

R E P O R T
OF THE
METEOROLOGICAL COUNCIL
TO THE
ROYAL SOCIETY,

For the Year ending 31st of March 1892.

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



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BY EYRE AND SPOTTISWOODE,
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1893.

[C.—6878.] *Price 6d.*

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THE METEOROLOGICAL COUNCIL,

1891-92.

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

MR. ALEXANDER BUCHAN, M.A., LL.D., F.R.S.E.

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Captain WILLIAM J. L. WHARTON, R.N., F.R.S., Hydrographer of
the Admiralty.

R E P O R T
OF THE
METEOROLOGICAL COUNCIL
TO THE
ROYAL SOCIETY,

For the Year ending March 31, 1892.

THERE has been no change in the Council during the year. Introductory.
The executive officers are, as stated in the last Report :—

Mr. R. H. Scott, M.A., F.R.S., Secretary.

Nav.-Lieut. C. W. Baillie, R.N., F.R.A.S., Marine Superintendent.

Registration of the Council under the Companies Act.—It was stated in the last Report that the Council had, with the sanction of the President and Council of the Royal Society, made an application to the Board of Trade for registration as an Association under the Companies Act, 1867. The necessary consent having been obtained, the Association was registered on the 8th of October 1891. The Memorandum and Articles of Association will be found at Appendix I., p. 25. Registration of Council as a corporate body.

Removal of Valencia Observatory.—The circumstances which led to the removal of Valencia Observatory from the island to a situation on the mainland adjoining, have been already explained. The purchase of Westwood House, Cahirciveen, by the Royal Society, from the funds of the Council, was completed in the month of March 1892, and after some needful repairs had been executed, and alterations made to admit of the proper erection of the instruments, the change of the observatory to its new location was completed on the 28th of that month. Removal of Valencia Observatory.

The International Meteorological Conference.—In the autumn a meeting of representatives of various meteorological establishments was held in Munich. It was attended by 33 persons representing most of the States of Europe, and also the United States, Brazil, and Queensland. The Council instructed their Secretary, Mr. Scott, to represent them on this occasion. The International Meteorological Conference.

The English version of the Report of the Proceedings will as usual be published in due course.

PART I.

OCEAN METEOROLOGY.

Collection of information. *Collection of Information.*—The practice followed by the Office with reference to observers at sea, as described in former Reports, remains unchanged.

Recognition of "excellent" observers. Appendix II. (p. 28) contains a list of all the observers who during the past year have contributed logs classed as "excellent." Several of these observers have regularly co-operated with the Office for many years. The names which appear in the list for the first time are as follow:—

Observer's Name.	Ship.
Bell, Richardson, R.N.R.	Barquentine "Bootle."
Bett, William, Surgeon, R.N.	H.M.S. "Stork."
Combe, J. W., Lieut., R.N.	H.M.S. "Penguin."
Conby, H. B.	Ship "Garfield."
Davis, Harry	Barque "Alexander Lawrence."
Martin, Walter, R.N.R.	S.S. "German."
Murray, Alexander, Junr.	S.S. "Windward."
Oliver, G., Lieut., R.N.	H.M.S. "Penguin."
Peterkin, William	Ship "Khyber."
Rohde, H. P. R.	Barque "Archdale."
Smyth, M. H., Lieut., R.N.	H.M.S. "Stork."
Spalding, T. F.	S.S. "Australasian."
Walker, J. J., F.L.S., Chief Engineer, R.N.	H.M.S. "Penguin."
White, W. E., R.N.R.	S.S. "Ormuz."

Proportion of "excellent" to total number of logs received. The total number of logs received in the year ending March 31, 1892, was 143, of which 106, or 74 per cent., have been classed as "excellent."

The average number of logs received annually during the five years, 1886-90, was 176, of which the per-centage of "excellent" logs was 75.

The Council take this opportunity of expressing their best thanks to the observers who have assisted them during the past year, and also to the Ocean Steamship Company, Liverpool, who have kindly presented to the Office a large number of the logs of their vessels.

They regret to have to announce the deaths of no less than eight of their observers, all of whom had sent in "excellent" logs, and many had been observers for a long period. They were Captains James Clarke, R. F. Hoskyn, R.N., R. C. Jennings, W. G. North, C. W. Pearson, P. Rowsell, and J. Thearle, and Mr. W. H. Young.

Appendix III. (p. 30) gives a list of the meteorological logs and of meteorological reports from stations abroad, received at the Office during the year.

The following summary of the voyages of the ships observing for the Office shows the districts from which observations were received during the year:—

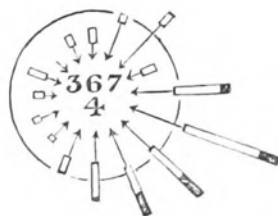
Districts from which observations are obtained.

To Baffin's Bay or Greenland	-	-	-	4
„ North America, East Coast	-	-	-	14
„ „ „ West „	-	-	-	9
Off East Coast of North America	-	-	-	3
To West Indies	-	-	-	3
„ South America, East Coast	-	-	-	13
„ „ „ West „	-	-	-	7
„ Australia and New Zealand, viâ Cape of Good Hope	-	-	-	26
„ „ „ „ viâ Suez	-	-	-	8
At Australian stations	-	-	-	4
To India, viâ Suez	-	-	-	8
„ India, viâ Cape of Good Hope	-	-	-	16
„ China, viâ Suez	-	-	-	6
„ Cape of Good Hope	-	-	-	9
Off East Coast of Africa	-	-	-	3
Between British Ports	-	-	-	5
To Continental Ports	-	-	-	4

Red Sea Charts.—These charts will shortly be handed to the engraver. In the course of their preparation a suggestion was made by Lieut. Baillie for modifying the system hitherto adopted for the representation of wind results, which was approved by the Council and will be generally adopted in future, as being a decided improvement on the former method. In the new form of Wind Rose, which is given below, the arrows show by their length the frequency of winds of various directions, and by their thickness their various forces; light winds, forces 1 to 3; moderate winds, forces 4 to 7; and gales, forces 8 to 12:—



Thus in the diagram selected as an illustration, a great prevalence of South-east winds is shown, and gales will be seen in this particular case to be almost exclusively confined to that quarter:—



The circle supplies a scale for estimating the frequency of winds in any direction. The length from the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = 4 inches). The upper figures in the central space are the total number of observations, the per-centage of calms being given underneath.

Current Charts for the Atlantic, Pacific, and Indian Oceans.—The extraction of data from the Office logs and from the

Current Charts.
Remark Charts.

Books of the Royal Navy has been completed, and the Royal Navy log books are now being examined for the period prior to the introduction of the uniform system of Remark Books. The number of these logs examined during the year has been 4,046.

Southern Ocean.

Southern Ocean.—The extraction of data from the Office logs for this district has been completed. The log books of H.M. ships are now being dealt with, to the number of 567 in the year, and valuable information has been obtained from the logs of the various steamship companies carrying on trade with Australia.

Distant stations.

Supply of Instruments to distant Stations.—On a representation received through the Colonial Office, it was decided to supply a complete outfit of meteorological instruments, including the self-recording anemograph formerly at Heligoland, to St. Helena, the Governor of which island had undertaken to arrange for the regular record of the usual meteorological observations at a station specially selected with the object of obtaining a satisfactory register of the wind; a set of instruments has also been supplied to Mr. Knott, Vice-Consul at Mojange, Madagascar, and to Mr. Anstruther at the cable station at Fernando Noronha.

Royal Naval Exhibition.

Royal Naval Exhibition.—The Council took advantage of this opportunity to exhibit specimens of the charts which have recently been issued by the Office, and of the instruments which they supply to captains willing to observe for them. These exhibits attracted considerable attention from the visitors.

In addition the forecasts and weather charts emanating from the Office were exhibited and renewed three times daily.

Stock of Instruments belonging to the Office.

Supply and Stock of Instruments.—In Appendix IV. (p. 36) is given a list of the meteorological instruments supplied by the Office to ships in the Royal Navy during the year, with a statement for the 31st March 1892 of the stock and distribution of the instruments standing on the books to the account of the Admiralty.

Appendix V. (p. 37) gives similar information with regard to the disposal of the other instruments belonging to the Office, remaining in store, or which have been supplied to the Mercantile Marine, and to observatories, telegraph offices, &c.

PART II.

WEATHER TELEGRAPHY AND FORECASTS.

Administrative.

There have been no serious interruptions of telegraphic communication during the year.

A new reporting station has been established at the North Foreland; in this case, as in that of Malin Head, the Council have been indebted to Lloyd's Committee for the means of obtaining regular observations at an outlying station not otherwise available. Among the observers the only changes have been the substitution of Mr. G. Freeman for Mr. J. H. Watson at Spurn Head and of Mr. W. Newlands for Mr. J. Hay at Leith.

The Council have to express their sincere regret at the death by accident of Mr. John Hartnup, the superintendent of the Bidston Observatory, Birkenhead, which occurred on April 21, 1892. Mr. Hartnup had for many years, by permission of the Mersey Docks and Harbour Board, furnished to the Office the weather reports from his observatory.

Administrative.

A list of the telegraphic reporting stations, British and Foreign, is given in Appendix VI. (p. 38).

The work in this branch of the Office continues to increase. The Daily and Weekly Weather Reports, in particular, have been extended and improved.

Daily and Weekly Weather Reports.

In the volume of the Daily Weather Reports for the second half of 1891 the following monthly averages for nearly all the stations have been published as a preface :—

Pressure, 20 years, 1871-90.

Temperature, 20 years, 1871-90.

(viz., maximum, minimum, and dry and wet, the two latter for 8 a.m.)

Rain, 25 years, 1866-90.

A new column has also been added to the Report giving an account of the weather which has prevailed at the stations in the intervals between the observing hours.

The Weekly Weather Report has been improved by the addition of two new stations, and by a table giving weekly sunshine records for ten other stations.

Inspection of the Telegraphic Reporting Stations.—The telegraphic reporting stations have been inspected during the year, in England by Mr. Ley, 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. 39), show that the efficiency of the service continues to be satisfactorily maintained.

Inspection of the Stations.

Discussion and Publication of the Information received.—The practice of the Office in collecting, discussing, and disseminating the meteorological information received by telegraph is described in Appendix VIII. (p. 58). The Daily Weather Report has appeared regularly during the year; for details see that Appendix. It is distributed free of cost as follows :—To newspapers, seven copies; to seaports, for public exhibition, 71 copies; to Government offices and public institutions, 66 copies; to correspondents of the Office, 73 copies; and to foreign meteorological establishments, 46 copies. Nearly 200 copies are issued regularly to subscribers.

Discussion the reports.

The Weekly Weather Report, with its Monthly Appendices, has also appeared regularly; for particulars of this publication see Appendix VIII, p. 58.

Display of
information in
front of the
Office.

Public display at the Office of the State of the Weather on British Coasts.—This arrangement, which was made with a view to the earliest possible supply to the public of the latest information as to the weather received from the principal points on the eastern, southern, and western coasts, has been regularly carried out, and it is believed with general public approval. It supplies at 9.30 a.m. and 3 p.m. every week day the substance of the reports received by telegraph, of the state of the weather and sea at the following stations: Yarmouth, Dungeness, the Needles (Hurst Castle), Scilly, Holyhead, and Valencia, and this is displayed in a conspicuous manner on the front of the Office, 63, Victoria Street, S.W.

Supply of Forecasts to the Fleet.—At the request of the Admiralty daily forecasts were supplied to the Commander-in-Chief of the "A" Fleet during the continuance of the Manœuvres as in previous years, and also to the Commander-in-Chief, Devonport. This latter service is continued throughout the year. It commenced at the end of 1890.

Forecasts.

Weather Forecasts.—Forecasts are prepared three times a day, namely, at 11 a.m., at 3.30 p.m., and 8.30 p.m. The Forecasts prepared at 11 a.m., on the information derived from the 8 a.m. reports, refer to the probable weather between noon on the day of issue and noon on the following day. They are publicly exhibited in several places in London,* and are supplied to the afternoon editions of the newspapers. The 3.30 p.m. Forecasts are employed for storm warnings only, excepting in the hay harvest season, when they are issued as subsequently explained. The forecasts at 8.30 p.m. are specially prepared for publication in the morning newspapers, but all the forecasts are available for the information of anyone who applies for them at the Office.

Inquiries at the
Office.

The inquiries received through the Post Office for special forecasts during the year amounted to 84, and the personal applications to 66. The rules of the Office relating to such inquiries are stated in Appendix VIII. (p. 62).

Results of
Forecasts.

The results of a comparison of the Forecasts issued at 8.30 p.m. during the year, with the weather actually experienced, are given in Appendix IX. (p. 63). The following summary shows the successes and failures over the whole United Kingdom, estimated as explained in that Appendix. The results were best in England, South, and worst in Scotland, West. The total per-centage of success was 2 lower than in 1890-91.

* Viz., in the City at the Mansion House, Lloyd's Rooms, Messrs. R. & J. Beck's, Cornhill, and Messrs. de la Rue & Co.'s, Buhill Row; in the West End, in the Libraries of the House of Lords and House of Commons, at Messrs. Elliot's, St. Martin's Lane; Messrs. Stanford's, Charing Cross; Messrs. Negretti & Zambra's, Regent Street; and Messrs. Pastorelli's, New Bond Street; and at the Office, 63, Victoria Street.

SUMMARY of RESULTS of 8.30 p.m. FORECASTS, 1891-92.

Results of
Forecasts.

Districts.	Per-centages.				Total per-centage of Success.
	Complete Success.	Partial* Success.	Partial* Failure.	Total Failure.	
SCOTLAND, N. - -	51	32	11	6	83
„ E. - -	54	27	14	5	81
ENGLAND, N.E. - -	51	30	14	5	81
„ E. - -	49	33	13	5	82
MIDLAND COUNTIES -	50	29	15	6	79
ENGLAND, S. - -	52	32	12	4	84
SCOTLAND, W. - -	46	29	15	10	75
ENGLAND, N.W. - -	50	30	13	7	80
„ S.W. - -	51	31	11	7	82
IRELAND, N. - -	53	29	11	7	82
„ S. - -	46	32	12	10	78
Summary - -	50	30	13	7	80

* Note "partial" implies "more than half."

The following table shows for each year from 1882 to 1891, inclusive, the per-centages of complete and partial success of the Forecasts issued at 8.30 p.m. for the whole year. Testing of
Forecasts.

PER-CENTAGES of RESULTS of FORECASTS for the whole of the
BRITISH ISLES.

Year.	Complete Success.	Partial, i.e., more than Half Success.	Total Success.
1882 - -	43	37	80
1883 - -	48	33	81
1884 - -	50	31	81
1885 - -	50	34	84
1886 - -	49	31	80
1887 - -	52	32	84
1888 - -	51	31	82
1889 - -	49	32	81
1890 - -	50	32	82
1891 - -	50	30	80
Average - -	49	32	81

Hay Harvest Forecasts.—The Council renewed in 1891 the offer made in previous years to the Royal Agricultural Society, the Royal Dublin Society, and the Highland and Agricultural Society to send Daily Forecasts *gratis* during the haymaking season to a number of observers selected by those Societies, on two conditions, viz., that the information should be made known as widely as possible, and a record of the weather actually experienced sent Hay Harvest
Forecasts.

Hay Harvest
Forecasts.

weekly to the Office. The Societies accepted the proposal, and the Forecasts were issued as shown in the following table:—

LIST of those who received HAY HARVEST FORECASTS
in 1891.

Districts.	To whom sent.	Address.
0. SCOTLAND, N.	Rev. Dr. Joass - Major Smith -	Golspie. Munlochy, Inverness.
1. SCOTLAND, E.	J. Whitton - G. Murdoch - C. W. L. Forbes -	Glamis Castle, by Forfar. Rothiemay, Huntly. Aberfeldy.
2. ENGLAND, N.E.	Sir J. Wilson - J. Turner -	Chillingham Barns, Chatton, Northumberland. The Grange, Ulceby.
3. ENGLAND, E.	W. Birkbeck - Sir J. B. Lawes, Bt., and Prof. J. H. Gilbert, Ph.D.	High House, Thorpe, Norwich. Rothamsted, Harpenden.
4. MIDLAND COUNTIES	Royal Agricultural College. E. E. Harcourt-Vernon	Cirencester. Grove Hall, East Retford.
5. ENGLAND, S.	C. Whitehead - E. P. Squarey - The Aylesbury Dairy Company. M. J. Sutton -	Barming House, Maidstone. The Moot, Downton, Wilts. Stammerham, Horsham. Reading.
6. SCOTLAND, W.	W. Calder - M. J. Stewart, M.P. J. S. R. Ballingal	Castle Hill, Dalreoch, Dum- barton. Ardwell, Stranraer. Eallabus House, Islay.
7. ENGLAND, N.W.	G. W. Wray - The Earl of Derby, K.G.	Leyburn, Yorkshire. Knowsley Hall, Prescott.
8. ENGLAND, S.W.	The late Colonel T. Picton Turbervill. The Earl of Ducie - T. Dyke - R. Neville Grenville	Ewenny Priory, Bridgend, Glamorganshire. Tortworth, Gloucestershire. Long Ashton, Clifton, Bristol. Butleigh Court, Glastonbury.
9. IRELAND, N.	E. F. Farrell - J. M. Wilson, J.P.	Moynalty, Co. Meath. Currygrane, Edgeworthstown.
10. IRELAND, S.	D. A. Milward - W. Talbot Crosbie, D.L. The Earl of Rosse, K.P.	Lavistown, Kilkenny. Ardfert Abbey, Tralee, Co. Kerry. Birr Castle, Parsonstown.

In addition to the above names the forecasts were sent to six other gentlemen at their own cost.

The issue of the forecasts commenced on June 15th with those for the South and East of England, and were continued for about five weeks, ending on the 18th of July in those districts. In

other parts of the country they commenced and ended about a fortnight later. Hay Harvest Forecasts.

The general result of the issue of these forecasts, shown by the subjoined table, has been prepared 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, 1891.

Districts.	Names of Stations.	Per-centages.				Total per-centage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N.	Mumloch and Golspie	40	42	17	1	89
" E.	Aberfeldy, Glamis, and Rothiemay	49	41	9	1	90
ENGLAND, N.E.	Chatton and Ulceby	61	26	11	2	87
" E.	Rothamsted and Thorpe	69	23	8	—	92
MIDLAND COUNTIES	Girencester and East Retford	70	22	8	—	92
ENGLAND, S.	Reading, Maidstone, Downton, and Horsham.	62	28	8	4	90
SCOTLAND, W.	Stranraer, Islay, and Dunbarton	52	35	11	2	87
ENGLAND, N.W.	Leyburn and Prescot	60	34	6	—	94
" S.W.	Tortworth, Clifton, Bridgend, and Glastonbury.	66	23	9	2	89
IRELAND, N.	Moynalty and Edgeworthstown	58	32	10	—	90
" S.	Tralee, Kilkenny, and Parsonstown	56	34	8	2	90
Mean for all districts		58	31	10	1	89

These figures show that the results for the forecasts for 1891 reached a total per-centage of success of 89, being the same figure as was recorded in the two preceding years.

The Council regret that they have been informed by the Board of Agriculture that that Department does not see its way to aid in the further dissemination of these forecasts.

Storm Warnings for the Coasts of the United Kingdom.—In Appendix X. (p. 64) are given the names of the stations furnished with signals for Storm Warnings, in accordance with Circular 717 of the Board of Trade issued in February 1874. Storm Warnings.

These stations were, at the end of March 1892, 170 in number, situated :—

81 in England, 16 in Wales, 47 in Scotland, 20 in Ireland, 3 in the Isle of Man, and 3 in the Channel Islands.

An application was received during the year from the Royal National Lifeboat Institution for the supply of daily forecasts to all lifeboat stations on the coast. The Council were reluctantly obliged to reply that the grant at their disposal would not suffice for the additional cost of telegraphing daily to these stations.

A comparison has been made in the Office between the warnings issued during the year and the weather experienced on our coasts, the warnings being tested by the method explained in Appendix

Storm
Warnings.

VIII. (p. 63). The results of this comparison are shown in the following tables:—

RETURN of the RESULT of the COMPARISON between the
WARNINGS ISSUED and the WEATHER EXPERIENCED in 1891.

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 partially late. Force 9 reached at one Station before issue.	Storms for which no Warning was issued.
Scotland, N.E.	50	35	9	2	1	3	—
„ E.	35	13	18	4	—	—	—
„ N.W.	52	30	14	4	4	—	Dec. 15.
„ W.	44	27	12	5	—	—	Dec. 15.
Ireland, S.W.	46	35	5	5	—	1	March 2—Nov. 11.
„ N.W.	53	39	7	1	1	5	March 5-6; May 15; Nov. 28; Dec. 15.
Irish Sea	41	30	4	—	1	6	March 5-6; May 15; Oct. 11.
St. George's Channel	36	20	10	3	1	2	Dec. 7.
Bristol Channel	34	20	11	3	—	—	Dec. 7.
England, S.W.	33	18	10	3	—	2	Dec. 7.
„ S.	27	15	10	2	—	—	—
„ S.E.	25	15	8	2	—	—	Oct. 22.
„ E.	22	10	8	4	—	—	—
„ N.E.	24	18	2	1	1	2	Feb. 11; March 5-6; May 15; Nov. 11; Dec. 3.
Totals -	522	325	128	39	9	21	
Per-centages -	—	62·3	24·5	7·5	1·7	4·0	

NOTE as to GALES experienced in 1891 on certain parts of our coasts, and for which WARNINGS were NOT ISSUED.

