not commence till January 1867.

† Did not commence till January 1869.

By Order,
ROBERT H. SCOTT,
Secretary.

APPENDIX XVI.

METHODS FOLLOWED IN DEALING WITH METEOROLOGICAL RETURNS FROM LAND STATIONS IN THE UNITED KINGDOM.

These stations are of five classes, as stated on page

I.—*Observatories continuously observing all the Meteorological Elements.*

Hourly measurements of the curves obtained from the self-recording instruments at the seven observatories of the Office are made by the observers at each station on printed forms supplied for the purpose, which, together with the curves, are forwarded to the Office weekly. They comprise measurements of the barograms, of the dry and wet-bulb thermograms, of the anemograms, and of Beckley's rain-gauge curves. Returns from observatories.

The measurements are subjected to a careful examination in order to ensure as far as possible their accuracy, and the regulations which have been adopted to secure this end will be found fully detailed in the Report of the Office for 1868. They comprise rules for the guidance of observers, as well as of the assistants charged with the examination of the work at the Office. Attention need be called here to only two of these rules, viz.: (*a*) the use of subsidiary sheets on which are entered the results of a second set of measurements of the curves, made after and quite independently of the first set and with a different scale, the two sets of measures being afterwards compared together, and any differences found inquired into and set right; and (*b*) the re-measurements of the curve made by the assistants at the Meteorological Office, and which always amount to 10, and in doubtful cases many more, per month for each element. The attention of the observers is always drawn to such errors as may be detected, and to any failures in the continuity of the curves arising from failure of the light, stoppage of the clock, defective photography, faulty action of the wet-bulb thermometer, &c.; a report containing the results of the examination of each Observatory being also submitted to the Council each month and printed in their minutes. The curves and tabulations are eventually bound and stored in the Office. Examination of returns.

In addition to the publication of the "Hourly Values" and mean results, tracings of the curves themselves upon a reduced scale are engraved on copper plates and published in the "Quarterly Weather Report." The instruments by which this reduction is effected are described in the Report of the Office for 1870; but since that time many improvements have been effected in the methods of dealing with the curves; sources of error unavoidable in the original traces have been detected and are now allowed for, or met by special contrivances, and as the result, greater faithfulness is secured in the reproductions. The *average* degree of accuracy now attained is within $0^{\circ}\cdot 2$ for the thermograms, and $0\cdot 001$ inch for the barograms (see note accompanying Quarterly Weather Report, Part IV., 1874). Results of examination and report to Council.

In addition to the curves obtained from the self-recording instruments, a continuous curve of vapour tension is got from the reduced thermogram traces by means of the instrument invented for the purpose, and described in the Report of the Office for 1871, and is engraved on the copper plates with the automatic records. Plates of Quarterly Weather Report.

Accuracy of the plates.

Curve of vapour tension.

Chart plates.

In the more recent numbers of the Quarterly Weather Report (for 1876, *et seq.*) plates of charts are issued showing the conditions of barometrical pressure and wind for Western Europe for 8 a.m. and 6 p.m. each day, each plate containing 36 charts. The whole of this work is done in the Office, the copper plates being sent to the printer ready for press.

General supervision of observatory work.

In connexion with this work should be mentioned the general watch which has to be kept over the working of the observatories and of the instruments, not only to secure uniformity amongst them and observance of rules, but also to guard against small changes which are liable to occur at certain times, especially with the thermographs, and which may affect the scale-values of the instrument or the datum lines used for the tabulation of the curves. About twice a year this work calls for special examination, entailing some considerable time and occasionally the engraving of new scales for measuring the curves.

Harmonic analyser.

The photographic curves are also used in the harmonic analyser, and at present those for the year 1873 are being dealt with; they require little or no preparation for this purpose beyond that necessary for their reduction for the Quarterly Weather Report.

METHOD OF DEALING WITH THE NUMERICAL RESULTS FROM THE SELF-RECORDING OBSERVATORIES.

Interpolations.

In dealing with the tabulations the first step is to go over the sheets and fill up by interpolation, wherever possible, any gaps or breaks in the continuity of the record.

Means.

The record having been made as complete as possible, the daily, five-daily, and monthly means of the barometer and of the dry-bulb and wet-bulb thermometers are obtained by addition.

Vapour tension.

The hourly vapour tension is then computed by an expansion of Glaisher's Hygrometrical Tables prepared in the Office, and the work independently checked.

Hourly readings.

A copy is next prepared of the above-mentioned hourly measurements of the barometer, dry-bulb and wet-bulb thermometers, wind and rain curves, and of the computed values of vapour tension. To these are added the daily means of the three first-mentioned elements, and the whole series is printed and published under the title of "Hourly Readings from the Self-recording Instruments at the seven Observatories in connexion with the Meteorological Office."

To ensure accuracy the sheets are read over in proof with the originals. The interpolated readings are printed in *italic* type, but no distinguishing mark is affixed to the means which are partly based on them. When the gap in the record is too long to be dealt with by an interpolation of the missing hourly readings, the mean for the day is obtained by an interpolation from the adjacent daily means, and the result thus obtained is printed as an approximation.

Tables for the Quarterly Weather Report.

The five-daily, monthly, and annual means are published in the Quarterly Weather Report, together with the absolute extremes of pressure and temperature for each month, and the values are repeated in French measures.

Gale tables.

The gale tables printed in the text of the Quarterly Weather Report, which show the extent, duration and degree of severity of all the stronger gales, are prepared from the tabulations of the anemograms received from the seven self-recording observatories, together with those received from the six extra anemographic stations.

II.—Anemographic Stations at which the Wind is recorded continuously.

The anemograms received from the six stations enumerated on page 108 are regularly examined and tabulated in the Office, and the sheets bound up in volumes. Besides special inquiries on legal and other points that from time to time arise, and in which these documents are of the highest importance, the tabulations are always employed in the preparation of the chronicle and gale tables for the Quarterly Weather Report. They are also regularly used in the checking of the storm warnings issued by the Office.

III.—Method followed with regard to the Returns from Land Stations of the Second Order.

Ever since the year 1866 returns of more or less completeness have been received from land stations in the United Kingdom. In that year there was only one station, but by 1871 the number had increased to 15, and five years later to 49, including 14 stations belonging to the Meteorological Society (London), copies of the returns from which were sent to the Office under a special arrangement with the Society. Origin and progress of the system.

At the end of the present year the total number of stations is 58, including 15 belonging to the Meteorological Society.

This number is exclusive of the self-recording observatories, and of the anemographic stations, but it includes several from which only very scanty information is received.

The stations are distributed as follows: 44 in England, five in Wales, three in Scotland, and 12 in Ireland.

The returns are received at the Office monthly, and are duly entered and stored.

The publication of the returns is carried out in the following way: For a certain number of stations the observations of pressure, temperature, wind, cloud amount, and weather at 9 a.m. and 9 p.m. each day, together with the computed vapour tension and relative humidity at those hours, and the daily maxima and minima of temperature, and daily rainfall, are published *in extenso* on the Form, A., proposed by the Permanent Committee of the First International Meteorological Congress at Vienna in 1874, and adopted for international use by the Second International Meteorological Congress at Rome in 1879. Publication on Form A.

The Permanent Committee assigned an inferior limit to the number of stations from which returns should be published *in extenso*, varying from two for Belgium to 100 for Russia in Asia, the number in the case of the United Kingdom being 15. In 1875, when the systematic publication of returns from Stations of the Second Order began, only nine British stations were available, but this number has steadily grown, until for 1879 returns from 27 stations are actually published on the A. Form, and the list could be at once increased, if thought desirable.

Care is taken in adding to the list for publication to see, first, that the station is satisfactory as regards its instruments, their exposure, &c.; secondly, that the returns bear internal evidence of accuracy and care in their preparation; and thirdly, that the district represented by the station is one for which information is needed. Addition to the list for publication.

All the returns selected for publication on Form A. are carefully examined and compared before being copied for the printer. The reduction of all the barometer readings to 32° Faht. at mean sea level is checked, and the corrected readings are then compared with the isobars. Examination of the returns.

on the Daily Weather Charts and readings at neighbouring stations, allowance being made for any difference in time and the corresponding change in barometric pressure.