These were 12 in number, and may be classified as follows:—

(1.) Gales of *February 11*, *March 2*, *May 15*, *October 11*, *November 3*, and *December 3*, were due merely to the fact that storms which had been duly warned for in adjacent districts spread somewhat further than had been anticipated at the time when the warnings were being issued.

(2.) Gales of *March 5-6*, *November 2*, and *December 7*; The approach of these depressions not indicated by the latest reports received prior to their advance.

Gale of *October 22*. Strong but very local gale from S.S.W. on east coast of Kent and at mouth of Thames. Apparently due to the development over England during the night of local disturbances; secondary to a large system in the W., which was too shallow to cause gales.

Gales of *November 11* (North-easterly in Ireland S.W., South-easterly in England N.E.). Due to a disturbance which advanced

directly over the kingdom from the south-westward, but which proved to be much deeper than was anticipated.

Gales of *December 15*. This depression was complex, and appeared to be advancing in such a direction that the extreme north-west coast did not seem to be threatened. The centre, however, took a more westerly course than was anticipated, and the coasts were involved in the general disturbance.

The following table contains a comparative statement of the storm warnings and their results in 1891, and in the ten preceding years. It will be seen that the total per-centage of warnings justified is 86·8, being even better than that for the preceding year. The per-centage of warnings not justified by weather, or, in other words, of total failures, is the lowest on record.

Comparison of results for 1891 with previous years.

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.
		p.c.	p.c.	p.c.	p.c.
1881	454	58·6	23·3	81·9	14·8
1882	503	61·4	21·1	82·5	14·9
1883	610	56·2	21·6	77·8	20·8
1884	461	66·4	20·0	86·4	12·1
1885	591	55·3	24·0	79·3	19·5
1886	542	55·3	26·9	82·2	15·9
1887	472	55·5	26·1	81·6	16·4
1888	539	55·3	28·6	83·9	14·3
1889	373	47·7	33·5	81·2	16·9
1890	525	61·0	25·5	86·5	9·3
1891	522	62·3	24·5	86·8	7·5

Fishery Barometers.—To add to the means of obtaining warnings of stormy weather by the sea-going population, barometers were many years ago supplied by the Board of Trade on loan to fishing villages and other places on the coast, to be set up for public information. The whole number of stations supplied by the Office with these instruments is 185. Of these 60 are in England, 6 in Wales, 52 in Ireland, 62 in Scotland, 4 in the Isle of Man, and 1 in Jersey. The list is given in Appendix XI., p. 67.

PART III.

LAND METEOROLOGY OF THE BRITISH ISLES.

Observatories and Stations.—The observations of the climate of the British Isles, which are received by the Office from certain stations, may be arranged in five classes, according to the degree of completeness with which they are made.

1. The Observatories furnished with self-registering instruments by which all the principal meteorological phenomena are recorded

Self-recording observatories.

continuously. These alone afford the materials necessary 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 rather to weather as distinguished from climate, and are especially important in connexion with storms. They are often useful in affording evidence available in 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 the observations are taken by eye, but supplemented in some cases by self-recording aneroids, &c., supply the material upon which the daily weather reports and forecasts are based. The hours of observation at these stations are determined by the requirements of the telegraphic system, as explained in Part II., but the data which they furnish are also utilized to afford climatological information for parts of the country where Stations of the Second Order do not exist.

Extra stations.

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

Sunshine stations.

A continuous record of the amount of bright sunshine is received from 44 stations in the British Isles, of which some are First or Second Order stations, whilst from others the sunshine record is alone received. See Appendix XII., p. 68.

A fuller account of these several stations and of the methods employed by the Office in dealing with their records will be found in Appendix XIII., p. 69.

Documents received.

Appendix XIV., p. 72, contains a list of all documents relating to the land meteorology of the British Isles received at the Office during the year.

Inspection of stations.

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 Royal Meteorological Society, and these are visited by an Inspector appointed by that 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, including those belonging to the Scottish Meteorological Society, are visited, most of them annually, by the Inspectors of the Office. The Superintendent of the Kew Observatory, Mr. G. M. Whipple, and his chief assistant, Mr. T. W. Baker, are specially 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 are given in Appendix VII., p. 39.

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

The Weekly Weather Report, which is prepared in the Telegraphic Branch of the Office (see Appendix VIII., p. 58), supplies, by its synchronous charts and Monthly Summaries, a very complete and instructive view of the chief meteorological changes, day by day, over the greater part of Europe, such as is not to be found in any of the similar publications issued by any other office. Publications.

Appendix I. to the Weekly Weather Report for 1891 gives a summary for each quarter, and for the whole year, of the Rainfall and Temperature for each district, for the 26 years 1866–1891, and also the Monthly and Progressive values of Accumulated Heat, Rainfall, and Bright Sunshine for all the districts in each month of 1891. Appendix II. to the same Report gives the Weekly and Progressive values for the same elements during the year 1891 (in continuation of Appendix II. for the year 1890).

Hourly Readings of Meteorological Instruments.—The Volume of Hourly Means for 1888 has appeared, and that for 1889 is in a very advanced state. These volumes differ in no respect, as to arrangement, from that for the year 1887, described in the last Report. Hourly Readings of Meteorological Observations.

Harmonic Analysis of the Hourly Observations at British Observatories.—A volume containing a full series of tables illustrative of this method of dealing with the Hourly Values of the Temperature and Pressure at the seven self-recording observatories maintained by the Meteorological Office, and at Greenwich, has been published. It deals with the hourly records of Temperature and Pressure at Greenwich for 20, and at the seven observatories for 12 years, for every month of every year. It is believed to be the first systematic publication of the description that has till now been brought out by any of the established meteorological institutions. Harmonic Analysis of the Hourly Readings.

The computation of mean hourly values, on the system explained fully in the Report for 1890, of the temperature of the air and of barometrical pressure for the seven observatories for each month, has been completed for several years, and is still being carried on. The work is somewhat heavy, but considerable progress has already been made with it, and when completed it will supply data which would not otherwise be made available for meteorologists.

Observations at Stations of the Second Order.—The volume for 1888 is now nearly complete.

Stations for
publication.

The following is the list of stations for which returns are being published for 1888 :—

STATIONS for PUBLICATION in DETAIL on Form A.,
21 in Number.

Stations.	In connexion with	Years already published in detail.	Remarks.
Glasgow -	M. O.	12	Formerly observatories. 10 years hourly readings already published. Continuous records of pressure, temperature, wind, and rainfall still available, except for Armagh, which furnishes wind and rain only. For Stonyhurst and Armagh the records from 1884 have been published on Form A.
Stonyhurst -	M. O.	14	
Armagh -	M. O.	14	
Dunrobin Castle -	S. Met. Soc.	8	High-level station (1,113 feet).
Braemar -	S. Met. Soc.	8	
Dundee -	S. Met. Soc.	8	
Wolfelee -	S. Met. Soc.	2	
Scarborough -	R. Met. Soc.	7	
Hillington -	R. Met. Soc.	11	
Churchstoke -	R. Met. Soc.	12	
Carmarthen -	R. Met. Soc.	13	This is the most northern station available, and there is a continuous record of wind.
Margate -	R. Met. Soc.	6	
Babbacombe -	R. Met. Soc.	11	
Swanbister (Orkneys).	M. O.	2	At both of these stations there are long series of observations available taken by the officers of the Ordnance Survey.
Laudale -	M. O.	9	
Douglas (Isle of Man).	M. O.	10	
Southampton -	M. O.	10	At both of these stations there are long series of observations available taken by the officers of the Ordnance Survey.
Dublin (Mountjoy Observatory).	M. O.	2	
Markree Castle -	M. O.	13	
Parsonstown -	M. O.	15	
Londonderry -	M. O.	9	

LIST for PUBLICATION on Form B. (Monthly Means and Summaries).

Stations for publication.

Swanbister.	❧ Buxton.
❧ Lairg.	❧ Cheadle.
❧ Dunrobin Castle.	❧ Hillington (Norfolk).
❧ Gordon Castle.	Uppingham.
❧ Glencarron.	❧ Churchstoke (Montgomeryshire).
Aberdeen.	Geldeston (Beccles).
❧ Fort Augustus.	❧ Bennington.
❧ Braemar.	❧ Cheltenham.
❧ Fort William.	St. David's.
❧ Lednathie.	❧ Carmarthen.
Laudale (Argyleshire).	❧ Berkhamsted.
❧ Dundee.	Kew.
❧ Ochertyre.	❧ Margate.
❧ Callton Mor.	Southampton (Ord. Survey Office).
Glasgow.	Eastbourne.
❧ Rosewell.	❧ Rousdon.
❧ Rothesay (Isle of Bute).	❧ Dartmoor.
❧ Marchmont.	❧ Babbacombe (Torquay).
❧ Wolfelee.	Falmouth.
❧ Pinmore (Ayrshire).	Londonderry.
❧ Glenlee.	❧ Lissan (Co. Tyrone).
❧ Cramlington.	Armagh.
❧ Cargen.	Brookeborough (Colebrooke Park).
Durham.	Markree Castle (Co. Sligo).
Newton Reigny.	Edgeworthstown.
❧ Aysgarth (Yorkshire).	Dublin (Glasnevin).
❧ Scarborough.	Dublin (Mountjoy Observatory,
Cronkbourne (Douglas), Isle of Man.	Phoenix Park).
York.	Dublin (City).
Stonyhurst.	Parsonstown (Birr Castle).
❧ Wakefield.	❧ Killarney.
❧ Prestwich.	Valencia.
❧ Llandudno.	

The Stations marked ❧ belong to the Scottish, and those marked ❧ to the Royal Meteorological Society.

With reference to these stations and the arrangements with the Royal Meteorological Society and the Scottish Meteorological Society as to the supply of information therefrom, a considerable increase has been made in the allowances to the respective Societies, inasmuch as it was found that the terms hitherto existing were not sufficient to defray the cost of supply of the information.

Removal of the Anemometer to Deerness, Orkney.—In the month of April the anemometer, which had been removed from Swanbister to Stenness in the month of August preceding, was again removed to Deerness School House, the observer having received the appointment of schoolmaster in that parish.

Removal of Anemometer in the Orkney Islands.

PART IV.—MISCELLANEOUS.

Storm Warnings for the West Indies.—An inquiry was received in January from the Colonial Office as to the advisability of instituting a system of storm warnings among the Windward and Leeward Islands, with the view of giving timely intelligence of

West Indian Storm Warnings.

hurricanes. The Council strongly recommended the introduction of such a system.

Sea Surface
Temperature.

Sea Surface Temperature on the Coasts of the British Isles.—These observations, which are obtained through the courteous assistance of the Admiral Superintendent of Naval Reserves, the Trinity House, and the Commissioners of Irish Lights, are still continued, and a large amount of valuable information is thereby collected.

Cloud Observa-
tions.

Cloud Photography and Measurement.—These researches have been continued, and an account of the results hitherto obtained, and of the methods adopted to procure them, was laid before the Royal Society on the 30th of April, and printed in their Proceedings, Vol. xlix.

Anemometer
Comparisons.

Anemometer Experiments.—As intimated in the last Report, Mr. W. H. Dines has continued his experiments on the comparison of anemometers. This investigation was first instituted at the suggestion of the Royal Meteorological Society, and has been conducted by the aid of a grant from the Meteorological Council. A notice of the results will be found at Note A., p. 23.

The Electrical
Anemometer.

The Electrical Anemometer.—The Post Office Telegraph Department, by which this instrument was constructed, having expressed their readiness to make further trials of its action, it was handed over to them for that purpose.

The Electro-
graph.

Electrograph.—The performance of this instrument, devised for the registration of atmospheric electricity, at the Kew Observatory has been unsatisfactory of late, and the Council have requested the Kew Committee to take up the subject by obtaining a discussion of the results that have been recorded in the past, and of improving the system of registration, should those results give evidence of the continuance of the registry being of scientific value.

Simultaneous
Observations.

Simultaneous Observations.—The Office has received intimation from the Weather Bureau, Washington, that the service of International simultaneous observations, taken at Greenwich mean noon, which was organized in 1874, at the request of the Chief Signal Officer of the United States, had been discontinued when that officer was relieved of his meteorological duties in July, 1891.

The number of these observations which have been received during the year from the Royal Navy has been 3,460, and from the Mercantile Marine, 4,400.

Instruments
for Public
Parks.

Instruments for the Public Parks.—In the course of the year the Office was consulted by the County Council as to the erection in the parks, connected with the Council, of pillars bearing meteorological instruments, for the information of the public as to weather. Instruments of the pattern recommended by the Office have been erected in Battersea Park.

Rain Means for the British Islands.—In the year 1883 the Council published a set of tables of rain means for 366 stations, for the 15 years 1886–80, which had been obtained from Mr. G. J. Symons, F.R.S. As a further period of 10 years has now elapsed, the Council are considering the desirability of continuing the publication so as to bring it more up to date, and have entered into correspondence with Mr. Symons on the subject. Rain Means.

Sunshine of the British Isles.—Tables of the amount of sunshine recorded in the British Isles during the 10 years 1881–90 have been prepared by Mr. Scott, and published by the Office. Sunshine.

Diurnal Range of Rain.—A Report on the Diurnal Range of the Fall of Rain at the seven observatories for the 10 years 1871–80, was prepared by Mr. Scott in 1882, and published in the Quarterly Weather Report for 1887. This investigation has now become extended for a further interval of 10 years, down to 1890, and the calculations are nearly complete. Rain, Diurnal Range of.

Fog.—An enumeration of the days on which fog or mist has been reported at the telegraphic reporting stations has been undertaken for the 15 years 1876 to 1890. It will probably be completed in the course of the coming summer. Fog and Mist.

LIBRARY.

The library contains standard works on Meteorology and the allied Sciences, and is, besides, particularly rich in Transactions, Proceedings, Reports, and other Publications which give a large mass of Meteorological observational data from all parts of the world, extending over many years. It consists at present of over 11,500 volumes and pamphlets, exclusive of charts and MS. records of observations. The books and other documents are accessible to scientific men for reference at the Office. Library.

Appendix XV., p. 78, contains a list of the additions to the library during the year, which have been catalogued upon cards, and are entered in the reference catalogues under (1) Authors, and (2) Subjects.

EXPENDITURE.

Appendix XVI., p. 101, shows the receipts and payments during the year ending 31st March 1892. The amount voted by Parliament was 15,300*l.*, as in the previous year. Financial.

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 1891–92 as compared with the previous year :

Financial.

NET EXPENDITURE.	1890-91.	1891-92.	Increase.	Decrease.
GENERAL ADMINISTRATION:	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Payment of Council -	988 15 0	992 10 0	3 15 0	—
Secretary -	800 0 0	800 0 0	—	—
Office -	789 14 0	793 6 0	3 12 0	—
Rent, fuel, and lighting -	726 10 3	700 11 3	—	25 19 0
Alterations to premises, attendance, and contingencies -	737 16 2	553 10 3	—	184 5 11
Expenses incidental to International Meteorological Congress -	37 9 8	32 16 9	—	4 12 11
Pensions -	186 16 4	186 16 4	—	—
SPECIAL RESEARCHES -	950 13 3	905 1 8	—	45 11 7
LAND METEOROLOGY -	3,412 10 0	5,182 2 9	1,769 12 9	—
WEATHER INFORMATION -	3,759 17 11	3,823 6 0	63 8 1	—
INSPECTIONS -	706 8 9	584 0 11	—	122 7 10
OCEAN METEOROLOGY -	2,294 5 2	2,351 5 0	56 19 10	—
Total -	£ 15,390 16 6	16,905 6 11	1,897 7 8	382 17 3

In the year 1891-92 the sum of 1,527*l.* 6*s.* 1*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to clerks, and rental of private wires. The increase under Land Meteorology is chiefly due to the outlay on account of the purchase of the lease of the new Valencia Observatory and its equipment, which amounted to 1,623*l.* 1*s.* 2*d.*

(Signed) R. STRACHEY,
Chairman.

NOTE A.

ANEMOMETER COMPARISONS carried out with the aid of a
GRANT from the METEOROLOGICAL COUNCIL.

Abstract of a Report by Mr. Dines read before the Royal Meteorological Society, April 20, 1892.

The comparisons were made at the request of the Council of the Royal Meteorological Society, the cost being defrayed by the Meteorological Council. The instruments compared were:—

- I. Kew Pattern Robinson Anemometer.
- II. Self-Adjusting Helicoid Anemometer.
- III. Small Air Meter.
- IV. Foot Circular Pressure Plate.
- V. A special modification of the Tube Anemometer.

After pointing out the impossibility of comparing a velocity instrument with a pressure instrument, when the pressure curve is obtained in the usual way, owing to the fact that the square of the mean of a number of quantities is different from the mean of the squares of the same quantities, the report describes the way in which the recording part of the pressure instruments was arranged so as to avoid this difficulty.

The comparisons were made by getting simultaneously, and automatically, records upon the same sheet of paper, the sheets so obtained amounting to about 100 yards in length.

At first the instruments were placed 9 feet above the roof of a house, but it was soon found that eddies from the gables and chimney-stacks rendered the results quite useless. The instruments were then raised to 18 feet, at which height very little trace of any eddies could be detected.

The proper factor for the Robinson Anemometer, except for a perfectly steady wind, being unknown, the true velocity was taken to be the mean of the velocities recorded by the other four instruments, and the per-centages were found to be—

Robinson (assumed Factor 2·00).	Helicoid.	Air Meter.	Pressure Plate.	Tube.
92·8	93·9	93·0	105·8	107·2

These values are the mean of the whole set, but the difference between the two extremes decreases not only as a per-centage, but also in actual value, as the velocity rises.

The report points out the close agreement between the three velocity instruments taken by themselves, and also between the two pressure instruments taken by themselves, and then discusses the way in which the difference between the steady artificial wind of the whirling machine and the natural, but variable, wind will affect each instrument.

It is shown that during light winds the velocity instruments will give too low, and the pressure instruments will give too high readings; that frequent and sudden changes in intensity will make the pressure instruments indicate too high values, and also decrease the factor of the Robinson cups; that frequent and sudden changes in direction will make the Helicoid and Air Meter read too low, but will not alter the other instruments.

The conclusions arrived at are, that with proper precautions, the tube anemometer will form a most useful and convenient instrument; that the relation between pressure and velocity for a foot circular plate and at ordinary barometrical pressure is $P = \cdot 003V^2$; and that the factor of the Kew Pattern Robinson Anemometer is practically constant for all velocities except very low ones, that its value must lie between 2.20 and 2.00, and that there is very great probability that it is within $2\frac{1}{2}$ per cent. of 2.10.

(Signed) W. H. DINES.

APPENDIX.

APPENDIX I.

MEMORANDUM OF ASSOCIATION.

1. The name of the Association is "The Meteorological Council."
2. The registered office of the Association will be situate in England.
3. The objects for which the Association is established are:—
 - (1.) The administration of the Parliamentary Grant for Meteorological purposes.
 - (2.) The management of the Meteorological Office.
 - (3.) The doing all such lawful things as are incidental or conducive to the attainment of the above objects. Provided that the Association shall observe any lawful conditions or directions imposed or given by the Lords Commissioners of the Treasury as to the administration of the said Grant or the form of receipt to be given for payment of it.
4. The income and property of the Association, wheresoever derived, shall be applied solely towards the promotion of the objects of the Association as set forth in this Memorandum of Association; and no portion thereof shall be paid or transferred directly or indirectly, by way of dividend, bonus, or otherwise howsoever by way of profit, to the Members of the Association.

Provided that nothing herein shall prevent the payment, in good faith, of remuneration to any officers or servants of the Association, or to any Member of the Association, or other person, in return for any services actually rendered to the Association.
5. The fourth paragraph of this Memorandum is a condition on which a licence is granted by the Board of Trade to the Association in pursuance of section 23 of the Companies Act, 1867.
6. If any Member of the Association pays or receives any dividend, bonus, or other profit, in contravention of the terms of the fourth paragraph of this Memorandum, his liability shall be unlimited.
7. Every Member of the Association undertakes to contribute to the assets of the Association, in the event of the same being wound up during the time that he is a Member, or within one year afterwards, for payment of the debts and liabilities of the Association contracted before the time at which he ceases to be a Member, and of the costs, charges and expenses of winding up the same, and for the adjustment of the rights of the contributories amongst themselves, such amount as may be required not exceeding one pound, or in case of his liability becoming unlimited, such other amount as may be required in pursuance of the last preceding paragraph of this Memorandum.
8. If upon the winding up or dissolution of the Association there remains, after the satisfaction of all its debts and liabilities, any property whatsoever, the same shall not be paid to or distributed among the Members of the Association, but shall be transferred to the Lords Commissioners of the Treasury, and on any winding up the Association shall consent to the appointment of any liquidator who may be nominated by the said Commissioners.

9. True accounts shall be kept of the sums of money received and expended by the Association and the matter in respect of which such receipt and expenditure takes place, and of the properties, credits, and liabilities of the Association ; and, subject to any reasonable restrictions as to the time and manner of inspecting the same that may be imposed in accordance with the regulations of the Association for the time being, shall be open to inspection of the Members. The accounts of the Association shall be submitted quarterly to the Treasury for audit, or to any auditor or auditors to be appointed from time to time by the Lords Commissioners of the Treasury and the remuneration of such auditors shall be paid by the Association but the Lords Commissioners of the Treasury shall not in any way be required to see to the application of the funds of the Association or be responsible for their misapplication or for any of the debts or liabilities that may be incurred by the Association.

We, the several persons whose names and addresses are subscribed, are desirous of being formed into an Association in pursuance of this Memorandum of Association.

Signed by the Members of the Council and the Secretary.

Dated the 23rd day of September 1891.

ARTICLES OF ASSOCIATION.

(1.) For the purposes of registration the number of the Members of the Association is declared not to exceed ten.

(2.) These Articles shall be construed with reference to the provisions of the Companies Act, 1862, and the Companies Act, 1867, and terms used in these Articles shall be taken as having the same respective meanings as they have when used in these Acts.

(3.) The Association is established under the authority of the Lords Commissioners of the Treasury for the purposes expressed in the Memorandum of Association.

(4.) *Qualification of Members.*—The Association consists of the Members and the Secretary of the Meteorological Council.

(5.) *Admission of Members.*—The Members of the Meteorological Council are nominated by the President and Council of the Royal Society, with the exception of the Hydrographer to the Admiralty, who is a Member *ex officio*, and the Secretary of the Meteorological Council is appointed by the Council.

(6.) *Honorary Officers and their Elections.*—The Chairman is nominated by the Royal Society.

(7.) *Management of the Association.*—The business is to be managed by the Members of the Association, the remuneration of whom, if any, is to be such as may be sanctioned by the Treasury.

(8.) *Meetings, Proceedings, &c.*—The First General Meeting of the Association shall be held within four months after the registration of the Memorandum of Association. A General Meeting shall be held at least once in each year, in accordance with section 49 of the Companies Act of 1862. The Ordinary Meetings of the Association shall be held as the Council shall direct, and their proceedings shall be regularly recorded and printed.

The Association shall submit yearly a Report of its Proceedings to the Royal Society for presentation to Parliament.

(9.) *Accounts, Audit.*—The annual Estimates shall be submitted for approval to the Treasury, and the accounts, after examination by two Members of the Association, shall be sent to the Treasury for audit.

(10.) A notice may be served by the Association upon any Member, either personally or by sending it through the post as a prepaid letter addressed to such Member, at his registered place of abode.

Any notice, if served by post, shall be deemed to have been served at the time when the letter containing the same would be delivered in the ordinary course of the post, and in proving such service it shall be sufficient to prove that the letter containing the notice was properly addressed and put into the Post Office.

Signed by the Members of the Council and the Secretary.

Dated the 23rd day of September 1891.

APPENDIX II.

LIST of CAPTAINS and OFFICERS who have sent in Logs classed as "Excellent" during the year ending March 31, 1892. 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.

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Andersen, O. E. - - -	5	S.S. "Longhirst."
Angus, T. S. - - -	4	S.S. "Canton."
Atkinson, G. W. - - -	3	S.S. "Kaisar-i-Hind."
Atkinson, S. P. H. - - -	5	"Hollinwood."
Baxter, A. S. - - -	6	"City of York."
Belding, R. - - -	4	"Atlantic."
Bell, Richardson, R.N.R. - - -	1	"Bootle."
Bett, Dr. W., R.N. - - -	1	H.M.S. "Stork."
Blackburne, Mr. H. S. - - -	10	S.S. "Rohilla."
Bolton, S. H. - - -	13	S.S. "Baidar."
Bright, H. - - -	6	"Beltana."
Brown, W. L., R.N.R. - - -	1	S.S. "Rohilla."
Cameron, J. G., R.N.R. - - -	8	S.S. "Germanic."
Campbell, R. - - -	8	S.S. "Elton."
Clarke, Comr. A. C., R.N. - - -	5	H.M.S. "Espiegle."
Combe, Lieut. J. W., R.N. - - -	1	H.M.S. "Penguin."
Conby, H. B. - - -	1	"Garfield."
Couper, W. - - -	4	"Clackmannanshire."
Cromarty, D. S. - - -	5	"Kirkmichael."
Crotty, F. H. - - -	5	"Evesham Abbey."
Dart, L. C. - - -	12	"Semantha."
Davis, H. - - -	2	"Alexander Lawrence."
Dawson, Comr. L. S., R.N. - - -	11	H.M.S. "Rambler."
Day, Lieut. E. A., R.N. - - -	3	H.M.S. "Dart."
De Horne, M. - - -	3	S.S. "Carthage."
Dunbar, J. I. - - -	21	S.S. "Arracan."
Dyke, H. W. - - -	9	"Tenasserim."
Elliott, W., R.N.R. - - -	3	S.S. "Clan Murray."
England, T. - - -	11	"Glen Grant."
Exham, T. K., F.R.A.S. - - -	11	S.S. "Tamar."
Field, Comr. A. M., R.N. - - -	8	H.M.S. "Egeria."
Fraser, W. D. - - -	5	"Michael Hutchinson."
Frederick, Lieut. and Comr. G. C., R.N. - - -	11	H.M.S. "Dart."
George of Wales, H.R.H. Prince, Lieut. and Comr., K.G. - - -	3	H.M.S. "Thrush."
Gray, John - - -	15	S.S. "Hope."
Hepworth, M. W. C., R.N.R., F.R. Met. Soc. - - -	9	S.S. "Port Adelaide."
Home, Dr. W. E., R.N., B.Sc. - - -	3	H.M.S. "Thrush."
Janes, George - - -	5	"Middlesex."
Kemp, A. H. - - -	5	"Hudson."
King, J. W. - - -	4	"Philomene."

Name of Captain or Officer.	Number of "Ex- cellent" Logs.	Ship.
Martin, Walter, R.N.R.	2	S.S. "German."
Merrett, J. (gunner)	2	H.M.S. "Egeria."
Millican, J. W.	6	"Myrtle Holme."
Milne, W. F.	9	S.S. "Maud."
Milner, W. H.	12	S.S. "La Plata."
Mitchell, George	4	S.S. "Trinacria."
Molony, E. J.	10	"British Merchant."
Moore, Comr. W. U., R.N.	15	H.M.S. "Penguin."
Munn, L. A.	5	S.S. "Spartan."
Murdoch, Peter	12	"Sierra Lucena."
Murray, A., Junr.	1	S.S. "Windward."
Nicholson, J. I.	2	"Majestic."
<i>North, W. G.</i>	16	S.S. "Plato" and S.S. "Panther."
Oliver, Lieut. G., R.N.	1	H.M.S. "Penguin."
Owen, Owen	2	"Cordelia."
Parson, G. F.	11	"Earnock."
Peebles, R.	15	"Bracadale."
Peterkin, W.	1	"Khyber."
Pope, J.	5	S.S. "Dee."
Pritchard, Lieut. C. E., R.N.	6	H.M.S. "Espiegle."
Quaile, D. W. A.	5	"Craigerne."
Randall, W.	13	"Laomene."
Rohde, H. P. R.	1	"Archdale."
Rosseter, W. L.	13	"Brenda."
Sargent, A. H.	6	"Pleione."
Scott, George	7	"Holyrood."
Shearer, George	11	"Airlie."
Simpson, Alexander	14	S.S. "Australasian" and S.S. "Thermopylæ."
Simpson, Alexander	21	S.S. "Traveller."
Smyth, M. H., R.N.	1	H.M.S. "Stork."
Spalding, T. F.	1	S.S. "Australasian."
Stewart, A.	2	"County of Selkirk."
Streater, R.	2	"Lutterworth."
Thompson, Lieut. H., R.N.	5	H.M.S. "Rambler."
Thompson, J. E.	4	S.S. "Monarch."
Thomson, A.S., R.N.R., F.R.G.S.	12	S.S. "Silvertown."
Trenaman, R. W.	3	S.S. "Pascal."
Trott, S., F.R.Met.Soc.	20	S.S. "Minia."
Walker, H., R.N.R.	15	S.S. "Aurania."
Walker, J. J., F.L.S. Ch. Eng., R.N.	2	H.M.S. "Penguin."
Wheaton, N. J.	13	"Eliza."
White, W. E., R.N.R.	3	S.S. "Ormuz."
Wibmer, L. M., R.N.R.	1	S.S. "Rhilla."
Wilson, J., R.N.R.	7	S.S. "Ethiopia."

Name of deceased observer printed in italics.

APPENDIX III.—SHIPS supplied and DOCUMENTS returned during the year ending 31st March 1892.

The number of merchant ships supplied with standard instruments and meteorological logs during the above period was 95.

The number of meteorological logs, and documents from Foreign Stations, received during the same period, and registered in the Office, amounted altogether to 343, of which 171 were returned from ships, and the remainder from land stations, outside the British Isles.

LIST of DOCUMENTS received from FOREIGN LAND STATIONS.

Place.	Observer.	No. of Documents.	Nature of Observations.
Abaco (Bahamas)	C. A. Strachan, Lightkeeper	2	Lighthouse Register, 1891, January to December.
Akassa, Nun River, Niger Delta	Frank Russell, F.R.G.S.	2	Two observations daily, 1890, April to September and December.
Barbados (Commercial Hall)	-	1	Lighthouse Register, 1889, May to 1890 October.
Barbados	Sergeant C. E. Phillips, M.S.C., Private J. H. Cummins, M.S.C., Sergeant J. Anderson, M.S.C.	3	Two observations, daily, 1891, July to September.
Reyrou (Lee Observatory)	R. H. West, M.A.	12	" " 1891, February to December; 1892, January, February.
Breaksea Island (King George's Sound).	G. C. Powney, G. Turner, and A. Robinson.	1	Lighthouse Register, 1871, January to December; 1872, July to December; 1882, January to June; 1888, October to 1889, April.
Brunana (Mt. Lebanon)	Thomas Little	11	Two observations daily, 1891, March to December; 1892, January and February.
Cape Juby (N.W. Africa)	Hubert Bray, M.R.C.S., L.R.C.P., W. H. E. Knaggs, and W. B. Silverwood.	12	" " 1891, January to May and July to December; 1892, January and February.
Cape Pembroke (Falkland Islands)	G. K. Broom, Lightkeeper	1	Lighthouse Register, 1891, January to June.
Cay Lobos (Bahamas)	Lightkeepers	2	" " 1891, January to December.
Cay Sal (Bahamas)	T. R. Thompson, Sen., Lightkeeper.	2	" " 1891, January to December.
Famagusta (Cyprus)	G. Eliades	8	Two observations daily, 1890, January to 1891 December.
George Town (British Guiana)	Robert Ward	9	" " 1891, February to December; 1892, January.
Gibraltar	Sergeant R. Scott, Med. Staff Corps.	12	" " 1891, February to December; 1892, January.

List of Documents—continued.

Place	Observer.	No. of Documents.	Nature of Observations.
Inagua (Bahamas)	R. A. A. Espie, and J. W. Roberts, Lightkeepers.	2	Lighthouse Register, 1891, January to December.
Kaneohe (Oahu)	H. Cobb-Adams -	5	Two observations daily, 1891, September to December; 1892, January, February.
Kyrenia (Cyprus)	M. Fuleiham and C. Natais -	8	Two observations daily, 1890, January to 1891 December.
Lagos -	J. W. Rowland, Colonial Surgeon.	4	" " " 1891, June, August to December; 1892, January.
Larnaca (Cyprus)	G. P. Voudiziano -	8	" " " 1890, January to 1891, December.
Limassol (Cyprus)	Luigi Béraud -	8	" " " " " "
Malden Island -	- - -	1	Three observations daily, 1890, February to 1891, June.
Nicosia (Cyprus)	G. Stephen -	8	Two " " " January to 1891, December.
Papbo (Cyprus) -	E. A. Malliotis -	8	" " " " " "
Point King (King George's Sound).	S. Mitchell -	1	Lighthouse Register, 1870, January to December; 1871, May, to 1872, December; 1882, January to June; 1888, October to 1889, March; 1890, April, to 1891, November.
Principe Island (West Africa)	G. R. Scovell -	1	Two observations daily, 1891, February.
Sanchez (Samana Bay)	(late) W. Reid, M.D. -	1	Four observations daily, 1886, January, to 1888, December.
Suva (Fiji)	J. D. W. Vaughan, F.R.Met. Soc. -	2	One observation daily. 1890, December; 1891, January.
Teneriffe (Sitio de Cullen)	A. F. Perry -	12	Two " " 1891, February to December; 1892, January, February.
Tobago -	J. P. Tulloch, M.A., M.D. -	11	" " " 1891, March to December; 1892, January.
Trinidad -	J. H. Hart, Supt. Botanic Gardens. -	12	" " " 1891, February to December; 1892, January.
Watling Island (Bahamas)	T. R. Thompson, jun., Light-keeper. -	2	Lighthouse Register, 1891, January to December.

LIST of DOCUMENTS received from SHIPS.

Captain's Name.	Ship.	Voyage.	Year.
Andersen, O. E.	S.S. Longhirst	New York - - -	1891
"	"	"	1891-92
Anderson, Charles	S.S. Achilles	China, viâ Suez - - -	1889
¹ Angus, T. S.	S.S. Canton	"	1890-91
² Armstrong, B. G.	R.M.S. Elbe	Rio " Janeiro	1891
³ " "	"	Lisbon, East Coast of South America - - -	1891-92
Asquith, W.	S.S. Deucalion	China, viâ Suez - - -	1888-90
Atkinson, G. W.	S.S. Kaiser-i Hind	Calcutta, viâ Suez - - -	1891
⁴ " "	"	Shanghai, viâ Suez - - -	1891
⁵ " "	"	Calcutta, viâ Suez - - -	1891-92
Atkinson, S. P. H.	Hollinwood	Melbourne - - -	1891
Barker, R. J. M.	Barque Orion	New York, Australia, San Francisco	1890-91
Barwise, J.	S.S. Sarpedon	China, viâ Suez - - -	1889-90
Batt, H. E.	S.S. Hector	"	1888-89
Baxter, A. S.	City of York	San Francisco - - -	1890-91
Belding, Rawtin	Barque Atlantic	Talcahuano - - -	1890-91
Bell, Richardson	Barquentine Bootle	Natal, Mauritius, Adelaide -	1890-91
⁶ Benson, F. J.	Barque Elvira	Monte Video, Valparaiso, Cadiz -	1891
Bolton, S. H.	S.S. Baidar	Between English Ports - - -	1890-91
"	"	Continental and English Ports -	1891
Bright, H.	Barque Beltana	Adelaide - - -	1890-91
"	"	"	1891-92
Broun, W. L., R.N.R.	S.S. Rohilla	Home from Calcutta, viâ Suez -	1891
Brown, R. J.	S.S. Titan	China, viâ Suez - - -	1888-90
⁷ Cameron, J. G., R.N.R.	S.S. Germanic	New York - - -	1890-91
⁸ " "	"	"	1891
⁹ Campbell, Robert	S.S. Elton	India, viâ Suez - - -	1890-91
¹⁰ " "	"	"	1891
¹⁰ " "	"	Singapore and Cuba, viâ Suez -	1891-92
Chrimes, H.	S.S. Sarpedon	China, viâ Suez - - -	1888-89
¹¹ Clarke, Comr. A. C., R.N.	H.M.S. Espiègle	Coquimbo, San Francisco, Panama, and Pisagua - - -	1890-91
¹¹ " " "	" "	West Coast of South America, Rio Janeiro - - -	1891
Conby, H. B.	Garfield	Melbourne, San Francisco - -	1890-91
¹² Copp, B.	R.M.S. Moor	Cape Town - - -	1891
¹³ Couper, William	Clackmannanshire	San Francisco - - -	1890-91
Cromarty, D. S., F.R. Met. Soc.	Barque Kirkmichael	Antwerp - - -	1890-91
Crotty, F. H.	Evesham Abbey	Calcutta, Philadelphia, Japan, and San Francisco - - -	1889-91
¹⁴ Crutchley, W. C., R.N.R.	S.S. Kaikoura	Cape Town, New Zealand, Rio Janeiro - - -	1891
" " "	"	"	1891
Cuthbert, I., R.N.R.	S.S. Fifeshire	Australia - " " -	1891-92
Dart, L. C.	Barque Samantha	San Francisco - - -	1890-91
¹⁵ Davies, David	Andora	Mauritius, Calcutta - - -	1890-91
Davis, Harry	Barque Alexander Lawrence.	Portland (Oregon) - - -	1891
"	"	Astoria - - -	1891-92
¹⁰ Dawson, Comr. L. S., R.N.	H.M.S. Rambler	Hong Kong, Red Sea - - -	1891
De Horne, M.	S.S. Carthage	Australia, viâ Suez - - -	1890-91
"	"	Sydney, viâ Suez - - -	1891
¹⁷ " "	"	Bombay, viâ Suez - - -	1891-92
¹⁸ Dickinson, L. R.	S.S. Tagus	River Plate - - -	1891
Dunbar, J. I.	S.S. Arracan	Rangoon, viâ Suez - - -	1891
Dyke, H. W.	Tenasserim	Callao and Havannah - - -	1890-91
Elder, Wm.	S.S. Nestor	China, viâ Suez - - -	1889-90

Captain's Name.	Ship.	Voyage.	Year.
Elliott, Wm., R.N.R.	S.S. Clan Murray	Cape Town, Ceylon, and home via Suez	1891
"	"	"	1891-92
England, Thomas	Barque Glen Grant	Quebec, Apalachicola	1891
¹⁹ Exham, T. K.	S.S. Tamar	East Coast of S. America	1891
"	"	"	1891
²⁰ Field, Comr. A. M., R.N.	H.M.S. Egeria	Darvel Bay, Sandakan	1891
²⁰ " "	"	At Hong Kong and North Borneo	1891
²⁰ " "	"	Sandakan, Singapore, Hong Kong	1891
²¹ Fordyce, William	County of Roxburgh	Calcutta	1891-92
Fraser, W. D.	Barque Michael Hutchinson.	Rockhampton, Iquique	1890-91
Frederick, Lieut. and Comr. G. C., R.N.	H.M.S. Dart	Australian Station	1890-91
²² " "	"	Tasmania, Sydney, Norfolk Island, New Hebrides	1891
²³ George of Wales, Lieut. and Comr. H.R.H. Prince, K.G.	H.M.S. Thrush	Bermuda, Halifax	1891
²³ " "	"	West Indies	1891
²⁴ Gray, John	S.S. Hope	Greenland	1891
Grier, John	S.S. Antenor	China, via Suez	1888-90
¹² Griffin, E. J., R.N.R.	R.M.S. Moor	Cape Town	1891
"	"	"	1891
Gruchy, H. de.	Sierra Ventana	Mauritius, Rangoon	1890-91
Guthrie, W. E.	S.S. Bellerophon	China, via Suez	1888-89
Hannah, W. T.	S.S. Glaucus	China, via Suez	1889-90
¹⁹ Hepworth, M. W. C.	S.S. Port Adelaide	Australia, via Cape and Suez	1890-91
¹⁹ " "	S.S. Port Denison	Las Palmas, Sydney via Suez	1891
¹⁹ Huddy, G. R.	S.S. Port Adelaide	Australia, via Cape of Good Hope	1891
Hutchinson, I.	S.S. Orestes	China, via Suez	1888-89
Jackson, Charles	S.S. Palamed	"	1889-90
" M. H. F.	S.S. Telamon	"	1888-90
" T. S.	S.S. Paliurus	"	1888-90
Jamieson, D. E.	S.S. Port Adelaide	Australia, via Suez	1891
Janes, George	Middlesex	Chittagong	1890-91
Jones, Henry	S.S. Telemachus	China, via Suez	1889-90
²⁵ Keane, Lt. & Comr., H. J., R.N.	H.M. Gunboat Herald	On East Coast of Africa	1890-91
²⁵ " "	" "	Zambesi and Shire Rivers	1891
²⁵ " "	" "	"	1891
Kemp, A. H.	Barque Hudson	New Zealand	1890-91
Kenward, John	Barque Savilla	St. Paul de Loanda	1890
King, J. W.	Philomene	Melbourne, San Francisco	1890-91
Lapage, W. P.	S.S. Anchises	China, via Suez	1890
Low, John	Dundee	Sydney, San Francisco	1889-90
"	"	Philadelphia, Calcutta	1890-91
Lowrison, G. M.	Eaton Hall	San Francisco	1890-91
Martin, T. C.	Loch Tay	Melbourne	1891-92
²⁶ Martin, Walter, R.N.R.	S.S. German	Cape Town	1891
²⁶ " "	"	"	1891-92
²⁷ Miller, A. T., R.N.	School Ship Conway	Off Birkenhead	1891
Millican, J. W.	Barque Myrtle Holme	Adelaide, Cape Town, and Wallaroo	1890-91
¹⁹ " "	"	Adelaide	1891-92
Milligan, John	S.S. Jason	China, via Suez	1888-90
Milligan, Samuel	S.S. Stentor	"	1889-90
Milne, W. F.	S.S. Maud	Davis Straits	1891
Milner, W. H.	R.M.S. La Plata	Brazil	1890-91
"	"	"	1891
Mitchell, George	S.S. Trinacria	Naples, New York	1891
" John	Cape York	New York, Melbourne	1890-91
Molony, E. J.	British Merchant	Port Townsend	1891-92