The correction of the readings of the dry-bulb and damp-bulb thermometers is checked, and the maxima and minima temperatures are compared with the dry-bulb thermometer readings over the same periods to ensure that they are the extreme temperatures registered.

The computed values of the vapour tension and the relative humidity are examined from the tables. The cloud amount is compared with the weather at the time of observation, and finally, the sums and means are all re-calculated.

Doubtful readings.

If any readings are doubtful, reference is made through the observer to the original observation book. If no fresh light is thrown on the question by this means, and if on reconsideration the reading still appears to be wrong, it is rejected, and the probable reading is inserted in its place, but printed in different type as an interpolation. These probable readings are used in obtaining the monthly means. Similarly, if from any cause a set of readings has been omitted, the gap is filled by an interpolation, and the probable values are printed in different type.

Apparent errors, or discrepancies, in the working on the sheet are also referred to the observer before alteration.

Unpunctual observations.

The observations are taken at 9 a.m. and 9 p.m. each day. It sometimes happens, however, that strict punctuality cannot be observed. In such cases if the difference in time does not exceed 30 minutes, the observations are, in most cases, printed without alteration. When the difference exceeds 15 minutes, a note is inserted in the remarks showing the exact time of observation. If the difference in time is more than half-an-hour, the readings are usually rejected and an interpolation made.

Publication on Form B.

Besides this publication in full, the monthly means of the various elements, together with summaries of the wind direction and of the weather, are published on the Form, B., also devised by the Permanent Committee of the Vienna Congress, and adopted by the Roman Congress.

Returns from six stations were published in this manner for the year 1873, and from nine stations for the year 1874. In 1875 the list included the names of 26 stations. This number has grown to 37 for the year 1879, and might be even further increased.

All the stations returns from which are published *in extenso* on Form A., are included in the Form B. list. But this list also includes others, either not quite so good, not so representative, or not so long established. The method of preparation is in the main the same as in the case of the Forms A. But the summaries of wind and weather are specially prepared for this publication. For wind, the summary shows the number of observations at 9 a.m. and 9 p.m. under each of the bi-quadrantal points N., N.E., E., &c., the observations under intermediate points being thrown alternately forward and backward. For weather, the summary gives the number of days of rain, snow, hail, thunder-storm, clear sky, overcast, and gale. The days of clear sky and overcast are those when the mean of the cloud amounts at 9 a.m. and 9 p.m. are less than 2, and more than 8 respectively. The days of gale are those when force 7 or upwards by Beaufort scale is recorded.

New stations.

When the application for the adoption of a new station is received, a schedule is forwarded to the observer containing a series of questions as to the outfit of the station, the exposure of the instruments, and the influence likely to be exerted on their indications by surrounding objects, such as houses and trees. Only mercurial barometers are accepted, and only such as have been duly verified. All thermometers must have been

tested at Kew. A plan of the station, showing the positions of the instruments with regard to neighbouring objects is also required.

On the return of this schedule the answers are considered, and, where necessary, alterations are advised.

If, however, the existing arrangements are satisfactory, tables for reducing the barometer readings to 32° Fahrenheit at mean sea level are prepared and duplicates sent to the observer, together with a set of Hygrometrical Tables, and a copy of "Instructions in the Use of Meteorological Instruments."

The first returns are compared and examined with special care, and a report of the result of the examination is forwarded to the observer, with instructions how best to complete and perfect the returns.

The daily records of sunshine which are now received from 29 Stations in the British Islands are examined generally to guard against accidental changes in the adjustment of the instrument. After their receipt has been acknowledged, the cards are duly stamped and dated and stored in the Office. Sunshine records.

A tabulation of these curves is published as part of the Weekly Weather Report mentioned in Appendix VIII.

The Stations of the Second Order are annually inspected, the attention of the inspector being directed by the Office to any special point which may require elucidation. Inspector

IV.—*Telegraphic Reporting Stations.*

Full particulars relating to these stations, the information received from them, and the method of dealing with that information, will be found in Appendix VIII. A paragraph in that Appendix (p. 74) explains the use that is made of the monthly schedules sent in by the observers.

V.—*Extra Stations.*

No returns from Stations of the Fifth Class are published by the Office, but some of them are regularly used in the checking of the storm-warnings, and all are available for any special investigation that may be taken up.

The rainfall values at these stations are, however, copied and supplied to Mr. Symons, F.R.S., for publication in "British Rainfall."

APPENDIX XVII.

LIST OF DOCUMENTS RELATING TO THE LAND METEOROLOGY OF THE BRITISH ISLANDS, RECEIVED DURING THE YEAR ENDING MARCH 31ST, 1882.

Stations.	Observers.	Nature of Information received.	Notes.		
I. Valencia	J. E. Cullum -	Continuous records of pressure, temperature, wind, sunshine, and rain, with notes on the weather.			
Armagh	S. Call, for the late Rev. T. R. Robinson, D.D. F.R.S.				
Glasgow	Prof. R. Grant, LL.D., F.R.S.				
Aberdeen	Prof. C. Niven -				
Falmouth	Lovell Squire -				
Stonyhurst	Rev. S. J. Perry, F.R.S. -				
Kew	G. M. Whipple, B.Sc., F.R.A.S. -	Continuous record of wind (direction and velocity).			
II. Alnwick Castle	Major F. Holland, for the Duke of Northumberland, K.G.				
Holyhead	Hugh Williams, C.E. -				
Sandwick	Rev. C. Clouston, LL.D. -				
Seabam	G. H. Aird -				
Selly	W. Thomas -				
Yarmouth	G. T. Watson -				
Waterford	The Harbour Authorities -				
III. †Aysgarth	Rev. W. Fenwick Stow, M.A., F.M.S. -			Regular observations at 9 a.m. and 9 p.m. of pressure, temperature, wind, cloud and weather, with the daily maxima and minima of temperature, and rainfall, and remarks on the weather generally.	
‡Babbacombe	E. E. Glyde, F.M.S. -				
‡Buxton	E. J. Sykes, F.R.A.S., F.M.S. -				
‡Carmarthen	G. J. Hearder, M.D. -				
†Chatham	Lieut.-Col. C. Warren, R.E., C.B., C.M.G. -				
‡Cheadle	J. C. Philips, F.M.S. -				
‡Cheltenham	R. Tyrer, B.A., F.M.S. -				
Chigwell Row	J. Campbell, Staff Surgeon, R.N. -				
‡Churchstoke	Philip Wright, F.C.S., F.M.S. -				
†Colebrooke	W. Ferguson, for Sir Victor Brooke, Bt., F.L.S. -				
‡Dartmoor	W. H. Tooker -				

LIST OF DOCUMENTS—continued.

Stations.	Observers.	Nature of Information received.	Notes.
Douglas, Isle of Man -	A. W. Moore, F.M.S. -		
† Dublin (City) -	J. W. Moore, M.D., F.M.S. -		
† Dublin (Phoenix Park) -	Col. R. H. Stotherd, R.E. -		
† Durham -	G. A. Goldney -		
† Geldeston (Suffolk) -	E. T. Dowson, F.M.S. -		
† Botanic Gardens, Glasnevin (near Dublin). -	F. W. Moore -		
† Hillington -	Rev. H. Ffolkes, M.A., F.M.S. -		
† Jersey (St. Aubin's) -	J. E. Vibert, M.A. -		
† Laudale -	A. Fletcher, for T. H. G. Newton, F.M.S. -		
† Llandudno -	J. Nicol, M.D., F.M.S. -		
† Leicester -	J. C. Smith -		
† Londonderry -	J. Conroy, F.M.S. -		
† Markree Castle, Sligo -	E. Salles, for Col. Cooper, F.R.A.S. -		
† Marlborough -	Rev. T. A. Preston, M.A., F.M.S. -		
† Oscott -	Rev. J. MacElmail -		
† Parsonstown -	W. Harding, for the Earl of Rosse, F.R.S. -		
† Prestwich -	H. R. O. Saukey, M.D. -		
† Ramsgate -	Rev. T. E. Egan, O.S.B. -		
† Sandwick -	Rev. C. Clouston, LL.D. -		
† Scalby -	R. A. Allison, F.M.S. -		
† Scarborough -	F. Shaw -		
† Seabam -	G. H. Aird -		
† Southampton -	J. T. Cook, R.E., for Director General of Ordnance Survey. -		
Stokesay -	Rev. J. Digges La Touche -		
† Strathfield Turgiss Street (Westmeath) -	Rev. C. H. Griffith, B.D., F.M.S. -		
† St. David's, Pembroke -	W. E. Wilson, F.R.A.S. -		
	W. P. Probert, LL.D., F.G.S., F.M.S. -		
		Regular observations at 9 a.m. and 9 p.m. of pressure, temperature, wind, cloud and weather, with the daily maxima and minima of temperature, and rainfall, and remarks on the weather generally.	

LIST OF DOCUMENTS--continued.

Stations.	Observers.	Nature of Information received.	Notes.
† St. Leonards ..	H. Colborne, M.R.C.S., F.M.S.	Regular observations at 9 a.m. and 9 p.m. of pressure, temperature, wind, cloud and weather, with the daily maxima and minima of temperature, and rainfall, and remarks on weather generally.	
† Totnes ..	T. H. Edmunds, F.M.S.		
† Uppingham ..	Rev. G. H. Mullins, M.A., F.M.S.		
† Wakefield ..	H. Clarke, L.R.C.P., F.S.S., F.M.S.		
Waterford ..	Joseph Neale ..		
† York ..	W. Keeping, M.A., F.G.S.	Regular observations twice (and in some cases three times) daily of pressure, temperature wind, weather, and sea disturbance.	
IV. The Telegraphic Stations, see List on p. 55.	-		
V. Castletownsend ..	Lieut. T. W. Cobb, R.N.	Pressure and temp. four times daily, and wind twice daily.	
Crookhaven ..	"		
† Cooper's Hill (Egham)	Prof. H. McLeod, F.R.S.	Full return for 9 a.m. and 3 p.m.	
Ennis ..	J. Hill, C.E.		
Gorleston ..	R. C. J. Day ..	Daily rainfall.	Pressure and wind twice daily.
Harpenden ..	T. Wilson, F.M.S.		
Haslar ..	G. Coppen ..	Pressure and temperature four times daily.	
Helston ..	J. Gill ..		
Killarney ..	Rev. G. R. Wynne, F.M.S.	Full return, except for want of pressures.	
Llandoverly ..	J. Watkins ..		
Rugby ..	Rev. T. N. Hutchinson, M.A.	Monthly rainfall.	Daily rainfall.
Saffron Walden ..	J. G. Bellingham ..		
† Sheffield ..	W. F. Cooper ..	Full 9 a.m. obs. with 9 p.m. temperatures.	
Worksop ..	H. Mellish, F.M.S.		
		Pressure and temperature twice daily, with a.m. wind and rainfall.	Full returns for 8 a.m. and 11 p.m.
		Full return, except for want of 9 p.m. temperatures.	

The Stations in the above List marked "†" belong to the Meteorological Society: those marked thus † have been inspected during the year.

APPENDIX XVIII.

SIR,

December 12, 1881.

I REGRET to have to submit the following report :—

On Saturday, the 10th of December, I ascended from Bath, accompanied by Mr. Walter Powell and Mr. Agg-Gardner, at 1h. 55m. p.m., for the purpose of taking the temperature of the air, and ascertaining the amount of snow in the air, for the Meteorological Office. I cleared the snow clouds at 4,000 feet altitude; the temperature of these clouds was 28°, and the wet-bulb thermometer read 26°. At 4,200 feet we passed over Wells, the time being 2h. 50m. At this height I worked over Glastonbury; the temperature now rose to 41°, and the sky was perfectly clear. I passed then between Somerton and Langport, and I here found that I was in a N. $\frac{1}{2}$ W. current. I asked Mr. Powell to send the balloon up to 6,000 feet, to ascertain the temperature of a small bank of cirrus. I found this temperature to be 31°, and then I asked him to place me at 2,000 feet altitude to regain the N. $\frac{1}{2}$ W. current, and then we came in view of Crewkerne. I now kept at a low altitude until I reached Beaminster. Mr. Powell here observed that we were going at 30 miles an hour, and here we first heard the roar of the sea. The balloon suddenly rose to 4,000 feet. At this time I said to Mr. Powell, "Go down to within 100 feet of the earth and ascertain our exact position." We coasted along close to the ground until we reached Symondsburly. I here called to a man and asked him how far the distance was to Bridport, and he said about a mile. I asked Mr. Powell to prepare to "take in;" our pace now increased to 35 miles an hour. To avoid the little village of Eype, Mr. Powell threw out some ballast. This took us to 1,500 feet elevation and we had still two miles to get in. I opened the valve and descended about 150 yards short of the cliff. The balloon on touching the ground dragged a few feet, and I rolled out of the car with the valve line in my hand. This caused the balloon to ascend about 8 feet, when Mr. Gardner dropped off, and unfortunately broke his leg. I found that the rope was being pulled through my hands, and I called to Mr. Powell, who was standing in the car, to come down the line. He took hold of the line, and in a few more seconds the line was torn through my hands. The balloon rose rapidly. Mr. Powell waved his hand to me, and I took his compass bearings, and found that he was going in a S. $\frac{1}{2}$ E. direction. Some men coming up, I placed Mr. Gardner in their charge and sent word to the Coastguard and to Bridport Harbour-master to keep a good look-out, and to go out with boats. I then proceeded to Bridport and telegraphed to the Commanding Officer, Royal Engineers, Weymouth, to have a steamer in readiness for me to go in search. I proceeded to Weymouth and found the S.S. "Commodore" with steam up. I here received a telegram from Bridport Harbour-master saying that the balloon had been seen to drop in the sea south of Bridport. I at once proceeded to sea, searched the alleged place of his descent, making due allowance for the wind and current. This proving unsuccessful, I crossed the Channel till we sighted the Casquets Light, and then returned in a N.W. direction, ultimately reaching Weymouth about 5h. a.m. on Sunday morning, and I have organised further search. I am of opinion that what was seen to fall to the sea was not the balloon

but part of the gear, thrown out to lighten the balloon, as the balloon could not have fallen so close to the shore as to be visible at about 5h. p.m.

I have, &c.

(Signed) JAMES TEMPLER,
Captain 7th Batt. King's Royal Rifle Corps.

R. H. Scott, Esq., F.R.S.,
Secretary, Meteorological Office.

7, Park Place, St. James' Street, S.W.,

December 31, 1881.

SIR,

I BEG to submit the following additional report of the balloon ascent of the 10th instant:—

In accordance with your instructions to take meteorological observations from time to time, I held myself in readiness to make an ascent the first favourable opportunity. On Friday, the 9th instant, London being enveloped in a very peculiar fog, I was anxious to ascertain the atmospheric conditions which might have produced it. On that day I was unfortunately detained in the train by the fog, but I determined to make the ascent on the following day, Saturday, December 10th. The balloon "Saladin" was at Bath, so I wrote to you that I would ascend from that place. I took Mr. Walter Powell as my assistant, for the management of the balloon. The following are the conditions under which the "Saladin" was equipped on that day:—

The capacity of the balloon was 38,600 cubic feet, giving an ascensional force of 1,700 lbs., under the conditions of filling explained below.

The weights carried were as follows—

Envelope, net, valve, hoops	-	-	lbs.	350
Car	-	-	-	80
Anchor	-	-	-	40
Rope	-	-	-	8
Line	-	-	-	10
Gear	-	-	-	4
				<hr/>
				492
Instruments	-	-	-	42
Kit	-	-	-	40
				<hr/>
				574
Self	-	-	-	198
Mr. W. Powell	-	-	-	156
Mr. A. Agg-Gardner	-	-	-	140
Ballast	-	-	-	632
				<hr/>
				1,700
				<hr/> <hr/>

The balloon therefore carried in total ballast at starting 632 lbs.