Captain's Name.	Ship.	Voyage.	Year.
²⁸ Moore, Comr. W. U., R.N.	H.M.S. Penguin	Australia, via Suez	1890-91
²⁹ " "	" "	Off coast of West and North-West Australia	1891
³⁰ Munn, L. A.	R.M.S. Spartan	Cape Town	1890-91
³¹ " "	" "	"	1891
Murdoch, Peter	Sierra Lucena	Rangoon	1890-91
³² Murray, A., Jun.	S.S. Windward	Greenland	1891
Nelson, R.	S.S. Menelaus	China, via Suez	1888-90
Nicholson, J. I.	Majestic	Calcutta	1891
Nish, H.	S.S. Cyclops	China, via Suez	1889-90
North, W. G.	S.S. Plato	Hamburg	1890-91
" "	S.S. Panther	"	1891
" "	S.S. Plato	"	1891
Owen, Owen	Barque Cordelia	New Westminster, Iquique, Talcahuano	1890-91
¹⁹ Parson, G. F.	Earnock	Melbourne	1890-91
Pattman, R.	Loch Torridon	Calcutta	1890-91
Peebles, R.	Bracadale	New York, Melbourne, San Fran- cisco	1890-91
Peterkin, William	Khyber	Calcutta	1891
³³ Pope, James	S.S. Dee	West Indies	1890-91
Pulford, I.	S.S. Patroclus	China, via Suez	1888-90
Purdy, Thomas	S.S. Dardanus	"	1888-90
Quaile, D. W. A.	Barque Craigerne	Monte Video, Iquique, Portland (Oregon)	1890-91
Randall, W.	Laomene	Calcutta and New York	1891-92
³⁴ Rigaud, H. C.	S.S. Moselle	River Plate	1891
Riley, James	S.S. Ajax	China, via Suez	1888-89
Rohde, H. P. R.	Barque Archdale	San Francisco	1891-92
Rosseter, W. L.	Brenda	New York, Calcutta, Demerara, Philadelphia	1891-92
¹⁹ Sargent, A. H.	Pleione	New Zealand	1891
Scale, R. F.	S.S. Laertes	China, via Suez	1889
¹⁹ Scott, George	Holyrood	Calcutta, Mauritius, and New York	1890-91
³⁵ " "	"	New York, Melbourne, and Cal- cutta	1891
Seougall, H.	Barque Closeburn	Brisbane	1889-91
Shearer, George	Airlie	Rio Janeiro, Adelaide	1890-91
Simpson, Alexander	S.S. Australasian	Melbourne, via Cape Good Hope	1891
" "	S.S. Thermopylae	" " "	1891-92
" "	Barquentine Traveller	Greenland	1891
²⁷ Smith, J. H., R.N.R.	Training Ship Worcester	Off Greenhithe	1890-91
³⁶ Smyth, Morris H., R.N.	H.M.S. Stork	Valetta to Suez, Red Sea, and Seychelles	1891
³⁷ Spalding, T. F.	S.S. Australasian	To Australia, via Cape Town, and home, via Suez	1891
Stewart, Alexander	County of Selkirk	Batavia, Chittagong	1891-2
Streater, R.	Barque Lutterworth	Wellington	1890-91
Symmers, John	Barque Inverurie	Rio Janeiro, Iquique	1890-91
³⁸ Thompson, J. E.	S.S. Monarch	Coasts of British Isles	1889-91
³⁹ " "	"	"	1891-2
Thompson, J. S.	S.S. Nestor	China, via Suez	1889
" "	S.S. Hector	"	1889-90
¹⁹ Thomson, A. S., R.N.R., F.R.G.S.	S.S. Silvertown	West Coast of South America	1890-91
¹⁹ " "	"	East Coast of South America	1891
⁴⁰ Trenaman, R. W.	S.S. Pascal	Rio Janeiro, St. Lucia, New Orleans	1890-91
⁴¹ Trott, Samuel, F.R. Met. Soc.	S.S. Minia	Boston and Halifax	1891
⁴¹ " "	"	North Atlantic	1891-92
⁴² Wait, A. McLean	R.M.S. Tartar	Cape Town	1890-91
" "	"	"	1891
⁴² " "	"	"	1891

Captain's Name.	Ship.	Voyage.	Year.
Walker, Henry, R.N.R.	S.S. Aurania -	New York - - -	1891
"	"	"	1891-92
⁴² Ward, John -	Barque Glencaird -	San Francisco -	1889-90
Ward, W. -	S.S. Lennox -	Malta, New York, China, viâ Suez	1891
Webster, I. K. -	S.S. Prometheus -	China, viâ Suez -	1888-90
Wheaton, N. J. -	Barque Eliza -	Frontera de Tobasco -	1891
⁴⁴ White, W. E., R.N.R.	S.S. Ormuz -	Sydney, viâ Suez -	1891
⁴⁵ " " "	" -	" " -	1891
⁴⁶ " " "	" -	" " -	1891-92
⁴⁷ Wibmer, " L. " M., R.N.R.	S.S. Rohilla -	Calcutta, viâ Suez -	1891
Wilding, James -	S.S. Agamemnon -	China and Japan, viâ Suez -	1888-89
⁴⁸ Williams, John -	Barque Elissa -	Paysandu, Valparaiso, Marseilles -	1891-92
Wilson, John, R.N.R.	S.S. Ethiopia -	New York -	1891
Wishart, J. T. -	Sierra Parima -	Rangoon -	1891
⁴⁹ Woolward, R.	S.S. Don -	West Indies -	1890-91

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

- ¹ Assisted by W. B. Palmer, 2nd Officer.
- ² Kept by Edward White, 4th Officer.
- ³ Kept by Mr. Dagnel, 2nd Officer, and Mr. White, 4th Officer.
- ⁴ Assisted by Messrs. Humphrey and Garwood.
- ⁵ Assisted by Messrs. Smith and Hook.
- ⁶ Kept by C. M. Redhead.
- ⁷ Kept by 3rd Officer.
- ⁸ Kept by F. R. Clarke, 3rd Officer.
- ⁹ Assisted by C. Matthews, R. Knill, J. Morris, and J. Mason.
- ¹⁰ Assisted by Clement Matthews and John Mason.
- ¹¹ Kept by Lieut. C. E. Pritchard, R.N.
- ¹² Kept by H. E. Butler, 4th Officer.
- ¹³ Kept by R. W. S. Pritchard, Chief Mate.
- ¹⁴ Kept by W. L. Paske, 4th Officer.
- ¹⁵ Kept by J. H. Jones.
- ¹⁶ Kept by Lieut. Henry Thompson, R.N.
- ¹⁷ Kept by Hugh S. Crauford, 5th Officer.
- ¹⁸ Kept by Edward Watt, 3rd Officer.
- ¹⁹ Assisted by Officers.
- ²⁰ Kept by Joseph Merrett, Gunner.
- ²¹ Kept by T. Robins and I. W. Anderson.
- ²² Kept by Lieut. E. A. Day, R.N.
- ²³ Kept by W. E. Home, M.B., Surgeon, R.N.
- ²⁴ Kept by A. W. Crauford Lindsay, Surgeon.
- ²⁵ Kept by John Ottley, Surgeon, R.N.
- ²⁶ Kept by I. George, 3rd Officer.
- ²⁷ Kept by the Cadets.

- ²⁸ Kept by Lieuts. J. W. Combe, R.N., Gerald Oliver, R.N., and J. J. Walker, F.L.S., Chief Engineer.
- ²⁹ Kept by J. J. Walker, F.L.S., Chief Engineer.
- ³⁰ Kept by J. J. Brickhill, F.R.G.S., and W. F. Stanley.
- ³¹ Kept by John Bernard, 4th Officer.
- ³² Kept by Tom M. Parkin, B.A., Surgeon.
- ³³ Kept by Austin Jolliffe, 2nd Officer.
- ³⁴ Kept by William Anderson.
- ³⁵ Assisted by G. Devereux, 1st Officer, and A. Young, 2nd Officer.
- ³⁶ Kept by William Bett, Surgeon, R.N.
- ³⁷ Kept by A. Robb, 2nd Officer.
- ³⁸ Kept by A. F. Halpin, 3rd Officer.
- ³⁹ Kept by A. F. Halpin and G. Lever.
- ⁴⁰ Assisted by Mr. McGill.
- ⁴¹ Kept by W. G. Squares, Chief Officer.
- ⁴² Kept by C. E. Garnett, 4th Officer.
- ⁴³ Kept by D. Goldsmith.
- ⁴⁴ Assisted by C. L. May, Chief Officer, F. S. Symons, 2nd Officer, J. F. Rankin, 3rd Officer, and B. L. Gace, 4th Officer.
- ⁴⁵ Assisted by Messrs. May, Symons, and Gace.
- ⁴⁶ Assisted by Messrs. May, Coish, Rankin, and Gace.
- ⁴⁷ Kept by Andrew Jones, 5th Officer, assisted by H. S. Blackburne, 1st Officer.
- ⁴⁸ Kept by William H. Tait.
- ⁴⁹ Kept by D. McNab, 2nd Officer.

APPENDIX IV.

INSTRUMENTS supplied, &c. to the Royal Navy.

Per Account.		Baro- meters.	Ane- roids.	Thermometers.				Hydro- meters.
				Ordinary.	Max.	Min.	Screens.	
April 1st, 1891, afloat	-	209	498	1,368	304	277	168	82
Issued since	-	78	131	279	50	48	19	13
		287	629	1,647	354	325	187	95
Returned since	-	72	107	273	57	46	17	19
April 1st, 1892, afloat	-	215	522	1,374	297	279	170	76

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

April 1st, 1891, in use	-	68	65	278	28	27	5	12
Issued since	-	6	7	52	4	7	1	4
		74	72	330	32	34	6	16
Returned since	-	4	6	42	3	6	1	5
April 1st, 1892, in use	-	70	66	288	29	28	5	11

DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1892.

Afloat in Royal Navy	-	215	522	1,374	297	279	170	76
In use at stations	-	70	66	288	29	28	5	11
In store at M.O.	-	56	67	304	71	98	10	32
„ Chatham	-	12	15	26	6	8	—	13
„ Sheerness	-	8	8	36	8	9	3	9
„ Portsmouth	-	9	41	14	4	9	3	5
„ Devonport	-	20	39	43	13	14	4	16
„ Queenstown	-	1	3	20	1	1	—	4
„ Gibraltar	-	2	3	14	3	3	—	4
„ Malta	-	7	11	46	12	12	2	17
„ Bombay	-	2	5	5	3	4	1	4
„ Halifax	-	3	9	19	3	5	—	14
„ Bermuda	-	6	15	43	7	9	2	15
„ Jamaica	-	7	3	31	2	2	—	—
„ Cape of Good Hope	-	4	6	29	5	6	2	4
„ Trincomalee	-	5	5	19	4	4	—	4
„ Hong Kong	-	11	19	42	11	10	—	17
„ Coquimbo	-	5	4	14	1	1	—	19
„ Sydney	-	3	7	25	7	5	1	8
„ Esquimalt	-	8	8	20	3	1	—	—
Total, April 1st, 1892	-	454	856	2,412	490	508	203	272
Lost, &c. since April 1st, 1891	-	—	6	181	19	—	15	12

APPENDIX V.

INSTRUMENTS supplied, &c. to Mercantile Marine.

Per Account.	Baro- meters.	Com- passes.	Thermometers.				Hydro- meters.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1891, afloat -	95	—	555	—	—	88	281
Issued since -	66	—	480	—	—	61	256
	161	—	1,035	—	—	149	537
Returned since -	55	—	368	—	—	47	176
April 1st, 1892, afloat -	106	—	667	—	—	102	361

INSTRUMENTS at Stations, viz., Telegraph Offices, Observatories,
Fishing Villages, &c.

April 1st, 1891, in use -	256	3	242	53	58	53	11
Issued since -	28	—	37	7	6	4	5
	284	3	279	60	64	57	16
Returned since -	6	1	28	6	4	3	5
April 1st, 1892, in use -	278*	2	251	54	60	54	11

DISPOSITION of Board of Trade Instruments on April 1st, 1892.

In merchant ships -	106	—	667	—	—	102	361
In use at stations -	278	2	251	54	60	54	11
In store at M.O. -	40	4	128	6	18	45	50
At Liverpool Agency -	2	7	18	—	—	4	20
„ Aberdeen „ -	5	—	18	—	3	5	15
„ Glasgow „ -	6	—	29	—	—	4	17
„ Dundee „ -	16	—	26	—	—	14	34
„ Hull „ -	8	—	30	—	—	6	26
„ Southampton „ -	1	—	14	—	—	8	14
Total, April 1st, 1892 -	462	13	1,181	60	81	242	544
Lost, &c. since April 1st, 1891	3	—	138	4	2	17	67
Under repair -	3	—	—	—	—	—	—

* Of these barometers 185 are lent for use of seafaring communities at fishing villages and ports.

APPENDIX VI.

LIST of STATIONS reporting Meteorological Observations to the Office by Telegraph on 31st March 1892, with the Names of Observers.

*†Sumburgh Head -	Rev. W. Brand - - -	Minister of Dunrossness.
*†Stornoway - - -	J. Forbes - - -	Nicolson Institution.
Wick - - -	J. Sinclair - - -	Watchmaker.
Nairn - - -	Miss Penny - - -	Schoolmistress.
*†Aberdeen - - -	W. Boswell - - -	Assistant at the Observatory.
Leith - - -	W. Newlands - - -	Telegraph Clerk.
*†Shields - - -	J. W. Irvine - - -	Do.
Spurn Head - - -	G. Freeman - - -	Lightkeeper.
†York - - -	H. M. Platnauer, F.G.S. - -	Curator of Museum.
Loughboro' - - -	W. Berridge - - -	—
†Ardrossan - - -	J. W. Mayes - - -	Telegraph Clerk.
†Malin Head - - -	O. O'Doherty - - -	Signalman, Lloyd's.
*†Mullaghmore - - -	K. Kerr - - -	Retired Coastguard Officer.
*†Belmullet - - -	Miss M. J. Tolan - - -	Telegraphist.
†Donaghadee - - -	T. MacGowan - - -	Postmaster.
Parsonstown - - -	E. Haines - - -	Assistant Observer at Lord Rosse's Observatory.
*†Holyhead - - -	Capt. Richards - - -	Keeper of Sailors' Home.
Liverpool - - -	J. Hartnup, F.R.Met.Soc. -	Bidston Observatory.
*†Valencia - - -	J. E. Cullum, F.R.Met.Soc. -	Superintendent of the Observatory.
†Roche's Point - - -	W. Kennedy - - -	Telegraph Clerk.
Pembroke - - -	S. Blake - - -	Lightkeeper.
*†Scilly - - -	A. Hicks - - -	Signalman.
Prawle Point - - -	W. Hewitt - - -	Coastguard Officer.
†Hurst Castle - - -	G. G. Appleton - - -	Lightkeeper.
†Jersey - - -	J. Fisher - - -	Station Master.
*†Dungeness - - -	W. Batton - - -	Assistant Lightkeeper.
†North Foreland - - -	A. Cox - - -	Signalman, Lloyd's.
*†London - - -	F. Gaster, F.R.Met.Soc. -	Clerk, Meteorological Office.
Oxford - - -	W. Wickham - - -	Radcliffe Observatory.
Cambridge - - -	H. Todd - - -	Observatory.
*†Yarmouth - - -	G. T. Watson - - -	Secretary, Sailors' Home.
†Hawes Junction - - -	W. H. Bunce - - -	Station Master.

In addition to the above, reports are received daily from the following Continental Stations.

Station.	Authority.	Station.	Authority.
Haparanda - - -	} Meteorological Office, Sweden.	†The Helder - - -	} Bureau Central Météorologique, Paris.
Hernösand - - -		Cape Gris Nez - - -	
†Stockholm - - -		†Brest (St. Mathieu) - - -	
Wisby - - -		Lorient (Île de Groix) - - -	
Bodö - - -	} Meteorological Institute, Norway.	*†Rochefort (Ile d'Aix) - - -	} Bureau Central Météorologique, Paris.
†Christiansund - - -		†Biarritz - - -	
*†Skudesnaes - - -		†Paris - - -	
Færder - - -		Belfort - - -	
†The Scaw - - -	} Meteorological Institute, Denmark.	Lyons - - -	} Cent. Met. Inst. of Germany.
Fanø - - -		Nice - - -	
Cuxhaven - - -		Perpignan - - -	
		Berlin - - -	
	} Deutsche Seewarte, Hamburg.	Wiesbaden - - -	} Observatory, Lisbon.
		Munich - - -	
		Corunna - - -	
		†Lisbon - - -	

Note.—The stations marked with an asterisk (*) report also at 2h. p.m.; and those with a dagger (†) at 6h. p.m.; Lisbon reports at 8h. a.m. and 4h. p.m.

† This station now reports by post only.

The station at the North Foreland was started January 1, 1892. At Leith Mr. Newlands succeeded Mr. Hay in May; at Spurn Head Mr. Freeman succeeded Mr. Watson in October.

Paris has ceased reporting at 6 p.m. on Sundays.

APPENDIX VII.

REPORT OF INSPECTION OF THE IRISH AND WELSH STATIONS.

TELEGRAPHIC REPORTING STATIONS.

Holyhead, visited July 25th.—The station is fairly satisfactory. The observer does not read the thermometers quite correctly as regards tenths of degrees. The rain-gauge required some slight repairs, which were ordered to be effected.

Roche's Point, visited July 28th.—The observations are very well taken. The thermometers were not clean, but there had been much dust about from building, and the weather had been very dry.

Valencia, visited July 31st.—The station calls for no remark as to the observations. I saw the builder about Westwood House, and gave instructions as to alterations, as authorised by Council. I directed builder to send in estimate for internal repairs and decorations to dwelling-house.

Parsonstown, visited August 4th.—The observer Haines is efficient, and the station is in good order.

Malin Head, visited August 10th.—The observer was absent, but his assistant, a very smart boy from Brow Head Signal Station (co. Cork) had learnt the duty of reporting very well.

Mullaghmore, visited August 11th.—The station is, as usual, in very good order. The observer wishes to be supplied with a self-recording aneroid, if possible.

Belmullet, visited August 13th. This station calls for no remark; it is satisfactory so far as is possible at such a place.

St. Ann's Head, visited December 9th.—I found this station in good order as usual. There is a prospect of a change of observer, as the present man expects promotion.

WEEKLY WEATHER REPORT STATIONS.

Killarney, visited July 29th.—This station calls for no remark.

STATIONS OF THE SECOND ORDER.

Dublin, Glasnevin, visited July 27th.—This station was, as usual, in very good order. The observer is careful.

Dublin, Phoenix Park, visited July 27th.—The station was in perfect order, but the observer was unfortunately absent. I saw the substitute, who was the former observer.

Dublin, Fitzwilliam Square, visited July 27th.—This station was, as usual, in perfect order. The thermometer and rain-gauge are not well exposed, as the garden is very confined.

Parsonstown, visited August 4th.—There is a new observer, Perry, a national school teacher. He seems to be efficient; he has only recently begun work.

Lissan, Co. Tyrone, visited August 5th.—Sir N. Staples has procured new instruments in place of those noted as defective on last inspection. The observations are very carefully taken.

Armagh, visited August 5th.—At this station there is a constant discrepancy between the Beckley and the ordinary gauge, which Dr. Dreyer is endeavouring to explain. He is going to try the effect of moving the ordinary gauge to a greater distance from the Beckley gauge, and therefore further out into the field.

Colebrooke, visited August 6th.—The station is in good order, but the observer is not careful enough about observing the weather in the intervals between the observations.

Londonderry, visited August 7th.—The station is satisfactory except as regards the position of thermometers and rain-gauge, but the only site available is a town garden.

Markree, visited August 12th.—This station is satisfactory. The assistant observer is shortly to be changed.

Currygrane, visited August 17th.—At this station the observer is new. He seems to read correctly, but I discovered some carelessness in entries. I hope that the notice taken will be sufficient to ensure care in future.

Arley Cottage, visited August 18th.—This is a new station; Major Somerset Maxwell has equipped it in a very complete manner. It is very good, and Major Maxwell has trained his assistant well.

St. David's, visited December 8th.—The station is in perfect order.

Tenby, visited December 10th.—This is a new station. The instruments have been procured by the Town Council, and the observer, Mr. Gower, is a local schoolmaster. The exposure in his garden is not good, as no grass is available. He takes his wind and weather reports from the Coast Guard log, and the sunshine recorder is on the Castle Hill in charge of the Coastguard.

Mr. Gower himself is very zealous, and I hope that he may improve the position of his instruments.

(Signed) ROBERT H. SCOTT.

STATIONS.	Dry Bulb.	Wet Bulb.	Max.	Min.	Spare Therm.	Remarks.
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TELEGRAPHIC REPORTING STATIONS.

Holyhead	-0.1	-0.3	-0.5	+0.2	-0.4	
Mullaghmore	+0.0	-0.2	-0.2	+0.3	-0.5	
Malin Head	-0.2	-0.2	-0.2	-0.1	-0.3	
Belmullet	-0.4	-0.1	0.0	-0.4	—	No spare ther.
Parsonstown	-0.7	+0.1	-0.4	+0.3	—	No spare ther.
Roche's Point	-0.5	-0.7	-0.3	-0.7	—	No spare ther.
Valencia	-0.6	-0.6	-0.3	0.0	—	
St. Ann's Head	-0.2	-0.1	-0.1	-0.2	-0.2	

WEEKLY WEATHER REPORT STATIONS.