Having a good ascensional force, I found that I could take Mr. A. Agg-Gardner, and he rendered me valuable assistance in checking the time with the chronometer. I had 300 lbs. of ballast ready, and I ordered 400 lbs. more to be made up at once. I now tied on the car, tested my lift by placing four men in the car with 300 lbs. of ballast, and then got on the car myself, and found that the balloon had good ascension, and with this load I had it towed to a good place to ascend from.

At 1h. 30m. p.m. Mr. Powell, whose duty it was to navigate the balloon and to place it at the different altitudes necessary for the observations, and Mr. Agg-Gardner, took their places, the instrument bags were lashed on, the men taken out and the 400 lbs. additional ballast put in. I filled up the meteorological forms, and at 1h. 54m. I got in, and by throwing out 20 lbs. of ballast the balloon left the earth. I give the observations from memory, as the whole of the notes were with the instrument bag and were lost with the balloon.

We cleared the town in six minutes.

ASCENT from BATH by CAPTAIN TEMPLER, 10th December 1881.

Balloon, "Saladin." Capacity 38,600 cubic feet, and Weight 492. Nature of charge, C_2H_4 , 44 lbs. buoyancy per 1,000 cubic feet.

Load of balloon.—Captain Templer, Mr. Walter Powell, and Mr. A. Agg-Gardner. Ballast, 632 lbs. Instruments, 82 lbs.

A.—OBSERVATIONS ON THE GROUND.

Time.		—	Letter on Chart.	Aneroid Barometer.	Thermometer.		Wind.		Cloud.	Weather.	Remarks.
Hour.	Minute.				Dry.	Wet.	Force.	Direction.			
1	50	At starting	A.	29.75	31	28	1	North	e	m	Object of ascent:— Capt. Templer to make observation of the temperature and the height of clouds. Mr. A. Gardner to give the times by chronometer. Mr. Walter Powell to work the balloon.
4	35	On alighting	T.	—	—	—	26	N. 3 W.	e low down.	q	

B.—OBSERVATIONS DURING THE VOYAGE.

Time.		Topographical Indications.	Letter on Chart.	Aneroid Barometer.		Thermometer.		CLOUD.				Weather.	Remarks.		
Hour.	Minute.			Dry.	Wet.	Above.	Around.	Below.	Apparent Direction of Motion.	Character.	Apparent Direction of Motion.			Character.	
1	45	Bath Wells	A.	29.75	31	28	—	—				—	—		—
			B.	28	27	26	—	—	—	—	—	At 4,000 feet altitude we met a little snow.			
			C.											At 4,200 feet altitude 41°. The whole of the atmosphere above was warm and clear.	
			D.	23.85	43	39	s.	b	b	S.S.E.	m	Sky perfectly clear above.	Average temperature, 40°. Highest reading, 43°.		
4	40	Eype Bay	G. H. T.												

The buoyancy of 38,600 cubic feet of coal gas, C_2H_4 , at a temperature of 40°, the air temperature being 32° is, at 44 lbs. per 1,000 cb. ft., 1,700 lbs.

Balloon	-	-	-	492 lbs.
Passengers	-	-	-	494 "
Instruments	-	-	-	82 "
Ballast	-	-	-	632 "
				<hr/>
				1,700 "

The barometer reading at starting was $29^{\circ} \cdot 7$; the thermometer read 31° Fahr.

The direction of the wind N.

At 2,000 feet altitude we found the lowest thermometrical reading 26° .

At 4,000 feet we met a snow cloud; temperature 28° ; wet bulb 26° .

At 2h. 45m. we passed clear of Wells at 4,200 altitude, sky clear above, and temperature 41° .

After passing Langport we found we were in a N. $\frac{1}{2}$ W. current, and we here rose to 6,000 feet altitude to a small cluster of cirrus; its temperature was 31° .

The average temperature of the clouds was 28° , and the temperature of the atmosphere averaged 40° , our highest reading being 43° . I plotted the course on the chart, and marked the currents that we met and the velocities at which we travelled.

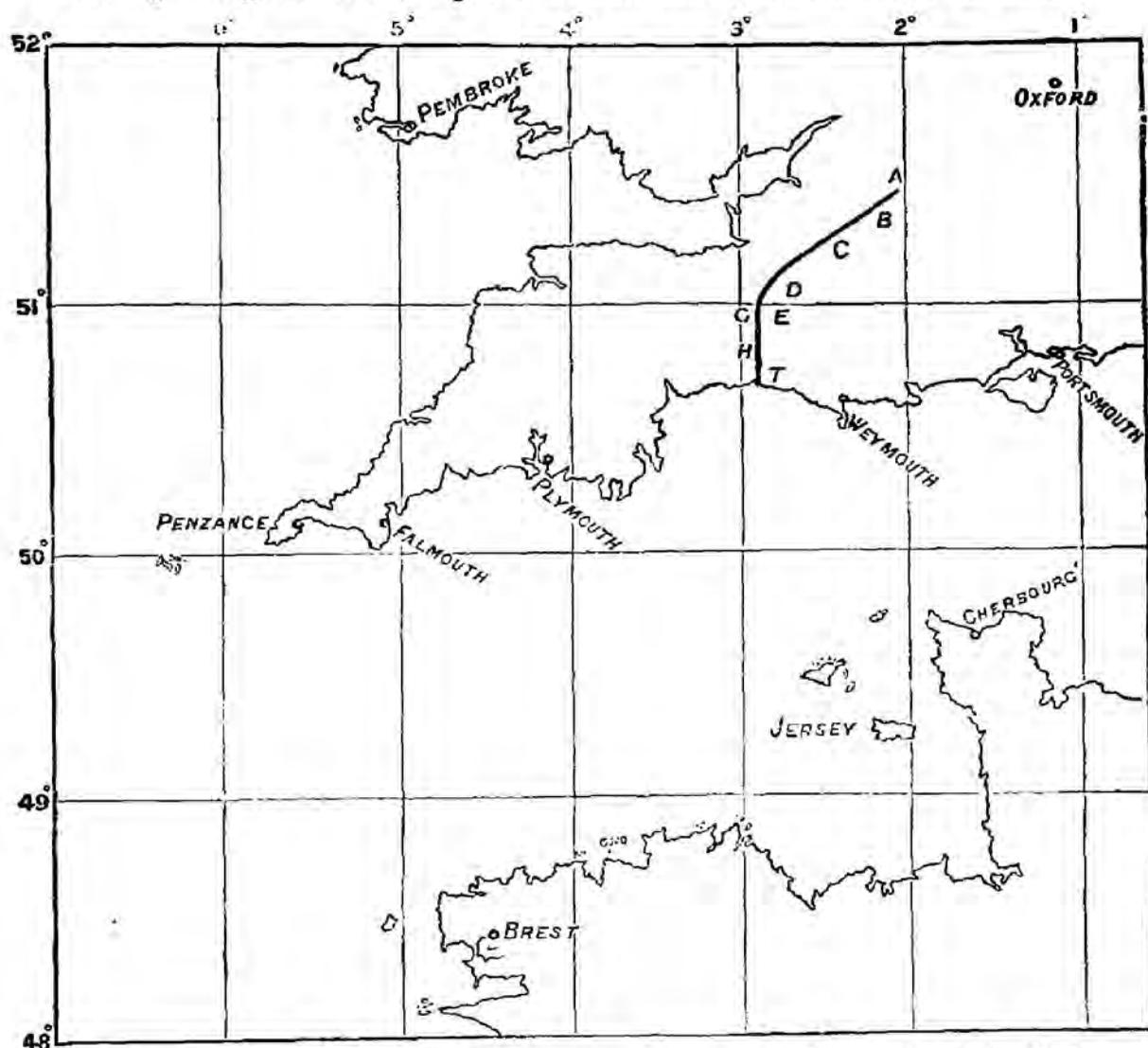
Crewkerne was sighted when we were at 2,000 feet altitude, and Mr. Powell allowed the balloon, at my request, to descend, and we passed Beaminster, where we first heard the sea, and immediately I verified my position, and we prepared to effect our descent. The horizontal velocity was here increased to 35 miles an hour.

The balloon was descending most favourably near Symondsburly when Mr. Powell threw out some ballast.

On his telling me that he had done so, I immediately opened the valve. He then asked me if this was necessary? I answered "We are nearing the sea," and he replied, "I am afraid I rather overdid that last ballast." Glancing downwards I found that our pace had increased. I asked Mr. Agg-Gardner to hold the valve open while I looked out for a place to descend; he did this, but almost immediately I took the valve line and never allowed the valve to close until the line was torn from my grasp after I had been thrown out and dragged for about 60 yards.

When we were about 200 feet distant from the earth Mr. Powell said he could touch the earth with his pilot line, and after a pause he said to me, "Shall I part [*i.e.* drop] the anchor?" I said, "No," as I considered it was not the proper moment to do so. I may here state that it was Mr. Powell's duty to part the anchor and any ballast that would be requisite to check too rapid a descent, while I continued to keep the valve open, and he would not have appealed to me had he not felt doubtful on the point. Immediately after this we touched the earth at about 4h. 40m. p.m. in the second field, or about 500 yards from the cliff. The car was capsized and turned right over, and I was thrown violently out; Mr. Gardner was thrown out at the same time, as also were several bags of ballast. Mr. Powell was, I think, partially thrown out, but, as far as I could see, he had hold of the hoop, and the car righting underneath him he recovered his position. I retained my hold of the valve line and was dragged along the earth by it, for a considerable distance. I tried very hard to get the line between my teeth, and could I have done so, I have no doubt the balloon would have been crippled. I shouted to Mr. Powell to come down the line. At this time he was close to me and about 8 feet from the earth. The line was then torn from my grasp by a succession of jerks, both my hands being severely lacerated. The balloon then floated along close to the earth for some 300 feet, until it reached a fence, which the car grazed as it went by. I had risen to my feet and could see Mr. Powell standing up in the car, and, in my opinion, three courses were open to him, as an aeronaut of experience, to effect his own safety from the moment the line was torn through my hands until the car grazed the fence:

(1.) Jumping out, as at no time was the car more than 8 feet from the ground; (2.) Throwing out the grapnel; (3.) Opening the valve again. Possibly he imagined he could save the balloon by opening the valve after it reached the cliff, so as to descend under its lee; but the balloon, after passing the fence, began to ascend and continued to do so steadily



MAP SHOWING THE TRACK OF THE BALLOON. December 10, 1881.

for about 10 minutes, when it was lost to my sight in the clouds. I took the direction of its motion by compass, and I conjecture from our experience of the high current that day, that Mr. Powell, if it was in his mind to cross the Channel, would attempt to work the low current, and I fear that to work this course the balloon would require more ballast than he had. He had with him the instrument bag, the kit bag complete, about 100 lbs. of ballast under the seat, and the balloon wrapper. The valve was in order when its line left my grasp; had it not been so the balloon would not have risen. To the best of my belief the balloon itself was also perfectly unscathed. After the accident had taken place I hailed a man, who was about 300 yards off, for assistance, Mr. Gardner telling me his leg was broken.

As soon as the balloon was out of sight and fearing it might come down in mid-channel, I told Mr. Gardner I must leave him, as I must go and see if I could rescue Mr. Powell; though suffering terribly, he most unselfishly said, "Go."

My action during the evening and night has been reported in my former letter. I feared that Mr. Powell was in imminent danger of coming down in mid-channel. But owing to my own knowledge of his aëronautical experience and determination, I had great hopes that he would make the French coast. He had often proved that he was a most fearless aëronaut, and had made more than 20 ascents this year, having a perfect knowledge of the whole management of a balloon.

I lament most deeply the untimely fate of my gallant friend ; but I have the melancholy satisfaction of feeling that, both at the moment of the accident and afterwards, nothing was left undone which could have averted it.

I have, &c.

(Signed) JAMES TEMPLER,
Capt. 7th Bat. King's Royal Rifle Corps.

To R. H. Scott, Esq.,
Secretary, Meteorological Council.

APPENDIX XIX.

ACCESSIONS TO THE LIBRARY DURING THE YEAR ENDING
31ST MARCH 1882.

A—AGRICULTURE AND BOTANY.

Commissioner of Agriculture, Washington.—Annual reports of the Commissioner of Agriculture for the years 1878 and 1879. 2 vols., with plates, 8°. Washington, 1879–80.

Field and other Experiments.—Memoranda of the origin, plan, and results of the field and other experiments, conducted on the farm and in the laboratory of **J. B. Lawes**, at Rothamsted, Herts; also a statement of the present and previous cropping, etc., of the arable land not under experiment. May, 1881. 27 pp. la. 4°. (London, s.a.)

|| **Hult, R.**—Recherches sur les phénomènes périodiques des plantes. Présenté à la Soc. R. des Sciences d'Upsal le 26 Nov. 1879. 51 pp., 3 plates, 4°. Upsal, 1881. (*Nova Acta Reg. Soc. Sc. Ups. Ser. iii.*)

* **Karsten, G.**—Periodische Erscheinungen des Pflanzen- und Thierreiches in Schleswig-Holstein. 16 pp., 2 tabular forms, la. 8°. Dated Kiel, 1878. (*Schrift. Naturw. Ver. Schleswig-Holst.*, iii., 2tes Heft, 1880, p. 1.)

|| **Meteorologiska Central-Anstalt, Stockholm.**—Månadsöfversigt af Väderleken i Sverige till Landbrukets tjänst utgifven under Meteorologiska Central-Anstaltens inseeende af Dr. H. E. Hamberg. Första Årgången, 1881, Jan.—Dec. 8°. (Stockholm, s.a.)

Ritter, C.—Influence des forêts sur les nappes liquides souterraines et sur la pluie. 22 pp. 8°. Paris, 1880.

|| **Scott, R. H.**—Remarks on the recent conference at Vienna on agricultural and forest meteorology. 22 pp. 8°. London, 1881. (*Journ. R. Agric. Soc. Engl.*, xvii. s.s., Part 1.)

Ufficio centrale di Meteorologia, Rome.—Servizio Meteorico-Agrario. Anno II., Nos. 1–39, Dec. 1880—Dec. 1881. la. 8°. (Roma, 1880–81.)

B—ASTRONOMY.

* **Airy, G. B.**—Gravitation: an elementary explanation of the principal perturbations in the solar system. xxiii. + 215 pp. sm. 8°. London, 1834.
Also printed in the Penny Cyclopædia.

Committee on Solar Physics, London.—Extract from a letter, dated 8th April 1881, from Mr. Henry F. Blanford, Meteorological Reporter to the Government of India, to Professor Stokes, Secretary, R.S. [transmitting the results of a year's observations with Balfour Stewart's actinometer at the Alipore Observatory.] 13 pp. 8°. (London, 1881.) (*App. K. to Report of Committee.*)

|| **Ferrari, G. S.**—La luce zodiacale. Lettura fatta alla Pontificia Accademia Tiberina il 16 Maggio 1881. 23 pp. 8°. Roma, 1881. (*Estratto dal Periodico "Gli Studi in Italia," Anno iv., vol. i., Fasc. vi.*)

K. K. Sternwarte zu Prag.—Astronomische, magnetische und meteorologische Beobachtungen an der K. K. Sternwarte zu Prag im Jahre 1880. 41 Jahrg. Auf öffentliche Kosten herausgegeben von Carl Hornstein. xviii. + 56 pp. la. 4°. Prag, s.a.

Menten, J. B.—Historia y Descripcion del Observatorio astronomico de Quito. 18 pp. la. 8°. Quito, 1877.

NOTE.—Books marked * have been acquired by purchase; the others are donations from institutions, societies, or authors. Those marked || are excerpt papers, extra copies of which have been separately printed.

In some cases additional publications have been received besides those specified, but only completed volumes or years are given here.

|| **Muirhead, H.**—On sun-spots, terrestrial magnetism, and the arrangement of cometic perihelia. Read December 1st, 1880. 13 pp., 2 plates, 8°. (*Proc. Philos. Soc. Glasgow*, 1880–81.)

Royal Astronomical Society, London.—Memoirs. Vol. xvi., 1880–81. 247 pp., 1 map, 12 plates, 4°. London, 1881.