Londonderry	-0.1	-0.1	0.0	+0.1	—	
Killarney	-0.1	-0.2	-0.1	+0.2	—	Min. ther. sluggish; bulb large

STATIONS OF THE SECOND ORDER, 1891.

STATIONS.	Dry Bulb.	Wet Bulb.	Max.	Min.	Spare Therm.	Remarks.
Armagh -	-0.2	-0.2	-0.9	0	0	Grass min. +0.9. Do. +0.2. Do. -0.1. Kew standard -0.5. Grass min. +0.1.
Brookeborough -	-0.5	-1.0	-0.2	-0.1	—	
Dublin (City) -	-0.5	-0.5	-1.0	0.0	—	
Dublin (Phoenix Park) -	-0.2	-0.2	-0.2	+0.4	-0.4	
Edgeworthstown -	-0.7	-0.6	-0.6	+0.1	—	
Glasnevin -	-0.4	-0.4	-0.7	+0.5	—	Kew standard -0.1 Grass min. +0.5. Do. +0.5. Do. -0.1. Do. +0.1.
Lissan -	-0.1	-0.1	-0.1	+0.3	—	
Londonderry -	-0.1	-0.1	0.0	+0.1	—	
Markree Castle -	-0.1	-0.1	0.0	+0.4	—	
Mount Nugent -	-0.1	-0.1	+6.9	0.0	—	
Parsonstown -	-0.7	+0.1	-0.5	+0.3	—	
St. David's -	-0.3	-0.5	+0.4	0.0	—	
Tenby -	-0.1	0.0	+0.1	+0.2	—	

REPORT of INSPECTION of the ENGLISH STATIONS, 1891.

At the stations visited by me this year the thermometers employed were, as before, Negretti and Zambra's Nos. 13516 and B.T. 3158. These instruments have been once annually tested by me before use, and twice tested in 1891 (on the last occasion by Mr. Whipple and myself at Kew on November 23rd). It is not a little remarkable that the negative corrections applicable to No. 3158 have annually increased up to the present date, although the increase is now extremely slow; and in No. 13516 it was only in 1889 that the index error became stationary. During inspection tours the corrections determined in the early part of each year have been employed. Although I took the greatest care in comparing the instruments at the stations, I do not feel very well satisfied with the aspect of the results of the thermometer comparisons shown in the table.

Jersey, August 10-13.—The instruments at St. Aubin's were all in excellent order. The thermometer screen has been thoroughly repaired. I consider the reports from this station to be very good.

Considerable difficulty had arisen with regard to the continuation of the records of bright sunshine at Jersey.

Since the removal of the recorder to Fort Regent, where its exposure is perfect, the instrument has been attended to by some of the pensioners at the Fort, who have been paid for this work by the harbour-master. The Harbour Board having declined to defray his expense in this matter, I applied to General Ewart, C.B., Lieutenant-Governor of the Island, who received my request with much kindness, and who has since obtained from the bailiff of Jersey a copy of an Act of the Committee of the Defence of the Island, authorising the payment of 1*l.* for the present year as salary to the men who attend to the sunshine cards. The Lieutenant-Governor has also promised to make an application for the same sum at the end of 12 months.

In any event the sunshine records at Jersey will not be dropped.

Hurst Castle, August 16.—All the instruments at this station were found to be clean and in good order. The minimum thermometer gave somewhat high readings, and the wet bulb has never been correctly fastened to the porcelain; the observer always takes his readings from the degree-lines on the glass, but it may be desirable that the instru-

ment should be changed. The thermometers are read somewhat roughly by Mr. Appleton, but, so far as I have observed, he takes the readings of the barometers with accuracy.

I have in previous years mentioned the impossibility of getting a fair estimate of sea disturbance in rough weather at this station; and I may add that when a sea of "5" is reported with Westerly winds from Hurst Castle, a disturbance of "6" may generally be anticipated in mid-channel. The force of the winds reported from this station may be taken as roughly representing the wind-force about the middle of our south coast, but the direction is locally influenced by certain topographical features.

Scilly (St. Mary's), August 19 and 20.—The reports from this important station have improved with the increased experience of the observer; but I regret to say that he has hitherto failed in telegraphing extreme readings of the self-registering aneroid, which are of considerable value in the case of disturbances advancing from the south-west.

The duration of gales which arise or subside in the night is a sore subject with observers who are unable to study the anemograph. I found the anemometer at this station in good order, but I must admit that there is some difficulty in changing the paper during a gale, especially if the latter is accompanied by rain, a difficulty not appreciated by those unaccustomed to the task.

The observer reads barometers and thermometers quickly and accurately. I feel sure that there is no one else in St. Mary's who could undertake the whole work so well.

Prawle Point, August 23.—The observations at this station are good; the observer and his assistants read the instruments very correctly, and all the instruments were found by me in excellent order. The maximum thermometer read $0^{\circ} \cdot 6$ too low (uncorrected). No difficulty has been experienced during the past year with the minimum.

Dungeness, August 28.—The readings of all the instruments, as taken in my presence, with care that they should be taken independently, were thoroughly satisfactory. Yet it is certain that the barometric readings reported are occasionally faulty, the errors being probably clerical, or being occasioned by mistakes made between an observer coming on watch and one leaving duty. I called special attention to this carelessness. I found half of the bulb of the wet-bulb thermometer immersed in the water kept in the glass, the glass having been needlessly raised on a piece of wood since my last inspection, probably just before my arrival this year, and having been completely filled. This proved great want of intelligence on the part of the observers, to whom I gave such instructions as were necessary on the hygrometrical observations.

I think that the estimates of wind-force and of sea-disturbance at this station (*e.g.*, the extreme force 10 on the day of my visit) are quite correct.

Liverpool (Bidston Observatory), September 17.—I think that the observations at this station are carefully taken, and the reports continue to be satisfactory. The old corrections of the thermometers require no change. The barometric readings reported are now taken from the large standard, whose readings differed by only $\cdot 001$ from the Adie's tube formerly in use.

North Shields, September 19.—The observer was not on duty at the time of my visit. I found the instruments in their usual order; that is

to say, the wet-bulb is very dirty, and the glass coated with metallic copper, while the other instruments are well attended to. The peculiar foulness of the air, characteristic of this station, is perhaps not so much due to collieries as to the smoke issuing from the factories in South Shields, and to the vomiting of immense quantities of the products of imperfect combustion from the steamers in the Tyne.

The instruments appear to be well read, and the reports to be promptly sent in.

York, September 19.—Inaccuracy is still noticed in the barometer readings reported from this station. The observer read the instrument correctly at the date of my visit; and possibly his occasional carelessness takes the form of that unpunctuality of which I have formerly complained. As much as $2^{\circ}\cdot9$ of spirit were found in the upper end of the minimum. It seems extraordinary that the observer, who had for some time, as he stated, noticed the lowness of the readings, had not detected the detached spirit, visible at a distance of 3 or 4 yards. The continuity of the column was restored by one swing of the arm.

As I have previously reported, the station is inconveniently situated for observations of the wind.

Cambridge, October 26th.—Mr. Todd was again absent at the time of my visit. All the instruments were found to be in excellent order, as usual, at this station.

Yarmouth, October 27th.—I found the instruments at this station to be all in good order. The anemograph is at present satisfactory, but I think that the instrument will have to be taken down and repaired in the course of the next 10 or 12 months, at the latest. On the evening of the 26th and morning of the 27th the observer, Mr. Watson, was entirely occupied in providing for a ship-wrecked crew, so that I could not compare his readings with my own, or indeed have any conversation with him.

Loughborough, November 10th.—The observer has removed to 9, Forest Road, a position almost entirely outside the town, having gardens and open ground towards the north and west. The position is decidedly more favourable than that formerly occupied in Victoria Street, the garden being larger, the walls much lower, and there being no trees or obstructions in the immediate vicinity of the instruments. I have sent a small plan of the garden, which is a strip of ground running N.W. from the observer's house. The observer was occupied during the time of my visit. All the instruments were, as usual, in the most perfect order.

SECOND ORDER and WEEKLY WEATHER REPORTING STATIONS.

Parkstone, August 24th.—This is a new second-order station. The observer, Mr. R. Hawkesworth Barnes, a gentleman of long experience in meteorological observations, employs a large assortment of instruments. The returns received are excellent, and the register kept by the observer, on the old system, of the amount and forms of cloud is more full and minute than any which I have met with elsewhere. The instruments are 199 feet above the sea-level. The thermometers and rain-gauges are in a garden surrounded by the thick fir trees characteristic of the neighbourhood; to the cutting off of the wind by which, the sharp ground-frosts noticed here are perhaps due. An anemometer is in use, but is necessarily much sheltered. All the instruments were in most excellent order.

Totland Bay, Isle of Wight.—The weather did not permit of my crossing the Solent at the time of my visit to Parkstone, Swanage, &c. The observer, Mr. Dover, informs me that he will have no difficulty in taking the 9 p.m. observations (hitherto not received from this new station), except in the summer season when he lets his residence, and may have a difficulty in getting the instruments attended to.

Leeson (Swanage), August 25th.—This is also a new station of the second order. It stands in wooded and undulating country, which on account of the weather could not be satisfactorily surveyed. The observer, Mr. H. Stillwell, was unfortunately absent from home on the day of my visit, and, except by comparison of instruments, I could obtain no information whatever. All the instruments were in good order, and their readings gave satisfactory results. The rain-gauge is well exposed. The Stevenson's screen is sheltered by trees in the afternoon. The station promises well.

Eastbourne, August 26th.—No alterations have been made here since my inspection in 1890. All the instruments were found to be in good order, with the exception of the rain-gauge, the injuries to which, owing to the stones thrown at it, had become very serious. A new gauge which I examined, and found to be a good instrument, was ready for erection, while a strong external iron case was being constructed for it; the instrument has since been put in position. It will be well that the rim should still stand only 6 inches above the ground.

The station, as previously reported, is a good one.

St. Leonards, August 27th.—This station has improved in one respect since it was visited in 1890, viz., the evening observations were recommenced in January. The observer read the thermometers well, but the barometer (through careless adjustment of the fiducial) incorrectly.

The wet-bulb was in a very dirty state. I removed the muslin and gave instructions to the observer.

Liverpool, September 17th.—I had not until now inspected this station as one of the second order. All the instruments, which include the Osler's anemometer, double windmill vanes, and the Robinson's cup-anemometer (the centres of whose 8-inch diameter cups move through 15 feet in each revolution) are kept in admirable order. The rain-gauges are unavoidably sheltered to a slight extent by the observatory buildings. The station, it need hardly be said, is an excellent one.

Seaham, September 18th.—Unfortunately, Mr. Aird was ill at the time of my visit, so that I could not give some instruction which was desirable as to the saturation columns in the Hygrometrical Tables. The assistant observer continues to be careful and attentive, except in the treatment of the wet-bulb, which was foul with copper salts, while the glass of the bulb itself has, like that at Shields, a deposit of metallic copper.

There is, I think, no doubt that the maximum readings at this station now require a larger correction than that hitherto applied.

York, September 19th.—It would, I think, be desirable if there could be another Stevenson's screen at this station. The instruments for the telegraphic reports and for the 9 o'clock readings are so crowded as to be somewhat difficult of manipulation; and, further, when they are read instantaneously on opening the screen, the readings of those near the roof of the screen differ from the readings of those near the floor, comparisons thus made being unsupported by comparisons of the instruments in water.

Sheffield, September 19th.—The instruments at this station are all in good order, and the station would form an excellent one of the second order if 9 p.m. observations could be obtained, which they cannot. There is a very good site for a sunshine recorder on the roof of the Art Gallery, and Mr. Howorth would have one established here if required.

Sudbury, October 27th.—The observers were absent for some days from home, and I obtained no information about the instruments. It is at present doubtful whether a second-order station can be established here, although one is much wanted in this neighbourhood. The observers, Messrs. Rawsom, are solicitors in Sudbury. They have undertaken to decide in a short time whether they will carry out the work.

Ketton Hall, October 28th.—This Weekly Weather reporting station is no longer under the immediate superintendence of Mr. Coventry, who left Ketton Hall in the year when the station was inspected by Captain Toynbee, and who has since lived at some miles' distance. The country round is undulating or moderately hilly. A sheet of artificial water borders on the south side the large garden, sloping down towards it, in which the outdoor instruments are kept; and this may partly account for the lowness of the temperatures experienced on clear winter nights at this station. The altitude of the ground above mean sea-level is 130 feet. The observations are taken by the head gardener, Mr. W. H. Divers, a most intelligent man, who has taken for many years great interest in weather observations, constructing barograms and thermograms from three-hourly eye observations. It will be seen from the Table that the corrections hitherto applied to the dry-bulb and to the minimum require considerable modification.

Rugby, November 9th.—The observations made at this station scarcely appear to me capable of so much improvement as to make the returns available for publication. Two of the masters and one of the boys undertake the observations in term time; but the work falls, *ipso facto*, upon Mr. Kirk, the gardener at the observatory gardens, who takes the readings rather roughly. Evening observations of the barometer are not sent and are rarely taken. The instrument is in a bad position, on the wall of a dark passage leading from the school quadrangle to some lecture rooms.

Tealby (Market Rasen), November 11th.—I have hopes that this will be a useful second-order station. The observer read the instruments correctly, and takes interest in the work; his time, however, appears to be much occupied in other duties. He has suffered from illness during the spring and summer, and has only commenced sending in returns in July last. As mentioned in my last year's report, the situation of the thermometer screen is not unexceptionable. At the date of my visit, during the storm prevailing at the time, there was a leakage in the roof of the screen, causing the dry bulb to give inaccurate readings; this I ordered to be immediately remedied. There is no good situation for the rain-gauge (an unverified instrument, which, however, appeared to give accurate measurements) to be found on the observer's grounds. I still think that the rainfall records should be obtained from the instrument kept by Mr. Jevons at Market Rasen, if such an arrangement can be made.

Sutton Coldfield, November 14th.—As at the last-mentioned station, the observer has suffered greatly in health from the results of influenza in the spring, and has been obliged to leave all the work of observation

to his clerks at the Borough Surveying Office. The returns are very much in arrear. The instruments were all in good order. The observer's business precluded him from taking readings with me, although I had selected a Saturday afternoon for my visit. His nephew, who is learning to take the readings, did not set the barometer correctly.

I think that if assistance in reductions can be given to the observer the returns will, after this visit, improve, and there is no reason why the station should not be a permanent one.

Chilworth, November 24th.—The observer, Mr. C. Bell, was absent at the time of my visit, and there was no one on the premises able to show me the barometer. The thermometer screen I found to be placed on sandy earth instead of on turf. The thermometer read correctly. The wet-bulb was not quite correctly mounted. These instruments are a good deal sheltered by the house. The rain-gauge, on the other hand, has a complete exposure, but it consists of a mere funnel placed on a glass bottle, which was greatly inclined, and I had no access to the measuring-glass. The house stands on a moderate eminence, in a rather richly wooded and undulating country.

Epsom, November 25th.—The former observer, Mr. Jackson, succumbed to typhoid fever in the vacation, and his successor has recently left the College. Mr. Mayo, together with another of the elder students, now undertakes the observations. The thermometers do not appear at present to be very accurately read, and the same remark applies to a less extent to the barometer.

Speaking generally, the instruments at this station are very well situated.

The following table, similar to those which I have previously submitted, gives the corrections of the instruments, &c. at the stations inspected last year.

(Signed) W. CLEMENT LEY.

STATION.	THERMOMETERS.										STATION.
	TEMPERATURE OF WATER.	DRY BULB.		WET BULB.		MAXIMUM.		MINIMUM.		SPARR.	
		Correction to re- duce to Inspec- tor's Standard.	Correction hitherto applied.	Correction to re- duce to Inspec- tor's Standard.	Correction hitherto applied.	Correction to re- duce to Inspec- tor's Standard.	Correction hitherto applied.	Correction to re- duce to Inspec- tor's Standard.	Correction hitherto applied.		
Cambridge	51	0.0	-0.1	-0.2	-0.2	-0.8	0.0	-0.4	0	A	Cambridge.
Duneness.	61	-0.1	-	-0.2	0.0	-	0.0	-	-	B	Duneness.
Hurst Point.	63	-0.4	-	-0.3	-0.2	-	-0.7	-	-	A	Hurst Point.
Jersey.	64	-0.3	-	0.0	+0.1	-	+0.2	-	-	A	Jersey.
Liverpool.	60	-0.06	-	-0.15	0.0	-	0.0	-	0.0	A	Liverpool.
Loughborough.	47	-0.05	-	+0.05	0.0	-	+0.05	-	-	A	Loughborough.
North Shields.	61	0.0	-	0.0	0.0	-	+0.3	-	-	A	North Shields.
Praule.	59	-0.3	-	-0.8	+0.6	-	0.0	-	-0.4	A	Praule.
Scilly.	54	-0.2	-	-0.1	-0.6	-	0.0	-	-1.1	A	Scilly.
Yarmouth.	54	-0.06	-	-0.2	-0.1	-	+0.1	-	-	A	Yarmouth.
York.	60	-0.3	-	-0.3	-0.2	-	+0.8	-	-	B	York.
Chilworth.	47	-0.05	+0.1	-0.1	-0.2	0.0	0.0	+0.1	-	B	Chilworth.
Eastbourne.	60	-0.1	0.0	-0.2	-0.1	-0.1	-0.2	0.0	-0.9	A	Eastbourne.
Epsom.	46	0.0	-0.1	+0.1	+0.6	-	+0.3	-	-	B	Epsom.
Liverpool.	60	-0.05	-	-0.15	0.0	-	0.0	-	-	A	Liverpool.
Market Rasen.	50	0.0	-0.1	-0.1	-0.7	-0.9	+0.7	+0.7	-	B	Market Rasen.
Parkstone.	62	-0.1	-0.3	-0.1	+0.1	-	0.0	-	-	A	Parkstone.
Rugby.	44	-0.1	-	-0.1	+0.2	-	+0.3	-	+0.2	C	Rugby.
St. Leonards.	67	-0.3	-0.3	-0.4	-0.1	+0.2	0.0	0.0	-	C	St. Leonards.
Seaham.	57	-0.05	0.0	0.0	+0.8	+0.5	+0.5	+0.5	-	A	Seaham.
Sheffield.	58	-0.1	0.0	-0.2	+0.1	0.0	+0.2	-0.1	-	A	Sheffield.
Stamford.	50	-0.4	+0.1	0.0	-0.3	-0.2	-0.2	+0.2	+0.1	A	Stamford.
Sutton Coldfield.	46	0.0	-0.1	0.0	+0.1	0.0	-0.2	0.0	-0.2	C	Sutton Coldfield.
Swanage.	65	-0.15	0.0	-0.2	+0.65	0.0	-0.05	-0.1	-	A	Swanage.
York.	60	-0.3	-0.1	-0.3	0.0	-0.1	+0.1	-	-	B	York.

REPORT OF INSPECTION OF THE SCOTTISH STATIONS FOR 1891.

The mercurial Standard Barometer No. 690 was used on this year's tour of inspection of stations. It was compared before and after inspection with a standard in Edinburgh, which shows that no change had occurred during inspection. The barometers were found to be in good order, and the observations made with satisfactory care and accuracy. The following table gives the results of the comparisons of the station barometers with the Standard Barometer No. 690.

TABLE I.

Stations.	Inspector's Standard, corrected.	Not corrected.		Remarks.
		Reporting Barometer.	Check Barometer.	
Ochertyre	ins. 29·678	ins. 29·664	ins. —	Check barometer in flat above.
Laudale	—	29·756	29·740	
Fort William	29·999	29·994	—	
Callton Mor	29·935	29·900	—	
Rothsay	29·953	29·956	—	
Ardrossan	29·980	29·972	—	
Pinmore	29·726	29·730	—	
Glenlee	29·690	29·690	—	
Cargen	29·820	29·760	—	
Stornoway	29·077	29·070	29·068	See Inspection Notes.
Nairn	29·149	29·144	29·146	
Fort Augustus	29·393	29·385	—	
Lairg	29·577	29·560	—	
Dunrobin	29·973	29·976	—	
Wick	29·250	29·244	29·198	
Deerness	29·158	29·168	—	
Dunrossness	29·772	29·763	29·772	
Aberdeen	30·057	30·060	30·057	
Braemar	28·770	28·754	—	Check barometer in higher situation in house.
Dundee	29·920	29·910	—	
Hawick	29·054	29·056	—	
Wolfelee	29·163	29·164	—	
Marchmont	29·520	29·520	—	
Glasgow	29·102	29·102	—	
Clober	28·766	28·748	—	
Edinburgh	28·996	28·960	—	
Leith	29·293	29·294	29·294	

The various thermometers in use at the stations were compared with Standard Thermometer No. 4433. The results of the comparisons are detailed in the following table, which gives the corrected readings of the standard thermometer, the errors of each instrument, and the conditions under which the comparisons were made.

TABLE II.