———Monthly Notices of the Royal Astronomical Society, containing Papers, Abstracts of Papers, and Reports of the Proceedings of the Society, from November 1880 to November 1881. Vol. xli., with plates, 8°. London, 1881.

Royal Observatory, Greenwich.—Description of the Greenwich time-signal system. Appendix to the Greenwich Observations, 1879. 13 pp. la. 4°. s.l.e.a.

———Report of the Astronomer Royal to the Board of Visitors of the Royal Observatory, Greenwich, read at the annual visitation of the Royal Observatory, 1881, June 4. 23 pp. la. 4°. [*London*, 1881.]

C—ATMOSPHERIC PRESSURE.

Bebber, [J.] van.—Wissenschaftliche Ergebnisse aus den monatlichen Uebersichten der Witterung. (Weitere Folge.) Die geographische Vertheilung und Bewegung, das Entstehen und Verschwinden der barometrischen Minima in den Jahren 1876 bis 1880. 5 pp., 6 plates, la. 8°. (*Monatl. Uebers. Witterung, Hamburg*, v. 1880, p. 28.)

|| **Eaton, H. S.**—The average height of the barometer in London. 8 pp. la. 8°. (*Quart. Journ. Met. Soc.*, vi., n.s., 1880, p. 191.)

|| **Pernter, J.**—Über den täglichen und jährlichen Gang des Luftdruckes auf Berggipfeln und in Gebirgsthälern. 42 pp., 6 plates, la. 8°. (*Sitzb. k. Akad. Wissensch., Wien, Bd. lxxxiv.*, ii. *Abth.*, 1881, p. 382.)

|| **Russell, H. C.**—Notes on some recent barometric disturbances. Read before the Royal Society of N.S.W., 5 Dec. 1877. 6 pp. 8°. (*Sydney*, 1877.)

|| **Whipple, G. M.**—Note on a discussion of Mr. Eaton's table of barometric height at London, with regard to periodicity. 4 pp. la. 8°. (*Quart. Journ. Met. Soc.*, vii., n.s., 1881, p. 189.)

———On the relative frequency of given heights of the barometer readings at the Kew Observatory, during the ten years, 1870 to 1879. 6 pp., 1 plate, la. 8°. (*Quart. Journ. Met. Soc.*, vii., n.s., 1881, p. 52.)

D—AURORA.

* || **Dalton, J.**—On the height of the aurora borealis above the surface of the earth; particularly one seen on the 29th of March, 1826. 12 pp., 1 plate, la. 4°. (*Phil. Trans.* 1828, p. 291.)

|| **Tromholt, S.**—Om Nordlysets Perioder (efter Iagttagelser fra Godthaab i Grønland). (*Preface by N. Hoffmeyer.*) 60 pp., 2 plates, sm. f°. Copenhagen, 1882. (*Ann. météor. Danois*, 1880.)

French text also in parallel columns.

E—BIBLIOGRAPHY.

Fineman, C. G.—Förteckning på svenska arbeten och uppsatser i meteorologi publicerade 1856–1881. 6 pp. la. 8°. (*Stockholm*, 1881.)

Meteorological Society, London.—Index to the publications of the English Meteorological Societies, 1839 to 1881. 32 pp. la. 8°. London, 1881. (*Suppl. vol. vii.*, *Quart. Journ. Met. Soc.*)

New York State Library.—Sixty-second and sixty-third annual reports of the Trustees of the New York State Library, for the years 1879 and 1880. 2 vols. 8°. Albany, 1880–81.

* **Royal Society, London.**—Catalogue of the scientific books in the library of the Royal Society. Transactions—Journals—Observations and Reports—Surveys—Museums. 262 pp. 8°. London, 1881.

F—CLIMATE AND HYGIENE.

|| **Buchan, A.**—The weather and health of London. 15 pp. 8°. (*London.*) (*Proc. R. Inst. Great Britain*, ix., 1879–81.)

* || **Chavanne, J.**—Das Klima von Graz. Untersuchung der klimatischen Verhältnisse der Stadt und Umgebung. pp. 295–366, 6 plates, 5 tables, la. 8°. s.l.e.a.

Cole, T. H.—Hastings and St. Leonards-on-Sea as a health and pleasure resort, with statistics and local information. Edited by T. H. Cole. Meteorological report by H. Colborne. 39 pp. sm. 8°. Hastings, 1881.

* || **Geikie, J.**—On changes of climate during the glacial epoch. 69 pp. 8°. London, 1872. (*Geol. Mag.*, viii. and ix.)

|| **Haughton, S.**—Notes on physical geology, No. vii. On the secular inequalities in terrestrial climates depending on the Perihelion longitude and eccentricity of the earth's orbit. 5 pp. 8°. (*Proc. R. Soc.*, 1881, No. 210, p. 473.)

|| ———.—On the effects of oceanic currents upon climates. 12 pp. 8°. (*London.*) (*Rep. Brit. Assoc. Advanc. Sc.*, 1881, p. 451.)

Inspector General of Customs, Peking.—Medical Reports, for the half-years ended 30th September 1880 and 31st March 1881. 20th and 21st Issues. 2 parts, with plates, 4°. Shanghai, 1881.

Meldrum, C.—Weather, health, and forests: a report on the inequalities of the mortality from malarial fever and other diseases, in Mauritius, considered in relation to the inequalities of temperature, humidity, and rainfall; on a possible periodicity of mortality related to the eleven-year periodicity of solar activity; and on the climatic and other effects of forests. viii. + 245 + lx. pp., 2 plates, sm. f°. Mauritius, 1881.

|| **Merrifield, J.**—The meteorology and climate of Plymouth. 23 pp., 3 plates, 8°. (*Trans. Plymouth Inst.*, 1881.)

* **Müller, F.**—Ein Beitrag zur Klimatologie von Ost-Sibirien. pp. 273–300, 8°.

* **Physician, A.**—The weather Doctor; or, the best means of resisting and counteracting the pernicious influence of cold, however applied to the human body, at all seasons of the year: 36 pp. sm. 8°. London, 1839.

|| **Physiographical Commission of the I. R. Academy of Science at Cracow.**—Materials for Galician climatology, collected by the Meteorological section of the 1880. 254 pp. la. 8°. Cracow, 1881. (*Extract Rep. Physiogr. Comm.*)

In the Polish language.

Registrar General, London.—Weekly return of births and deaths in London and in nineteen other large English towns. Vol. xlii., Nos. 1–52, 1881. la. 8°. (*London*, s.a.)

[**Registrar General of Births, Deaths, and Marriages in Ireland.**]—Quarterly return of the marriages, births, and deaths registered in . . . Ireland; . . . 1881, 1st–4th quarters, Nos. 69–72. la. 8°. (*Dublin*, 1881–82.)

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|| **Roth, H. L.**—The climate of Mackay. 19 pp., 1 plate, 8°. (*Read before Roy. Soc. N. S. W.*, 1 June 1881.)

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Board of Trade, London.—Abstracts of the returns made to the Board of Trade of sea casualties which occurred on and near the coasts of the United Kingdom, from the 1st July 1879 to the 30th June 1880; . . . With charts and appendices. viii. + 139 pp. sm. f°. London, 1881.

|| **Boys, C. V.**—An integrating machine. Read before the Phys. Soc. Feb. 26. 7 pp., 1 plate, 8°. (*Phil. Mag.*, S. 5, xi., 1881, p. 342.)

[**Editorial Committee of the Norwegian North Atlantic Expedition.**]—Den Norske Nordhavs-Expedition, 1876–1878. Chemi. Af H. Tornøe. Med 3 Træsnit og 3 Karter. 76 pp. f°. Christiania, 1880.

In the English language also.

———.—Den Norske Nordhavs-Expedition, 1876–1878. Zoologi. Fiske, ved R. Collett. Med 5 Plancher, 3 Træsnit, og 1 Kart. 164 pp. f°. Christiania, 1880.

In the English language also.

———.—Den Norske Nordhavs-Expedition, 1876–1878. III. Zoologi. Gephyrea, ved D. C. Danielssen og J. Koren. Med 6 Plancher og 1 Kart. 58 pp. f°. Christiania, 1881.

In the English language also.

Evans, Sir F. [J. O.]—A review of oceanic or maritime discovery, exploration and research, as made in the half-century, 1831–81. Read at the Meeting of the British Assoc. for Advanc. of Science, held at York, in September 1881. 31 pp. 8°. s.l.e.a.

* **Findlay, A.**—A directory for the navigation of the Indian Ocean, with descriptions of its coasts, islands, &c., from the Cape of Good Hope to the Strait of Sunda and Western Australia, including also the Red Sea and the Persian Gulf; the winds, monsoons, and currents, and the passages from Europe to its various ports. 3rd edition. xxxvi. + 1215 pp., 16 plates, la. 8°. London, 1876.

* **Forbes, C.**—Vancouver Island: its resources and capabilities, as a Colony. Prize Essay. 63 + 18 pp. 8°. (*Victoria, V. I.*), 1862.

Contains some meteorological observations.

* **Gelcich, E.**—Grundzüge der physischen Geographie des Meeres mit einem Anhang über Oceanschiffahrt. Mit 25 Holzschnitten. iv. + 215 pp. 8°. Wien, 1881.

* || **Hirn, G. A.**—Recherches expérimentales sur la relation qui existe entre la résistance de l’air et sa température. Conséquences physiques et philosophiques qui découlent de ces expériences. 91 pp., 4 plates, la. 4°. Colmar, 1882. (*Mém. Acad. sc.* xliii., 1881.)

* **Issel, A.**—Istruzioni scientifiche pei viaggiatori raccolte da A. Issel in collaborazione dei signori . . . xii. + 556 pp., 5 plates, 8°. Roma, 1881.

* **Lamont, J.**—Yachting in the Arctic Seas, or notes of five voyages of sport and discovery in the neighbourhood of Spitzbergen and Novaya Zemlya. (*Edited and illustrated by W. Livesay.*) 387 pp., 22 plates, 2 maps of Polar regions, 8°. London, 1876.

Marine Survey Department, Calcutta.—Return of wrecks and casualties in Indian Waters for the year 1880; together with a chart showing the positions in which they occurred. Prepared under the superintendence of A. D. Taylor. 112 pp., 1 chart, sm. f°. Calcutta, 1881.

The Appendix contains “Meteorological observations and Notes on the weather experienced at the principal ports in India and Burmah during the year 1880.”

* **Marsh, G. P.**—The Earth as modified by human action. A new edition of *Man and Nature*. xxvii. + 674 pp. 8°. New York, 1877.

|| **Nipher, F. E.**—On certain problems in refraction. 8 pp. 8°. (*Trans. St. Louis Acad. Sc.*, iv., No. 2 (?), p. 325.)

Olsen, O. T.—The Fisherman's practical navigator. viii. + 56 + 70 pp., 11 plates, 8°. Grimsby, 1878.

—The Fisherman's seamanship. 94 pp., 2 plates, 8°. Grimsby, 1881.

* **Oyster Culture.**—Report of the Commission appointed to inquire into the methods of oyster culture in the United Kingdom and France, with a view to the introduction of improved methods of cultivation of oysters into Ireland. Presented to both Houses of Parliament. 192 pp., 10 plates, la. 8°. Dublin, 1870.

Contains observations on the temperature of the surface of the sea on the coasts of Great Britain, Ireland, and France.

· **Papers relating to Her Majesty's Colonial Possessions.**—Part II. 1873. Presented to both Houses of Parliament by Command of Her Majesty, March 1873. 255 pp., 3 maps, la. 8°. London, 1873.

Contains meteor. obs. at St. John's, Newfoundland, for 1872.

[**Parish, A.**]—Hints for the navigation of steamers on some of the P. and O. routes. 29 + 13 pp. 8°. Bombay, 1868.

* **Rink, H.**—Danish Greenland, its people and its products. Edited by R. **Brown**. xvii. + 468 pp., 16 plates, 1 map, sm. f°. London, 1877.

* **Rosser, W. H.**—Short notes and sailing directions, with remarks on making passages; to accompany a chart of the N. Atlantic. 79 pp. 8°. London, s.a.

* ———.—Short notes and sailing directions, with remarks on making passages; to accompany a chart of the S. Atlantic. 43 pp. 8°. London, s.a.

* ———.—Winds, weather, and currents, together with general sailing directions and remarks on making passages; to accompany charts of the N. and S. Pacific. 120 pp., 4 maps, 8°. London, s.a.

Schuck, A.—Die astronomischen, geographischen und nautischen Kenntnisse der Bewohner der Karolinen- und Marshallinseln im westlichen grossen Ozean. 7 pp. la. 4°. (*Aus allen Welttheilen*. xiii., 1881 p. 51.)

Stanley, W. F.—Experimental researches into the properties and motions of fluids. With theoretical deductions therefrom. xvi. + 550 pp. 8°. London, 1881.

Steen, A. S.—Den internationale Undersøgelse af Polaregnenes fysiske Forhold. 10 pp. sm. f°. (*Naturen*, 1881, No. 11, p. 161.)

|| **Sundell, A. F.**—Bemerkungen über absolute Maas-Systeme in der Physik. Vorgetragen den 23 Mai 1881. 30 pp. 4°. Helsingfors, 1881. (*Acta. Soc. Scient. Fenn. Tom.* xii.)

"The Times" register of events in 1881. xcv. + 215 pp., 1 folding sheet, 8°. London, 1882.

* **United States Coast and Geodetic Survey.**—Deep-sea sounding and dredging. A description and discussion of the methods and appliances used on board the Coast and Geodetic Survey Steamer "Blake." By C. D. **Sigsbee**. (*Preliminary Note by C. P. Patterson*.) 208 pp., 41 plates, 6 forms, la. 4°. Washington, 1880.

University of Tokio, Japan.—Memoirs of the Science Department, Tokio Daigaku. (University of Tokio.) No. 5. Measurements of the force of gravity at Tokio and on the summit of Fujiyama. By T. C. **Mendenhall**. 17 pp. la. 8°. Tokio, 2541 (1881).

Wershoven, F. J.—Technical vocabulary, English-French, for scientific, technical, and industrial students. xii. + 291 pp. 18°. London, 1881.

White, W. H.—On the rolling of sailing ships. 23 pp., 2 plates, 4°. s.l.e.a. (*Read at the 22nd Session of the Inst. of Naval Architects, 8th April, 1881.*)

—**Carl Weyprecht**. 3 pp. la. 8°. (*Wien.*) (*Monatsbl. Wissensch. Club*, No. 7, 15 April 1881.)

APPENDIX XX.

METEOROLOGICAL OFFICE : ACCOUNT of RECEIPTS and PAYMENTS for the year ending 31st March 1882.

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
Balance from year 1880-81 -	2,370	8 0	ADMINISTRATION :		
Parliamentary Vote -	15,000	0 0	Payment of Council -	1,000	0 0
Repayment of expenses charged under—			Secretary -	800	0 0
(1.) Incidental expenses	36	0 4	Salaries and wages -	705	10 11
(2.) Special researches			Rent, fuel, and lighting	660	9 7
(Sun apparatus, &c.) -	20	1 5	Incidental and contin-		
SUPPLY OF INFORMATION :—			gent expenses :—		
Special 8 p.m. reports -	25	0 0	Attendance, cleaning, &c. -	438	2 11
D.W. Charts and ordinary Forecasts -	271	0 5	Alteration of premises, furniture, and fittings -	201	17 0
Telegrams -	123	9 6			
Ordinary weather information -	88	14 8			
	508	4 7		3,806	0 5
“Hourly Observations” -	10	0 0	SPECIAL RESEARCHES AND EXPERIMENTS -		
OCEAN STATISTICS -	11	3 0		1,212	7 6
Miscellaneous data -	20	18 6	LAND METEOROLOGY:		
SALE OF INSTRUMENTS, &c. :			Observatories and stations -	2,509	9 1
Royal Navy account (A) -	22	16 4	Discussion and reduction of observations	1,477	2 10
Mercantile Marine do. (B) -	76	18 7			
	99	14 11		3,986	11 11
Commissions executed for Colonial and Foreign Institutions, &c. (C) -	721	10 1	WEATHER INFORMATION AND FORECASTS :		
Commission charged on work done for Colonies, &c. -	32	8 7	Telegraphic reports and storm warnings -	3,102	5 0
			Preparation and issue of reports and forecasts -	1,396	19 10
				4,499	4 10
			INSPECTIONS :		
			Salaries and travelling expenses -	523	19 11
			OCEAN METEOROLOGY:		
			Discussion and reduction of observations -	1,414	5 8
			Expenses incidental to the supply of instruments :—		
			Care and issue of instruments -	200	0 0
			Royal Navy -	250	10 11
			Mercantile Marine -	341	9 11
			Distant island and coast stations -	43	5 0
				2,249	11 6
			Commissions executed for Colonial and Foreign Institutions, &c. -	749	11 1
				17,027	7 2
			BALANCE :		
			Cash in hand -	233	10 10
			Bank of England -	1,519	11 5
			Advance to Valencia Observatory -	50	0 0
				1,803	2 3
				£18,830	9 5
				£18,830	9 5

APPENDIX XXI.