Stations.	Standard No. 4433, corrected.	Dry Bulb.	Wet Bulb.	Spare Ther- mometer.	Max. Ther- mometer.	Min. Ther- mometer.	Time in Water in Minutes.	Change of Tempera- ture.
Ochertyre	60.2	0.0	0.0	—	+0.1	0.0	65	Uniform
Laudale	59.4	+0.2	+0.2	—	+0.1	+0.3	120	+0.3
Fort William	60.0	+0.2	+0.2	—	0.0	-0.1	150	+0.6
Callton Mor	59.6	+0.1	0.0	—	+0.8	-0.5	60	-0.3
Rothsay	59.8	0.0	0.0	—	+0.2	-0.4	75	+0.4
Ardrossan	60.0	+0.2	+0.3	—	-0.3	-0.2	95	+0.2
Pinmore	58.3	+0.3	+0.5	—	-0.1	+0.1	90	+0.3
Glenlee	61.0	+0.3	+0.2	—	-0.3	0.0	60	Uniform
Cargen	66.2	+0.4	+0.4	—	0.0	-0.2	70	+0.5
Stornoway	57.9	+0.5	+0.5	—	-0.4	-0.5	180	+0.4
Nairn	58.3	+0.7	+0.7	—	0.0	-0.1	60	Uniform
Fort Augustus	55.8	0.0	0.0	—	+0.1	-0.4	120	Do.
Lairg	54.8	+0.2	+0.1	—	+0.1	+0.1	60	Do.
Dunrobin	55.8	-0.6	-0.6	—	0.0	-0.4	90	Do.
Wick	56.6	+0.5	+0.4	—	-0.4	-0.1	45	Do.
Deerness	56.2	0.0	0.0	56.9	+0.2	0.0	120	+0.5
Dunrossness	57.4	+0.4	+0.5	—	+0.1	0.0	165	-0.5
Aberdeen	56.2	+0.3	+0.3	—	+0.3	+0.2	100	Uniform
Braemar	56.1	+0.4	+0.5	—	-0.1	-0.2	110	+0.3
Dundee	54.4	+0.4	+0.4	—	+1.4	-0.4	50	Uniform
Hawick	59.9	0.0	0.0	—	-0.1	+0.1	150	Do.
Wolfelee	53.2	-0.2	-0.3	—	+0.2	-1.0	120	+0.2
Marchmont	52.7	-0.1	-0.2	—	0.0	0.0	180	Uniform
Glasgow	47.9	—	—	—	-0.1	0.0	75	Do.
Clober	48.3	+0.9	+0.9	—	+0.4	-0.2	180	-0.6
Edinburgh	51.2	0.0	+0.1	—	0.0	0.0	105	+0.2
Leith	50.2	+0.1	+0.3	—	+0.1	-0.4	60	Uniform

The only cases of the minimum thermometer being out of order occurred at Wick and Dunrossness, which are described in the following notes.

Hygrometers.—The observations of the dry and wet bulbs made immediately on opening the Stevenson Screen at all the stations show that the hygrometers are very well attended to. The smallest difference—Dry $61^{\circ}8$, Wet $61^{\circ}5$ —was noted at Pinmore, immediately after exceedingly heavy rain when the air and all objects near were drenching wet.

NOTES ON THE STATIONS.

Ochertyre, July 31st, 1891.—The instruments are all in excellent order and the observations accurately and intelligently made.

Laudale, August 4th.—The instruments are in excellent order and are observed with care and accuracy.

Fort William, August 5th.—The instruments are in admirable order; the observations are punctually and correctly made.

Poltalloch, August 6th.—The instruments are well attended to and the observations are made with much care and intelligence.

Rothsay, August 7th.—The instruments are in thoroughly good order. Mr. Kay was from home at the time of my visit, and during his absence the observations are made by Mrs. and Miss Kay.

Ardrossan, August 7th–8th.—The instruments are in very good order and the observations are made with considerable intelligence, and a

good deal of interest appears to be taken in them. I gave instructions to resume at once the 10 p.m. or late daily, observation.

Pinmore, August 8th.—The condition in which the instruments are and the care and correctness shown in making the observations are all that can be desired. The vane on Pinmore House, which is kept in good order, is used, along with smoke, trees, &c. in making the observations of wind.

Glenlee, August 10th.—The instruments are in remarkably good order and the observations are made conscientiously and with much care.

Cargen, August 11th.—The instruments are in good order and the observations are made with great care and intelligence. Mr. Dudgeon personally gives much attention to the instruments, the observations, and the schedules. Shortly before my visit the barometer had been accidentally broken; but in the meantime, till the new one arrived from Edinburgh, the one in the hall, which of its kind is a good one, with error of $+0.060$ inch, is used.

Stornoway, August 25th.—The thermometer screen with enclosing railing were ordered to be repaired, otherwise the instruments are in remarkably good order and the observations are evidently made with conscientiousness and care. I specially drew Mr. Forbes and assistants' attention to the observations of wind direction, and recommended that the readings, after entry in the book, be compared with the observations.

Nairn, August 26th.—Some slight repairs are ordered for the thermometer screen, but with this exception the instruments are in very good order and the observations are made with care. The reductions of the barometer for the previous three months were scrutinized and one error was discovered, the reading of July 28th at 8 a.m. should have been 29.653 and not 29.613 as had been wired.

Fort Augustus, August 28th.—The instruments are all in excellent order and the observations are made with much intelligence and with the greatest care. The Rev. Adrian Weld Blundell became observer after the death of Father Cody. It is proposed to add observations of ozone and underground temperature, and possibly also observations of electricity.

Lairg, August 29th.—Shortly after last inspection a new rain-gauge was got and placed in a good situation. The instruments are all in good order. During the absence of Mr. Young the barometer was in the house of Sergeant Instructor Rae, of the volunteers, who was for the time acting as observer.

Dunrobin, August 29th.—As the scales of the dry and wet bulb thermometers have become indistinct a new hygrometer has been recommended, otherwise the instruments were in good order and the observations continue to be very carefully observed.

Wick, August 31st.—An air-bubble about 0.5 was in spirit column, which Mr. Sinclair was aware of, but thought it due to the instrument being a defective one. It was put right. A new stand for the Stevenson screen was ordered and the whole to be painted. The check barometer which had recently been repaired, was in good order, as were also the other instruments, with the above exceptions. The observations are carefully and very fully and intelligently made.

Deerness, September 2nd.—The instruments were removed from Stennis to Deerness three months ago. They have been remarkably

well placed in their new positions, the positions obtained for the anemometer and sunshine recorder being singularly good. All are in good order and the observations are made with great care and intelligence.

Dunrossness, September 4th.—Orders were given to repaint the Stevenson screen and posts. A small portion of spirit was lodged at the top of the tube of the minimum thermometer, which is so constructed that the observer could not have been expected to have detected it. It was put right with Mr. Brand's assistance. It is probable that the error commenced with the use of the instrument a year since, and that the error has been about a degree throughout. An excellent position for a sunshine recorder in front of the manse was selected and directions given as to the placing of it. Otherwise the instruments are in excellent order and the observations are punctually and intelligently made.

Aberdeen, September 8th.—Everything at this station is in excellent order and the observations are made with much intelligence.

Braemar, August 7th.—All the instruments are in admirable order and the observations are carefully and accurately recorded.

Dundee, September 8th.—The instruments continue to be well attended to and the observations are made with care and accuracy.

Hawick, October 1st.—The instruments are all in remarkably good order and the observations are made with much interest and intelligence. It is intended to add to the monthly sheet observations of wind, cloud, and weather. The observations of wind, however, cannot, owing to the deep confined valley of the Teviot here, be accepted as representing the general directions of the wind in this part of Scotland.

Wolfelee, October 2nd.—The instruments are well attended to and the observations are made with intelligence and conscientiousness.

Marchmont, October 3rd.—The instruments are particularly clean and well attended to and the observations are made with great fulness and intelligence.

Glasgow, October 15th.—The instruments continue to be kept in very good order, and the observations are accurately made.

Clober, Milngavie, October 16th.—Since last year's inspection considerable changes have been made. The shed originally designed for the thermometers has been removed and a Stevenson screen placed on the same site. The rain gauge has been removed from this site and placed in the open field near the anemometer. Experiments are being made with an anemometer sent by Mr. Bryson, of Edinburgh, with regard to the registration of the direction of the wind. The instruments, and their exposures, are now uniform with those at the Council's other stations; they are all in very good order, and Mr. Bertram makes the observations with much enthusiasm and intelligence.

Edinburgh, October 19th.—Since last inspection a new Stevenson screen has taken the place of the one previously used which was a modified Stevenson. There is also a storm rain gauge and a duplicate set of the other instruments at this station. The instruments are all in very good order and the observations are made with care and accuracy.

Leith, October 20th.—The instruments are in good order, and the observations are carefully and correctly made. Mr. T. Richardson, the new assistant, observes and makes up the daily weather report.

The Observatories.—The comparison of their barometers with the standard has been already given in first Table of this Report. In each case the maximum and minimum thermometers in the special screens of the observatories were compared with the standard with this result:—

	Standard No. 4433.	Maximum Temperature.	Minimum Temperature.
Fort William - - - -	60·0	60·0	59·7
Aberdeen - - - -	56·2	56·1	56·1
Glasgow - - - -	47·9	47·8	47·9

At Fort William the registering rain-gauge, which had not been acting satisfactorily, is now in good order.

The instruments, registrations, and observations at each of these observatories are very satisfactory.

(Signed) A. BUCHAN.

REPORTS ON INSPECTION OF OBSERVATORIES, &c.

I.—SELF-RECORDING OBSERVATORIES.

Falmouth Observatory.—Visited August 8th to 14th, 1891.

The self-recording meteorological instruments were examined, and all the clocks and lenses cleaned as usual. I found all parts carefully kept and in excellent order.

The anemograph bearings were found well lubricated, the asbestoline applied last year, with the exception of the top velocity-bearing, which had run dry, having proved a first-rate lubricant.

The rain-gauge pencil was examined and found to be an ordinary office blacklead.

I also very carefully tested the action of the float, and found its capacity was correct, and that the discharging siphon always acted properly.

I also looked into the question of collecting the water received by the gauge, but found that in consequence of the large amount of the maximum daily fall occurring at Falmouth it would be necessary to provide a vessel of considerable capacity to contain a fall of nearly 2 inches of rain, thereby necessitating the excavation and walling in of a large chamber. I did not think I should be justified in incurring the outlay such an operation would entail, and accordingly did not have it made.

I found the values of the thermograph lines to be as follows:—

Upper zero lines dry	-	-	-	-	82·5
" " wet	-	-	-	-	81·0
Lower zero lines dry	-	-	-	-	16·0
" " wet	-	-	-	-	17·8

The orientation of the anemograph was verified and found correct, and is recorded on sheet No. 225, duly forwarded to the Meteorological Office.

Radcliffe Observatory, Oxford, visited August 17th.—Dr. Stone was absent at the time of my visit to the observatory, but I received every attention at the hands of Mr. Wickham, the chief assistant.

I found all the instruments were working in good order, but cleaned the lenses and oiled the clocks.

I had a new suspension spring fitted to the pendulum of the Beckley gauge clock, which broke when dismounted for oiling.

The thermometers were all compared with my standard, with the following results :—

Dry, No. 576	-	-	-	-	-	0.0
Wet, No. 575	-	-	-	-	-	-0.3
Max., No. 356	-	-	-	-	-	-0.2
Min., No. 363	-	-	-	-	-	+0.2

Stonyhurst Observatory, visited September 10th, 1891.—The instruments at this observatory were working under the charge of the Rev. W. Sidgreaves, all being in good order. The anemograph by Beck, however, is beginning to show signs of wear, and will probably require the replacement of several of its more exposed parts before many more years have elapsed.

The thermometers were compared with my standard K.S. 682, and found to have the following corrections :—

Dry, No. 619	-	-	-	-	-	-0.3
Wet, No. 325	-	-	-	-	-	-0.4
Max., M.O. 439	-	-	-	-	-	-0.3
Min., M.O. 501	-	-	-	-	-	+0.4

The Beckley rain-gauge was found to be quite correct. My attention having been directed by the Meteorological Office to the exposure of the sunshine recorder, which is only raised 3 to 4 feet above the ground, I noted the following points as regards the summer-houses which it is thought may possibly throw shadows upon it. The pyramidal roof of the western pavilion subtends at the glass sphere, the horizontal angle from 17° to 30° south of west, through altitudes from 3° to 10° above the horizon, and the similar roof of the eastern house from 4° to 16° south of east, and shades also from 3° to 10° above the level plane.

II.—ANEMOGRAPHS.

The anemograph at Fleetwood was visited September 7th to 9th.

It was found to be in first-rate order, the loose ties of the fan were soldered up, all bearings were cleaned, and I replaced the old oil in the cups with asbestoline. I oiled clock and cleaned its escapement, which is in good order. Some slight repairs of the case, which are necessary, were ordered to be made, and the external parts were painted during my visit. The orientation was duly examined and the sheet marked.

The pavilion containing the instrument is now closed to the public, and the curves, together with two copies of the Daily Weather Report, are exhibited and consulted in the public library of the town.

Yarmouth anemograph.—This was found in good action and its bearings well oiled, but the following points were noted :—

The fans were found much corroded and worn, and new ones should be prepared, and if sent down with spindles made in accordance with the gauge-piece I forward to the Office with this report, could be put on by the local workman employed by Mr. Watson to oil and paint the instrument.

The cups are all fitting properly with the exception of one, which was broken away a long while ago: the iron tie applied last year was renewed.

The recorder was in good order, the clock was oiled, and the slides and fittings cleaned. The orientation was examined, and the marked curve was forwarded to the Meteorological Office.

The thermometers, which are in a wall-screen painted green, were compared and found to read corrected as follows:—

Dry, B.T. 1542	-	-	-	-	-	+0.1
Wet, B.T. 515	-	-	-	-	-	-0.5
Max., M.O. 21	-	-	-	-	-	-0.4
Min., M.O. 2480	-	-	-	-	-	+0.7

The maximum is not divided on its stem. The rain-gauge is in good order.

Plymouth, the Biological Laboratory.—I visited this institution on my return from Falmouth, at the request of Mr. Dickson, in order to view the site on which he intended erecting the screen, in which he was about to set up the instruments formerly used by Dr. Merrifield.

I considered it a very suitable and convenient locality, and I understand that since my visit the thermometers have been placed there, and all particulars duly forwarded to the Meteorological Office. The thermometers were verified whilst in the possession of Dr. Merrifield, and Mr. Dickson has since compared them with a Kew standard he purchased from Kew recently, and finds the values correct.

(Signed) G. M. WHIPPLE.

Glasgow, visited September 29th to October 1st.—At this observatory the instruments were all working satisfactorily, but the barograph and thermograph clocks required cleaning. This was accordingly done and new lines attached to the clock weights, also the lenses, mirrors, &c., were attended to.

During the night of September 29th the barograph clock repeatedly stopped, and on examining it the next morning one of the driving wheels was found bent. It was rectified, and since then the instrument has gone well.

The zero lines of the thermograph were changed to the winter position, and the various thermometers compared with Kew Standard 682 at 52° Fahr. and found to require the following corrections:—

Dry Standard No. 550	-	-	-	-	-	-0.1
Wet „ No. 472	-	-	-	-	-	-0.45
Maximum, No. 58,846	-	-	-	-	-	+0.1
Minimum, No. 63,942	-	-	-	-	-	-0.1
Grass minimum, No. 59,003	-	-	-	-	-	-0.1
Barograph thermometer (no number)	-	-	-	-	-	-0.8
Thermometer attached to the standard barometer	-	-	-	-	-	-0.5

The anemometer was dismounted and cleaned and fresh oil applied to all the bearings. One of the fan blades was found loose; this I had resoldered before again erecting the instrument.

Afterwards the orientation was duly examined, and the sheet containing the result accompanies this report.

As regards the self-recording rain-gauge; it was in very good order, and did not require any special attention.

The sunshine recorder was examined on the morning of October 1st, when it was found that the glass sphere had slipped off its pedestal and

was resting against the cusps of the metal bowl; in consequence the instrument was not recording, although the sun was shining brightly at the time. From an inspection of the cards it was evidently in proper action on September 27th, but in the interval the weather, according to the meteorological register, was chiefly overcast, so that very few hours of sunshine were really lost. In order, however, to prevent a recurrence of this accident, I thought it advisable to have the glass ball cemented down to its support, and Professor Grant gave instructions for this to be carried out.

Fort William, inspected October 3rd-5th.—Found all the instruments here in good order. The barograph and thermograph clocks were taken entirely to pieces and cleaned, and the lenses, condensers, and mirrors wiped.

The zero lines were changed to the winter position, and the standard thermometers were examined by means of Kew Standard No. 682 at 60° and the following corrections determined :—

Dry Standard, No. 671	-	-	-	-	0°0
Wet „ No. 682	-	-	-	-	-0°2
Maximum, No. 1032	-	-	-	-	+0°1
Minimum, No. 1322	-	-	-	-	+0°3
Barograph thermometer, K.O. 690	-	-	-	-	-2°1
Thermometer attached to the standard barometer, No. 72,222	-	-	-	-	-0°1

NOTE.—As the reading of the minimum thermometer was rather low, I dismantled the tube from its scale and gently heated the upper end by means of a lamp. After standing the tube in a vertical position for some three hours it was again tested at 60° and found to require a correction of +0°·1, thus indicating a rise of 0°·2.

The Beckley rain-gauge was found to be in good order, and the clock only required oiling.

Deerness, Orkney, October 8th-9th.—The anemograph at this station was shifted from Stenness in April last under the direction of Messrs. Fortescue and Spence, and is now entirely in charge of the last-named gentleman. The instrument has been very carefully erected, and is now distant about 400 yards from the school house, the position being an excellent one, with an uninterrupted exposure from all points of the compass. The hut rests on a stone basement rising some 3½ feet above the ground, and the cups are about 17 feet from the surface of the ground.

Although the anemograph was working well at the time of my visit, I had the cups, shafts, and fans dismantled and cleaned, and all the bearings were afterwards lubricated with asbestoline. An old crack in one of the cups had given way, but this I had rivetted, and the external parts of the instrument painted before putting up again.

Mr. Spence takes a considerable interest in the work, and is fully aware of the importance and necessity of keeping the bearings well oiled.

The orientation was duly checked by compass, and the sheet containing the result is forwarded herewith.

The sunshine recorder is fixed to a wooden pedestal 6½ feet above the ground, and is in proper adjustment. On all sides the exposure is good, excepting a small farmhouse distant about 200 yards to the south-west, which might perhaps obstruct the sun's rays for a short time, though it

is very questionable. Mr. Spence, however, promised to keep a look out on the recorder when the sun sets in that direction.

Aberdeen, October 13th-15th.—As usual everything at this observatory was found in very good order.

The barograph and thermograph had their clocks, lenses, and fittings generally cleaned. The ratchet spring of the barograph clock required repairing, which I had done before re-starting the instruments.

The various thermometers were compared with the Kew standard No. 682, in melting ice, and their corrections at 32° found to be as follows:—

Dry, Standard 597	-	-	-	-	-	-0°·1
Wet, „ 395	-	-	-	-	-	-0°·65
Maximum, 1002	-	-	-	-	-	+0°·1
Minimum, 5056	-	-	-	-	-	0°·0
Attached thermometer (to standard barometer),						
No. K.O., 71061	-	-	-	-	-	-0°·2
Barograph thermometer (no number)	-	-	-	-	-	-2°·2

The external portions of the anemometer were dismounted, and all parts cleaned, and fresh oil applied to the bearings. The clock and recording apparatus were also attended to, and afterwards the orientation was examined and found satisfactory.

The Beckley gauge was cleaned generally, and the clock bearings oiled. As regards measuring the total rainfall collected by this gauge, it would be impracticable to do it with the instrument in its present position. If, however, it were shifted to the College ground there would be no difficulty, as arrangements could then be made to have a suitable chamber constructed on its new site.

North Shields, October 17th-18th.—The anemograph at this station was found to be in very good order all its bearings appearing to be well oiled and quite free. I, however, had the instrument partly dismounted, with the aid of Captain Harrison's assistant, and thoroughly cleaned all its parts, after which the bearings were lubricated by asbestoline. When re-mounted it was oriented, and the sheet containing the results accompanies this report.

(Signed) T. W. BAKER.

REPORT OF VISIT TO NEW OBSERVATORY AT WESTWOOD HOUSE, CAHIRCIVEEN, AND OTHER STATIONS, IN MARCH 1892.

I ARRIVED on the evening of Saturday, March 5th.

On Monday Mr. Galvin came to the Observatory, accompanied by his workmen. We arranged for the closing in by a brick and slate erection of the instrument room on the ground floor, so that the thermograph should be on the ground level, and its thermometer bulbs should be fitted at a height of 5 feet above it. The mason accordingly prepared foundations for the erection of a wall arranged so as to form an alcove, which enclosed the thermograph slab and formed the north wall to the instrument room. Mr. Cullum and I then proceeded to Valencia, and dismounted the anemograph there, which we shipped on board a boat and conveyed direct to Westwood. The same evening we landed it and stowed it in the Westwood boathouse for the night.

The next morning we carted it up to the Observatory House, where we erected it upon the roof, making use of the same sheet-lead that we

had brought from Valencia, as we were unable to procure suitable new material at Cahirciveen. We then found some difficulty in joining up the shafts, for the new sections provided by Munro did not fit the old ones in any way. However, after some consideration and trouble I jointed up all the lengths by means of well-pinned mahogany plugs, excepting one joint which could not be made in that way, but which was carefully soldered up by Mr. Windeler, at the Telegraph Station, who kindly rendered me that service when I took the length to him. The next day we were able, after having cleaned the instrument thoroughly in every part and approximately oriented it, to set in action, having lost only three days' record during the transfer from the old Observatory.

On Thursday we went again to Valencia. We dismantled the thermograph and the standard thermometers, which we then conveyed to Westwood. The anemograph was properly oriented by means of the sun, and again started on Friday at 11 a.m. Then on Saturday we erected the thermograph slab, and properly covered in the instrument room. On Monday we fitted up the thermograph screen and cleaned the metal fittings, the lenses, and clock of thermograph. Tuesday, the 15th, the barograph and Stokes's sunshine recorder were dismantled at Valencia, and removed to the New Observatory, a proper brick pillar 5 feet high having been built to support the recorder in the meadow to the north of the house, but sufficiently distant as not to be shadowed at any time. On the 18th the barograph clock was cleaned, and the instrument was partly erected. The Beckley rain-gauge was planted over the site which had been prepared for it by excavating a hole and draining it, and fixing a levelled slate slab to support it.

On Saturday, March 19th, all the instruments were started provisionally, and on Monday, 21st, observations were made to adjust the sunshine recorder and to fix it in its place. The next day we dismantled and brought the standard barometer to Westwood, where we fixed it properly and adjusted it the next day, having referred its position to a bench-mark we had discovered on the wall of a cottage about half a mile distant to the south-east.

On March 24th I compared the thermometers with the Kew Standard No. 399, and found readings as follows:—

—		—	Correction.
Kew Standard	-	43·6	—
Dry	"	44·0	-0·4
Wet	"	43·8	-0·2
Maximum, No. 1003	-	43·6	0·0
Minimum, No. 2497	-	43·6	0·0

I then left Westwood, all instruments working well excepting the light stop in the case of the barograph.

On March 26th I visited the *Mountjoy Observatory*, where I dismantled and cleaned the anemometer and freshly oiled the bearings and clock.

March 29th and 30th I visited the *Armagh Observatory*, where the anemograph was not working. With the assistance of two workmen I was able to take down the instrument, and having built a fire round it and well heated the congealed oil, we were able to thoroughly clean it and afterwards to put it together and start it afresh, well oiled and

cleaned, leaving the bearings in perfect order. I also examined and oiled the Beckley rain-gauge, which I found to be in most excellent order.

I examined the anemograph at *Holyhead*, and found it in good order, with the exception of the arms and stays supporting the cups. These are very much corroded, due to the action of both smoke and spray, and will soon require to be replaced by new ones. The direction-fans are also considerably worn, but will last for some years longer. The new attendant in charge of the anemograph appears an active and intelligent young man. His name is William Davies.

(Signed) G. M. WHIPPLE.

APPENDIX VIII.

METHOD OF DEALING WITH TELEGRAPHIC WEATHER INTELLIGENCE.

THE operations connected with the preparation and issue of the Forecasts and Storm Warnings have not undergone any material change. Full details will be found in Appendix IX. to last year's Report.

DAILY WEATHER REPORT.

An important change has been made during the past year in the Daily Weather Report, a detailed description of which is given in the Annual Report for 1887. This alteration consists in the addition of a column giving the principal changes which have occurred in the weather at each station since the hour of observation on the previous day. The monthly averages of pressure, temperature, and rainfall hitherto printed for the current month on the second page of the Report have been published in a collective form as a preface to the volume for the second half of 1891. The Report still fills four large quarto pages.

The standing portions (maps, &c.) are printed in blue, while the information for each day is in black.

The subscription for the Report is —

<i>For delivery by hand, where feasible,</i>	<i>£2 per annum ;</i>
<i>Do. by book post</i>	<i>£1 „</i>

MS. copies of the observations and remarks can be supplied at the rate of 2*l.* 10*s.* per annum. Arrangements can also be made for the supply of charts drawn from the 8*h.* a.m. or 6*h.* p.m. observations, such as appear in the "Times."

The Office receives, when the telegraphic communications are perfect, fifty-eight reports each morning, seventeen each afternoon (except on Sundays), and twenty-nine each evening, the arrangement of which is explained in the Annual Reports for recent years.

The Monthly "Correction and Addition List" is still published.

WEEKLY WEATHER REPORT.

The Weekly Weather Report, which has appeared since February 1878, was rearranged at the commencement of 1890, and is now prepared for the calendar week, Sunday to Saturday, thus bringing it into

agreement with other weekly publications. It is published regularly on Thursdays and is illustrated by three maps for each day. These, like the Daily Reports, show the outline of the land and sea in blue, while the information on them is in black. The maps show (1) for 8 a.m., the temperature, weather, and sea disturbance; and (2) for 8 a.m. and 6 p.m., the distribution of pressure and the winds, over, and on the coasts of, Europe. The information on the first and second pages of each report has been added to, and consists of observations of Temperature and Rainfall made at 76 stations, the individual values for which are now given on the second page of the Report, and of Sunshine records taken at 47 stations.

Tables of Accumulated Temperature designed to give persons engaged in agriculture better means of estimating the manner in which vegetation is affected by temperature than that afforded by the more usual methods of treating the readings of the thermometer, are given on the first and second pages, and show for each week, and for the whole period from the beginning of the year, the weekly and progressive values respectively, of the combined amount and duration of the excess or defect of the air temperature, above or below a suitably fixed standard, or *base temperature*. The base value adopted is 42° Fahr.

Accumulated Temperature is expressed in Day-degrees; a Day-degree signifying 1° F. of excess or defect of temperature above or below 42° F. continued for 24 hours, or any other number of degrees for an inversely proportional number of hours. An explanation of the rules by which it is obtained will be found in the Annual Report for 1889, while full details as to the facts on which the rules are founded are published in Appendix II. to the Quarterly Weather Report for 1878.

In addition to the reports from the Telegraphic Reporting Stations, and the returns from the self-recording Observatories, weekly schedules from 56 volunteer observers are used, the names of the stations and observers being given below:—

The MS. of the report is prepared on Tuesday in every week, and the summary on its first page is sent to several papers on Tuesday evening; the printed copies of the complete report are ready for sale on Thursday afternoon.

1. OBSERVERS FURNISHING TEMPERATURE, RAINFALL, and in some cases BRIGHT SUNSHINE RECORDS.

Names of Stations.	Names of Authorities.
Alnwick Castle	Lieut.-Col. F. Holland, for the Duke of Northumberland, K.G.
Arlington (N. Devon)	W. Stewart, for Lady Chichester.
Bawtry (Hesley Hall)	B. I. Whitaker, J.P., F.R. Met. Soc.
Blackpool	J. Wolstenholme.
Braemar	J. A. Aitken, J.P.
Brookeborough	Mr. Ferguson, for Sir Victor Brooke, Bt., F.L.S.
Cheadle	J. C. Philips.
Churchstoke	P. Wright, F.C.S., F.R. Met. Soc.
Cirencester	The Royal Agricultural College.
Cullompton	T. Turner, J.P., F.R. Met. Soc.
Douglas (Isle of Man)	A. W. Moore, M.A., J.P.
Dublin	J. W. Moore, M.D., F.R. Met. Soc.
Durham Observatory	H. J. Carpenter.
Edgeworthstown (Currygrane)	J. M. Wilson, J.P.

Names of Stations.				Names of Authorities.
Fort Augustus	-	-	§	Rev. A. Weld-Blundell, O.S.B.
Fort William	-	-	-	R. T. Omond, F.R.S.E., for Directors of Ben Nevis Observatory.
Foynes	-	-	-	W. Ward, for Lord Monteagle, K.P.
Geldeston	-	-	-	E. T. Dowson, F.R. Met. Soc.
Glencarron	-	-	§	D. D. Munro, for Lord McLaren.
Glenlee	-	-	§	W. Melville, for G. Maxwell.
Hastings (St. Leouard's)	-	-	-	H. Colborne, M.R.C.S.
Hereford	-	-	§	T. A. Chapman, M.D.
Hillington	-	-	§	Rev. H. E. B. Ffolkes, M.A., F.R. Met. Soc.
Kilkenny	-	-	-	H. Carlton, for the Marquis of Ormonde, K.P.
Killarney	-	-	-	The Ven. Archdeacon Wynne, F.R. Met. Soc.
Laig	-	-	§	J. Young, Schoolmaster.
Laudale (Loch Sunart)	-	-	-	A. Fletcher, for T. H. G. Newton, M.A., F.R. Met. Soc.
Llandoverly	-	-	-	J. Watkins, F.R. Met. Soc.
Llandudno	-	-	§	J. Nicol, M.D., F.R. Met. Soc.
Londonderry	-	-	-	J. Conroy, F.R. Met. Soc.
Marchmont	-	-	§	P. Loney, for Sir Hugh P. Campbell, Bart.
Markree Castle (Co. Sligo)	-	-	-	A. Marth, F.R.A.S., for Colonel Cooper, F.R.A.S.
Newton Reigny (Penrith)	-	-	-	T. G. Benn, F.R. Met. Soc.
Ochertyre	-	-	§	G. Croucher, for Sir P. Keith Murray, Bart.
Plymouth	-	-	-	H. N. Dickson.
Prestwich (Manchester)	-	-	-	T. R. H. Clunn, M.D., F.R. Met. Soc.
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.R. Met. Soc.
Scarborough	-	-	§	W. Robinson.
Southampton	-	-	-	J. T. Cook, R.E., Ordnance Survey Office.
Stamford (Ketton Hall)	-	-	-	Fred. Coventry.
Stowell	-	-	§	Rev. H. J. Poole, F.R. Met. Soc.
Strathfield Turgiss	-	-	§	Rev. C. H. Griffith.
Waterford (Brook Lodge)	-	-	-	C. Percival Bolton, J.P.

The returns marked "§" are supplied through the Royal Meteorological Society, those marked "§" through the Scottish Meteorological Society.

2. OBSERVERS who furnish RECORDS of SUNSHINE only.

Names of Stations.				Authorities.
Edinburgh	-	-	-	R. C. Mossman, F.R. Met. Soc.
Oswaldkirk	-	-	-	R. Thompson.
Worksop	-	-	-	H. Mellish, J.P., F.R. Met. Soc.
Thurcaston	-	-	-	Rev. F. A. Preston, M.A., F.R. Met. Soc.
Margate	-	-	-	J. Stokes, F.R. Met. Soc.
*Brighton	-	-	-	A. Newsholme, M.D., F.R. Met. Soc.
Eastbourne	-	-	-	R. Sheward, F.R. Met. Soc.
*Westbourne	-	-	-	Rev. L. B. Birkett.
*Torquay	-	-	-	A. Chandler, F.R. Met. Soc.
*Guernsey	-	-	-	F. E. Carey, M.D., F.R. Met. Soc.
Newquay	-	-	-	J. Pearce.
*Tenby	-	-	-	J. E. Gower.
Arley Cottage (Co. Cavan)	-	-	-	Major Somerset A. Maxwell, F.R.A.S.

* Those marked with an asterisk use Jordan's (Photographic) Recorder; the others use the Stokes-Campbell (Burning) Recorder.

Appendices, &c.

Two Appendices, I. and II., have appeared, similar to those for recent years. The supplement in the form of a Monthly Summary has been improved by the addition to its Tables of Columns showing the difference between the Pressure, Temperature, Rainfall, and Bright Sunshine of the current month, and the averages for the corresponding months in a long series of years.

ISSUE OF FORECASTS.

There has been little change in this work.

Remarks on 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. These are intended especially for the early editions of the evening papers, for the clubs, and for exhibition at certain selected stations. See page 10.
- (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 intended for publication in newspapers, but a copy is exhibited regularly at the door of the Meteorological Office.
- (3.) At 8.30 p.m. (from the 8 a.m., 2 p.m., and 6 p.m. reports), for the day following that of issue. These are supplied gratis to any newspaper or news agency which may apply for them, and send for them regularly. A very large number of the most important papers and news agencies avail themselves of this advantage.

The forecasts are made for the following districts :—



0. SCOTLAND, NORTH.
1. SCOTLAND, EAST.
2. ENGLAND, N.E.
3. ENGLAND, EAST.
4. MIDLAND COUNTIES.
5. ENGLAND, SOUTH.
6. SCOTLAND, WEST (with Isle of Man)
7. ENGLAND, N.W. (with North Wales).
8. ENGLAND, S.W. (with South Wales).
9. IRELAND, NORTH.
10. IRELAND, SOUTH.

The remarks and forecasts are posted at the doors of the Meteorological Office, 63, Victoria Street, S.W., on week days,* for the inspection

* Good Friday and Christmas Day are reckoned as Sundays.

of the public. Copies, or extracts from them, are communicated under the conditions stated below, but no information which is not substantially included in them can be supplied.

A series of boards is exhibited on the front of the Office showing in large type the state of the wind, weather, and sea disturbance at six stations, situated on our S.E., S., and W. coasts. The stations selected are Yarmouth, Dungeness, The Needles, Scilly, Holyhead, and Valencia Island, and the observations posted up are those for 8 a.m. and 2 p.m. daily, except on Sundays,* the boards being changed at about 9.45h. a.m. and 3h. p.m. The information can be easily read from the street.

FORECASTS FOR SUBSCRIBERS.—Any person can be supplied with a copy of the 11 a.m. Forecasts, once on each week day,* on payment of a subscription of ten shillings per annum, or 2s. 6d. per official quarter, *or any part thereof, in addition to the cost of transmission*; the charges will therefore be, by *letter post*, 9s., by *book post*, 5s. 9d., per quarter.

The forecasts for any of the districts and for any of the hours mentioned on p. 10 can be forwarded by telegraph daily, on payment of 3d. per day for any definite period, in addition to the cost of telegraphy.

FORECASTS FOR CLUBS.—These are drawn up at 11 a.m., for all the districts, and are supplied to Clubs, for a subscription of ten shillings per annum. They are delivered free, by hand, to Clubs situated in or near Pall Mall. Special arrangements can be made for delivery at a greater distance by hand or by post.

FORECASTS FOR HAY AND CORN HARVESTS, OR FOR PUBLIC USE.—Special facilities are offered for the transmission of Forecasts for these purposes, a nominal fee of 2s. 6d. being charged for a quarter or any part thereof, in addition to the cost of the telegrams.

EXHIBITION OF TELEGRAPHIC FORECASTS AT LOCAL POST OFFICES.—The Post Office has sanctioned the exhibition of Forecasts at Local Post Offices, provided space is available, if the persons to whom they are addressed desire them to be so exhibited instead of being delivered.

Unless otherwise arranged, all forecasts transmitted by post are sent by book post, not as letters.

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 7 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 one shilling in stamps, in addition to the cost of the reply (consisting of ten words, exclusive of the address) if the reply 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

* Good Friday and Christmas Day are reckoned as Sundays.

in any district of the United Kingdom by payment of a fee of 1s. in addition to the cost of a telegram and reply to any post office. The telegram containing the inquiry must be addressed as follows :

To

WEATHER,
LONDON.

The payment for the reply should be for at least ten words in addition to the address.

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

CHECKING OF FORECASTS AND STORM WARNINGS.

The forecasts and storm warnings issued by the Office are carefully checked by being compared with the conditions actually experienced after their issue. The method adopted was fully explained in the Annual Report for last year.

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 results of the checkings for 1891 will be found on pages 11, 13, and 14.

APPENDIX IX.

REPORT ON THE COMPARISON OF THE FORECASTS ISSUED AT 8h. 30m. p.m. WITH THE WEATHER SUBSEQUENTLY EXPERIENCED, for the 12 Months, April 1891 to March 1892. The results are for the United Kingdom as a whole.

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 in previous years, *i.e.*, each forecast has been considered under the separate headings of "Wind" and "Weather," but the results of the 8.30 p.m. Forecasts only are here published.

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

The Summary for the various districts is given on page 11.

Months.		Per-centages.				Months.		Per-centages.			
		Wind.	Weather.	Average.	a + b.			Wind.	Weather.	Average.	a + b.
April	a b c d	48 28 15 9	62 24 6 8	55 26 11 8	81	October	a b c d	37 38 18 7	57 29 9 5	47 34 13 6	81
May	a b c d	44 34 13 9	56 28 8 8	50 31 11 8	81	November	a b c d	36 30 21 13	52 30 14 4	44 30 18 8	74
June	a b c d	52 28 15 5	59 22 10 9	56 25 12 7	81	December	a b c d	48 30 18 4	65 22 7 6	57 26 12 5	83
July	a b c d	57 28 12 3	58 31 8 3	58 29 10 3	87	January	a b c d	44 27 19 10	57 26 11 6	51 26 15 8	77
August	a b c d	33 44 16 7	55 34 8 3	44 39 12 5	83	February	a b c d	42 33 18 7	53 28 10 9	48 30 14 8	78
September	a b c d	40 37 16 7	44 37 11 8	42 37 14 7	79	March	a b c d	46 32 15 7	55 29 8 8	51 30 12 7	81
		Per-centage.									
		Wind.	Weather.	Average.	a + b.						
The entire year		a b c d	44 23 16 7	56 28 9 7	50 30 13 7	80					

APPENDIX X.

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, 97 in England and Wales, 47 in Scotland, 20 in Ireland, 3 in the Isle of Man, and 3 in the Channel Islands.

NORTH.	WEST.	SOUTH.	EAST.
SCOTLAND, N.E.	IRELAND, S.W.	ENGLAND, S.W.	ENGLAND, E.
Lerwick.	New Ross.	St. Just.	Harwich.
Scalloway.	Dunmore East.	St. Sennen.	Ipswich.
Dunrossness.	Dungarvan.	Penzance.	Southwold.
Stromness.	Youghal.	Scilly.	Yarmouth.
Kirkwall.	Queenstown.	The Lizard.	Cromer.
Holborn Head.	Passage.	Falmouth.	Sheringham.
Dunnet Head.	Cork.	Pendennis.	Lynn.
Wick.	Kinsale.	Mevagissey.	Sutton Bridge.
Avoch.	Do. (Old Head)	Plymouth.	
Inverness.	Brow Head.	Devonport.	
Nairn.	Tralee.	Prawle Point.	
Burghead.	Limerick.	Teignmouth.	
Lossiemouth.	Galway.	Exmouth.	
Buckie.			
Port Knockie.	IRELAND, N.W.		
Cullen.	Malin Head.		
Portsoy.	Portrush.		
Banff.	Port Ballintrae.	ENGLAND, S.	
Fraserburgh.		Guernsey.	ENGLAND, N.E.
Peterhead.	IRISH SEA.	St. Helier's	Boston.
Aberdeen.	Belfast.	(Jersey).	Cleethorpes.
	Donaghadee.	Gorey (Jersey).	Grimsby.
	Howth.	Weymouth.	Goole.
	Kingstown.	Poole.	Hull.
SCOTLAND, E.	Ramsey (I. of M.).	Cowes.	Bridlington Quay.
Stonehaven.	Douglas "	Ryde.	Filey.
Montrose.	Castletown "	St. Catherine's	Whitby.
Broughty Ferry.	Silloth.	Point.	Redcar.
Dundee.	Maryport.	Portsmouth.	Middlesborough.
St. Andrews.	Workington.	Southampton.	West Hartlepool.
Anstruther.	Whitehaven.	Littlehampton.	Sunderland.
Pittenweem.	Barrow.	Brighton.	South Shields.
Burntisland.	Morecambe.	Newhaven.	Tynemouth.
Grangemouth.	Fleetwood.		Berwick - on -
Bo'ness.	Blackpool.		Tweed.
Granton.	Lytham.		
Newhaven.	Preston.	ENGLAND, S.E.	
Leith.	Southport.	Hastings.	
Fisherrow.	Liverpool.	Rye.	
Dunbar.	Runcorn.	Sandgate.	
Cockburnspath.	Connah's Quay.	Folkestone.	
St. Abb's Head.	Penmaenmawr.	Dover.	
Eyemouth.	Port Penrhyn.	Ramsgate.	
	Port Dinorwic.	Margate.	
	Carnarvon.	Faversham.	
	Holyhead.	Sheerness.	
		Chatham.	
	ST. GEORGE'S		
	CHANNEL.		
	Aberystwith.		
	Milford.		

[continued.]

NORTH.	WEST.	SOUTH.	EAST.
SCOTLAND, N.W. Stornoway. Port of Ness (Island of Lewis). SCOTLAND, W. Glasgow. Greenock. Rothesay. Campbelton. Girvan. Ballantrae.	BRISTOL CHANNEL. Pembrey. Llanelly. Swansea. Briton Ferry. Porthcawl. Penarth. Cardiff. Do. Barry Dock. Newport. Weston-super- Mare. Burnham. Bridgewater. Ilfracombe. Barnstaple. Appledore. Boscastle. Port Isaac. Newquay. Hayle. St. Ives.		

APPENDIX XI.

FISHERY BAROMETERS.

LIST of PLACES supplied with FISHERY BAROMETERS.

Shetland Isles.—Balta Sound, Uya Sound, Nesting, Lerwick, Sandsair, Scalloway, Symbister.

Orkney Isles.—Westray, Papa, Burra, Kirkwall.