LIST OF PUBLICATIONS, &c. issued under the Authority
of the Meteorological Council.

OFFICIAL.

- No. 1. Report for 1867. Presented to Parliament. 1s.
2. Instructions for Meteorological Telegraphy. New Edition. (1875.) 6d.
3. Fishery Barometer Manual. 6d.
4. Charts of Surface Temperature, South Atlantic Ocean. 2s. 6d.
5. Report for 1868. Presented to Parliament. 5d.
6. Report for 1869. Presented to Parliament. 10d.
7. Quarterly Weather Report for 1869.—Parts I. to IV. 5s. each.
8. The Barometer Manual (out of print, see Nos. 24 and 40).
9. Quarterly Weather Report for 1870.—Parts I. to IV. 5s. each.
10. Report for 1870. Presented to Parliament. 10d.
11. Contributions to our Knowledge of the Meteorology of Cape Horn and the West Coast of South America. 2s. 6d.
12. Currents and Surface Temperature of the North Atlantic Ocean, from the Equator to Lat. 40° N., for each month of the year, with a General Current Chart. 2s. 6d.
13. A Discussion of the Meteorology of the Part of the Atlantic lying North of 30° N., for the Eleven Days ending 8th February 1870. Price, with Book of Charts, 5s.
14. Quarterly Weather Report for 1871.—Parts I. to IV. 5s. each.
15. Report for 1871. Presented to Parliament. 10d.
16. Quarterly Weather Report for 1872.—Parts I. to IV. 5s. each.
17. Report for 1872. Presented to Parliament. 1s.
18. Contributions to our Knowledge of the Meteorology of the Antarctic Regions. 2s.
19. Quarterly Weather Report, 1873.—Parts I. to IV. 5s. each.
20. Charts of Meteorological Data for Square 3. Lat. 0° - 10° N. Long. 20° - 30° W., and Remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. 20s.
21. Report of the Proceedings of the Meteorological Congress at Vienna. 1s.
22. Report for 1873. Presented to Parliament. 4d.

LIST OF PUBLICATIONS, &c.—continued.

- No. 23. Report of the Proceedings of the Conference on Maritime Meteorology held in London, 1874. 2s.
24. Instructions in the Use of Meteorological Instruments. 2s. 6d.
25. Quarterly Weather Report for 1874.—Parts I., II., and IV. 5s. each. Part III., 5s. 9d.
26. Report for 1874. Presented to Parliament. 6d.
27. Charts of Meteorological Data for the Nine 10° Squares of the Atlantic which lie between 20° N. and 10° S., and extend from 10° to 40° W., with accompanying Remarks, ending with the best routes across the Equator. 24s.
28. Contribution to our Knowledge of the Meteorology of Japan. By Staff-Commander Thomas H. Tizard, H.M.S. *Challenger*. 1s.
29. Report for 1875. Presented to Parliament. 4d.
30. Quarterly Weather Report for 1875.—Parts I.—IV. 5s. each.
31. Report for 1876–7. Presented to Parliament. 3s. 5d.
32. A Discussion of the Meteorology of the North Atlantic during August 1873, with 31 Synoptic Charts. 15s.
33. Quarterly Weather Report for 1876.—Part I., 6s.; Part II. (In the press.)
34. Contributions to our Knowledge of the Meteorology of the Arctic Regions.—Part I., 2s.; Part II., 10s.; Part III. (In the press.)
35. Report for 1877–8. Presented to Parliament. 1s.
36. Report of the Proceedings of the Meteorological Congress at Rome, 1879. 1s. 6d.
37. Report on the Meteorology of Kerguelen Island. By the Rev. S. J. Perry, S.J., F.R.S. 3s.
38. Report for 1878–9. 5d.
39. Meteorological Observations at Stations of the Second Order for the year 1878. 20s.
40. Aids to the Study and Forecast of Weather, by the Rev. W. Clement Ley, M.A. 1s.
41. Report for 1879–80. 1s.
42. Report for 1880–81. 1s. 2d.
43. Charts of Meteorological Data for the Ocean District adjacent to the Cape of Good Hope, with accompanying Remarks. Price of the Charts, 25s.; of the Remarks, 7s.
44. Report on the Gales experienced in the Ocean District adjacent to the Cape of Good Hope, between Lat. 30° and 50° S., and Long. 10° and 40° E. 7s. 6d.
45. Meteorological Observations at Stations of the Second Order for the year 1879. 20s.
46. Report on the Storm of October 13–14, 1881. By Robert H. Scott, F.R.S. 1s. 6d.

LIST OF PUBLICATIONS, &c.—continued.

- No. 47. Rainfall Tables for the United Kingdom. Compiled by G. J. Symons, F.R.S. (In the press.)
48. Report for 1881-2. Price 1s.
49. Quarterly Weather Report for 1879 (New Series). Appendices and Plates. 27s.
50. Quarterly Weather Report for 1880 (New Series). Appendices and Plates. (In the Press.)
51. Hourly Readings, 1881 (New Series).—Part I., 10s. 6d. Part II. (In the Press.)
-

LIST OF PUBLICATIONS, &c.—*continued.*

NON-OFFICIAL.

- No. 1. Report to the Committee on the Connexion between Strong Winds and Barometrical Differences.—By Robert H. Scott, Director of the Office. 6*d.*
2. Report to the Committee on the Meteorology of the North Atlantic.—By Captain H. Toynbee, Marine Superintendent. 1*s.*
3. Report to the Committee on the Use of Isobaric Curves.—By Captain H. Toynbee, Marine Superintendent. 1*s.*
4. Routes for Steamers from Aden to the Straits of Sunda and back. Translated from a Paper issued by the Royal Meteorological Institute of the Netherlands. 6*d.*
5. On the Winds, &c. of the North Atlantic along the Tracks of Steamers from the Channel to New York. Translated from a Paper issued by the Deutsche Seewarte, Hamburg. 6*d.*
6. Report of the Proceedings of the Meteorological Conference at Leipzig. 1*s.*
7. Notes on Form of Cyclones in Southern Indian Ocean.—By C. Meldrum, Esq., M.A., F.R.S. 6*d.*
8. Report on Weather Telegraphy and Storm Warnings. Presented to the Meteorological Congress at Vienna. 6*d.*
9. Report of the Permanent Committee of the Vienna Congress for 1874. 1*s.* 6*d.*
10. On the Physical Geography of the part of the Atlantic which lies between 20° N. and 10° S., and extends from 10° to 40° W. A Paper read before the British Association at Bristol, in August 1875, by Capt. Toynbee, F.R.A.S., F.R.G.S., Marine Superintendent. 1*s.* 6*d.*
11. Report of the Permanent Committee of the Vienna Congress for 1876. 2*s.*
12. Reports to the Permanent Committee of the Vienna Congress on Atmospheric Electricity, Maritime Meteorology, and Weather Telegraphy, 1878. 2*s.*
13. Report of the Permanent Committee of the Vienna Congress for 1878. 6*d.*
14. Report of the International Meteorological Committee Meeting at Berne, 1880. 1*s.*

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