Scotland, east coast.—Duncansbay, Freswick, Auchengill, Keiss, Staxigoe, Wick, Lybster, Dunbeath, Portmahomack, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardentown, Roseheart, Pitullie, Fraserburgh, Inverallochy, Pointlaw, Findon, Portlethen, Skateraw, Stonehaven, Arbroath, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

England, east coast.—Berwick, North Shields, South Shields, Sunderland, West Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn (2), Wells, Gorleston, Harwich, Brightlingsea, West Mersea, Woodbridge Haven, Margate, Deal, Kingsdown, Dover.

England, south coast.—Bognor, Ryde, Bembridge, Brixton, Atherfield, Ventnor (2), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh Salterton, Exmouth, Cawsand, Mevagissey, Gorranshaven, Devoran, Portscath, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn (2), Mousehole.

England, south-west coast.—St. Ives, Hayle, Port Isaac, Boscastle, Burnham, Highbridge, Weston-super-Mare.

Wales.—Briton Ferry, Swansea, Angle, Milford, Nevin, Carnarvon.

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

Isle of Man.—Douglas, Port St. Mary, Peel (2).

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

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

Ireland, south coast.—Dunmore East, Dungarvan, Crosshaven, Kinsale, Union Hall, Castletownsend, Baltimore, Schull (2), Crookhaven.

Ireland, west coast.—Valencia, Dingle, Tralee, Tarbert, Kileredane, Kilonan, Spiddal, Elly Bay, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Portnoo, Burton Port, Kincaslugh, Bunbeg.

Ireland, north coast.—Dunfanaghy, Rathmullen, Buncrana, Moville, Greencastle, Portstewart, Portrush, Ballycastle (Co. Antrim).

Scotland, west coast.—Tarbert (Loch Fyne), Campbeltown, Carradale, Portree, Armadale (Isle of Skye), Plockton, East Mey, Stroma.

Hebrides.—Stornoway, Portnaguiran, Obb, Valtos, Carlaway, Ness.

SUMMARY of STATIONS supplied with INSTRUMENTS.

England and Wales -	-	-	-	-	67
Scotland and Isle of Man	-	-	-	-	66
Ireland	-	-	-	-	52
					<hr/>
					185
					<hr/>

APPENDIX XII.

LIST of STATIONS from which CONTINUOUS RECORDS of BRIGHT
SUNSHINE have been received

Station.	Observer.
Aberdeen Observatory - - -	Prof. C. Niven, M.A., F.R.S.
Armagh - - -	J. L. E. Dreyer, Ph.D., F.R.A.S.
Blackpool - - -	J. Wolstenholme.
Cambridge - - -	H. Todd.
Churchstoke - - -	P. Wright, F.C.S., F.R. Met. Soc.
Cirencester - - -	Prof. Ohm, B.A., F.R. Met. Soc.
Cronkbourne, Isle of Man - -	A. W. Moore, M.A., J.P.
Cullompton - - -	Thos. Turner, J.P., F.R. Met. Soc.
Deerness (Orkney) - - -	M. Spence.
Dublin, Mountjoy Observatory -	Col. Kirkwood, R.E.
Durham - - -	H. J. Carpenter, F.R.A.S.
Eastbourne - - -	R. Sheward, F.R. Met. Soc.
Edinburgh - - -	R. C. Mossman, F.R. Met. Soc.
Falmouth Observatory - - -	E. Kitto, F.R. Met. Soc.; for the R. Cornwall Polytechnic Soc.
Fort Augustus - - -	Rev. A. Weld-Blundell, O.S.B.
Fort William - - -	R. T. Omond, F.R.S.E.; for the Directors Ben Nevis Observatory.
Geldeston, Beccles - - -	E. T. Dowson, F.R. Met. Soc.
Glasgow - - -	Prof. R. Grant, M.A., LL.D., F.R.S.
Harpenden - - -	J. H. Gilbert, Ph.D., F.R.S.
Hastings - - -	H. Colborne, M.R.C.S.
Hillington - - -	Rev. H. E. B. Ffolkes, M.A., F.R. Met. Soc.
Jersey (St. Helier's) - - -	Capt. Richard, Harbour Master.
Kew Observatory - - -	G. M. Whipple, B.Sc., F.R.A.S.; for the Kew Committee.
Leicester (Thurcaston) - - -	Rev. T. A. Preston, M.A., F.R. Met. Soc.
Llandudno - - -	J. Nicol, M.D., J.P., F.R. Met. Soc.
London, Bunnhill Row - - -	Messrs. de la Rue.
„ Westminster - - -	The Staff, Meteorological Office.
Marchmont - - -	P. Loney; for Sir Hugh P. Campbell, Bt.
Margate - - -	J. Stokes, F.R. Met. Soc.
Markree Castle - - -	A. Marth, F.R.A.S.; for Col. E. H. Cooper, F.R.A.S.
Newquay - - -	J. Pearce.
Newton Reigny (Penrith) - - -	T. G. Benn, F.R. Met. Soc.
Oswaldkirk, Yorkshire - - -	R. Thompson.
Oxford - - -	E. J. Stone, M.A., F.R.S.
Parsonstown - - -	O. Boeddicker, Ph.D.; for the Earl of Rosse, K.P., F.R.S.
Plymouth - - -	H. N. Dickson, F.R. Met. Soc.
St. Ann's Head - - -	S. Blake, Principal Lightkeeper.
Southampton - - -	Sir C. Wilson, Col. R.E., K.C.B., F.R.S.
Stonyhurst - - -	Rev. W. Sidgreaves, S.J.
Stornoway - - -	John Forbes.
Sutton Coldfield - - -	C. F. Marston, C.E.
Valencia - - -	J. E. Cullum, F.R. Met. Soc.
Worksop - - -	H. Mellish, F.R. Met. Soc.
York - - -	J. E. Clarke, B.A., B.Sc.
Georgetown, British Guiana - -	G. S. Jenman.

In addition, the number of hours sunshine recorded each day is reported from the following Stations:—

Arley Cottage (Co. Cavan) - -	Major Somerset H. Maxwell, F.R.A.S.
Braemar - - -	James Aitken, J.P.
Brighton - - -	A. Newsholme, M.D., F.R. Met. Soc.
Guernsey - - -	F. E. Carey, M.D., F.R. Met. Soc.
Tenby - - -	J. E. Gower.
Torquay - - -	Alfred Chardler, F.R., Met. Soc.
Westbourne - - -	Rev. L. B. Birkett.

APPENDIX XIII.

METHODS FOLLOWED IN DEALING WITH METEOROLOGICAL RETURNS FROM LAND STATIONS IN THE BRITISH ISLES.

These stations are of five classes, as stated on page 15.

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

Hourly measurements of the curves obtained from the self-recording instruments at the 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 bulb and wet-bulb thermograms, of the anemograms, and of the 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 revised regulations which have been adopted to secure this end will be found in the Report of the Office for 1890. 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 form of scale, the two sets of measurements 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 40, and in doubtful cases to 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 periodically. The curves and tabulations are eventually bound and stored in the Office. Examination of returns.

Results of examination and report to Council.

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. General supervision of observatory work.

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

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. Interpolations.

The records having been made as complete as possible, are then used for the calculation of daily and hourly mean values, for periods of five days, calendar months, and for the year; which, together with other data obtained from the same source, are published under the title of "Hourly Means of the Readings obtained from the Self-recording Instruments at the Four Observatories under the Meteorological

“ Council.” The volume for 1888 has been issued during the year, and considerable progress has been made with the calculations for the year 1889.

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

The anemograms received from the stations enumerated on page 72 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 high importance, the tabulations are also regularly used in the checking of the Storm Warnings issued by the Office.

III.—*Land Stations of the Second Order.*

Origin and progress of system.

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 Royal Meteorological Society, copies of the returns from which were sent to the Office under a special arrangement with the Society.

At the end of March 1892 the total number of stations was 103, including 17 belonging to the Royal Meteorological Society and 19 belonging to the Scottish Meteorological Society.

It must, however, be observed that while this number is exclusive of the self-recording observatories and of the anemographic stations, it includes several others from which only very scanty information is received.

The stations are distributed as follows: 45 in England, 4 in Wales, 28 in Scotland, and 26 in Ireland.

The methods followed with regard to the examination and publishing of these returns have been fully detailed in previous reports, and need not now be repeated. The changes introduced into the volume for 1886 have been continued in those for 1887 and 1888. These refer to the barometer readings, which are now given at station-level instead of being reduced to the mean sea-level; and to the humidity, where the depression of wet-bulb is shown, the international forms A and B being modified accordingly.

The volume for 1888 contains returns from 64 stations.

Arrangements have been made under which it is hoped that the arrears of this publication will be rapidly reduced.

Reports from 11 of the Irish stations are regularly supplied to the Registrar-General for Ireland for his Weekly and Quarterly Returns.

New stations.

When an 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 improve and complete the returns.

There are still many parts of the British Islands very poorly represented by the existing stations, and any information for these districts would be valuable.

The daily records of sunshine which are now received from 44 Stations in the British Islands are examined generally to guard against accidental changes in the adjustment of the instruments. Notes explaining any omission or accidental defect are added to the cards if required, and after their receipt has been acknowledged, they are duly stamped and dated and then stored in the Office. Sunshine records.

A tabulation of these curves is published as part of the Weekly Weather Report, mentioned in Appendix VIII., and for those stations which are also Stations of the Second Order the monthly totals of bright sunshine in hours, together with the per-centages of its possible duration, are published as Part IV. of "Returns from Stations of the Second Order." A table showing the daily amount of sunshine at Bunhill Row, one of the London stations, is also prepared quarterly for the Royal Meteorological Society. Weekly totals.

INSPECTION.

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

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 VII. to the Report for the year 1888-9. A paragraph in that Appendix (p. 60) 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 XIV.

LIST OF DOCUMENTS RELATING TO THE LAND METEOROLOGY OF THE BRITISH ISLANDS, RECEIVED DURING THE YEAR ENDING MARCH 31ST, 1892.

Stations.	Observers.	Nature of Information received.	Notes.
CLASS I. †Valencia	J. E. Cullum, F.R. Met. Soc.	Continuous records of pressure, temperature, wind, sunshine, and rain, with eye observations of the clouds and notes on the weather.	Except wind.
†Aberdeen	Prof. C. Niven, M.A., F.R.S.		
†Falmouth	E. Kitto, F.R. Met. Soc.		
†Kew	G. M. Whipple, B.Sc., F.R.A.S., F.R. Met. Soc.		
†Fort William	R. T. Omond, F.R.S.E.		
†Glasgow	Prof. R. Grant, M.A., LL.D., F.R.S.	Continuous records of pressure, temperature, wind, sunshine, and rain.	
†Stonyhurst	Rev. W. Sidgreaves, S.J.		
CLASS II. †Armagh	J. L. E. Dreyer, Ph.D., F.R.A.S.	Continuous record of wind, rainfall, and sunshine.	
Alnwick Castle	Lt.-Col. F. Holland, for the Duke of Northumberland, K.G.	Continuous record of wind (direction and velocity).	
†Dublin (Phoenix Park)	Col. Kirkwood, R.E.	"	
†Fleetwood	M. S. Gaultier, C.E.	"	
†Holyhead	Hugh Williams, C.E.	"	
†North Shields	Capt. W. Harrison	"	
†Scilly	A. Hicks	"	
Stenness (Orkney)	M. Spence	"	
Deerness (Orkney)	M. Spence	"	
†Yarmouth	G. T. Watson	"	
†Kilkenry Castle	The Marquis of Ormonde, K.P.	"	
London	The Athenæum Club	Continuous record of pressure.	
Plymouth	H. N. Dickson	"	
Swansea	W. H. J. Webber	"	
†Waterford	The Harbour Authorities	"	
			Till April 11th. From April 13th.
			From September 1891. From November 1891.

LIST OF DOCUMENTS—continued.

Stations.	Observers.	Nature of Information received.	Notes.
CLASS III. †Armagh	J. L. E. Dreyer, Ph.D., F.R.A.S.	-	-
†Aysgarth	Rev. Fenwick W. Stow, M.A., F.R. Met. Soc.	-	-
††Babbacombe	E. E. Glyde, F.R. Met. Soc.	-	-
††Braemar	James Aitken, J.P.	-	-
†Brookborough	W. Ferguson, for Sir Victor Brooke, Bt., F.L.S.	-	-
††Carmarthen	G. J. Hearder, M.D.	-	-
†Chilworth	Chas. S. Bell	-	-
†Clober (Mingavie)	A. M. Bertram	-	-
†Cronkbourne, I. of Man	A. W. Moore, M.A., J.P.	-	-
†Deerness (Orkney)	M. Spence	-	-
†Douglas, Isle of Man	Thos. Keig	-	-
†Dublin (City)	J. W. Moore, M.D., F.R. Met. Soc.	-	-
†Dublin (Phoenix Park)	Corporal Stone for Col. Kirkwood, R.E.	-	-
†Dublin (Glasnevin)	F. W. Moore, M.R.I.A.	-	-
†Dundee	W. Ross McKelvie	-	-
†Dunrobin Castle	D. Melville, for the Duke of Sutherland, K.G.	-	-
†Durham	H. J. Carpenter, F.R.A.S.	-	-
†Eastbourne	R. Sheward, F.R. Met. Soc.	-	-
†Edgeworthstown	J. M. Wilson, M.A., J.P.	-	-
†Edinburgh	R. C. Mossman, F.R. Met. Soc.	-	-
†Epsom (Royal Med. College).	J. H. Murray and C. H. Wilson	-	-
Geldeston (Beccles)	E. T. Dowson, F.R. Met. Soc.	-	-
†Glasgow	Prof. R. Grant, M.A., LL.D., F.R.S.	-	-
†Hillington, Norfolk	Rev. H. E. B. Ffolkes, M.A., F.R. Met. Soc.	-	-
†Ladylaw, Hawick	W. R. Wilson	-	-
†Langton (Dorset)	H. Stilwell, J.P.	-	-
†Laudale (Argyleshire)	A. Fletcher, for T. H. G. Newton, M.A., J.P.	-	-
†Liverpool	J. Hartnup, <i>The late</i> , F.R.A.S., F.R. Met. Soc.	-	-
†Londonderry	J. Conroy, F.R. Met. Soc.	-	-
		Regular observations at 9 a.m. and 9 p.m. of pressure, temperature (dry-bulb and wet-bulb), wind, cloud and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.	From May 1891.
			Late Stenness.

LIST OF DOCUMENTS—continued.

Stations.	Observers.	Nature of Information received.	Notes.
†Margate -	J. Stokes, F.R. Met. Soc. -	-	-
†Markree Castle, Sligo -	A. Marth, F.R.A.S., for Col. Cooper, F.R.A.S. -	-	-
†Mount Nugent (Arley Cottage). -	Major Somerset H. Maxwell, F.R.A.S. -	-	-
†Newton Reigny (Penrith). -	T. G. Benn, F.R. Met. Soc. -	-	-
†Parkstone -	R. H. Barnes, B.A., F.L.S., F.R. Met. Soc. -	-	-
†Parsonstown -	W. Haines, for the Earl of Rosse, K.P., F.R.S. -	-	-
†Plymouth -	H. N. Dickson -	-	-
†Reading -	H. W. Jones -	-	-
†Prestwich (Manchester) -	T. R. H. Clunn, M.D., F.R. Met. Soc. -	-	-
†St. David's, Pembroke -	W. P. Probert, LL.D., F.G.S., F.R. Met. Soc. -	-	-
†Scarborough -	W. Robinson -	-	-
†Seabam -	G. H. Aird -	-	-
†Southampton -	J. T. Cook, for Dir. Gen. of Ordnance Survey -	-	-
†Stokesay -	Miss M. A. Digges La Touche -	-	-
†Stonyhurst -	Rev. W. Sidgreaves, S.J. -	-	-
†Tealby (Lincolnshire) -	Rev. S. Lewin -	-	-
†Uppingham -	Rev. G. H. Mullins, M.A., F.R. Met. Soc. -	-	-
†Wolfelee (Roxburghshire). -	M. W. Cockburn, for Sir W. Elliott, K.S.I. -	-	-
†York -	J. Wright, for Yorkshire Phil. Soc. -	-	-
CLASS IIIA.			
††Bennington, Herts -	Rev. J. Dunne Parker, LL.D., F.R. Met. Soc. -	-	-
††Berkhamsted -	E. Mawley, F.R.H.S., F.R. Met. Soc. -	-	-
††Buxton -	E. J. Sykes, M.B., F.R.A.S., F.R. Met. Soc. -	-	-
††Callton Mor -	J. Russell, for J. Malcolm of Poltalloch, M.P. -	-	-
		Monthly means and summaries on Form B. of observations taken at 9 a.m. and 9 p.m. each day as above.	
		Regular observations at 9 a.m. and 9 p.m. of pressure, temperature (dry-bulb and wet-bulb), wind, cloud and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.	From September 1891. From March 1892.
			From July 1891.

LIST OF DOCUMENTS—continued.

Stations.	Observers.	Nature of Information received.	Notes.
†Cargen (Dumfries) †Cheadle †Cheltenham †Churestoke †Crاملington †Dartmoor †Fort Augustus †Fort William	P. Dudgeon, F.R.S.E., and Alex. Peacock J. C. Philips R. Tyrer, B.A., F.R. Met. Soc. P. Wright, F.C.S., F.R. Met. Soc. W. Bonallo, F.R. Met. Soc. F. W. S. Stone, M.B. Rev. A. Weld Blundell, O.S.B. C. Livingston, for Directors of Ben Nevis Observatory.		
†Glencarron †Glendee (Kirkcudbrightshire). †Gordon Castle †Killarney	D. D. Munro, for Lord McLaren W. Melville, for George Maxwell J. Webster, for the Duke of Richmond, K.G. The Ven. Archdeacon G. R. Wynne, M.A., F.R. Met. Soc.		
†Laing †Ledaathie (Forfarshire). †Lissan (Co. Tyrone) †Llandudno †Marchmont †Ochtertyre †Pinnore †Rosewell †Rothsay (Isle of Bute) †Rousdon †Wakefield	J. Young, for The Duke of Sutherland, K.G. W. Morrison, for Stormonth Darling, Q.C. Sir Nathaniel Staples, Burt. J. Nicol, M.D., F.R. Met. Soc. Peter Loney, for Sir Hugh P. Campbell, Bt. G. Croucher, for Sir Patrick Keith Murray, Bt. Peter Donald, for Capt. Hamilton R. W. D. Cameron, M.D. James Kay C. E. Peek, M.A., F.R.A.S., F.R. Met. Soc. H. Clarke, L.R.C.P., F.S.S., F.R. Met. Soc.	Monthly means and summaries on Form B. of observations taken at 9 a.m. and 9 p.m. each day as above.	

CLASS IV. The Telegraphic Stations, see List on page 38.

List of Documents—continued.

Stations.	Observers.	Nature of Information received.	Notes.
Class V. Ballycastle	Coast Guard	Pressure, temperature, wind, and weather, four times daily.	
Baltimore	J. Halsey	Pressure, temperature, wind and weather, once daily.	
Bolton	W. W. Midgley, F.R. Met. Soc.	Full monthly summary.	
Bray (Co. Wicklow)	Coast Guard	Pressure and temperature four times daily, with wind and weather twice daily.	
Castletownsend	Coast Guard	Pressure and temperature four times daily, and wind twice daily.	
Chatham (School of Military Engineering).	L. M. S. Hall, for Instructor in Surveying	Full return for 9 a.m.	
Cooper's Hill (Eglam)	Prof. H. McLeod, F.R.S.	Full return for 9 a.m. and 3 p.m.	
Crookhaven	Coast Guard	Pressure and temperature four times daily, and wind twice daily.	
Crosshaven	J. W. Bridle	Pressure, temperature, and wind, twice daily.	
Cuckfield	John Howe	Daily rainfall.	
Ennis	J. Hill, M.I.C.E., F.R. Met. Soc.	Daily rainfall.	
Gorleston	R. J. C. Day	Pressure and wind twice daily.	
Harpenden	T. Wilson, F.R. Met. Soc.	Pressure, temperature, and wind, twice daily, with rainfall.	
Haslar Hospital	G. Coppen	Pressure and temperature four times daily.	
Hurdlestown	Capt. W. O. Bentley	Daily rainfall.	
Knightstown (Valencia).	Coast Guard	Pressure, wind, and weather once daily.	
Lowestoft	Secretary, Seamen's Missions	Pressure, temperature, wind, and weather at 9 a.m.	From August 1891.
Manchester	John Tatham, M.A., M.D.	Full set of morning observations	From January 1892.
Milford Haven (Hakin)	D. Hussey	Pressure and temperature once daily.	
North Arran	Coast Guard	Pressure, temperature of air and sea four times daily, with wind and weather at noon.	

LIST OF DOCUMENTS—continued.

Stations.	Observers.	Nature of Information received.	Notes.
Rosehearty -	Coast Guard -	Pressure once daily.	
†Rugby -	W. N. Wilson, M.A., and H. P. Highton, B.A.	Full set of 9 a.m. observations with 9 p.m. temperatures.	
†St. Leonards -	H. Colborne, M.R.C.S.	Full set of 9 a.m. observations.	
Schull -	Coast Guard -	Pressure, temperature, and wind twice daily.	
†Sheffield (Weston Park) -	Elijah Howarth, F.R.A.S.	Full return for 9 a.m. and 6 p.m.	
Spiddal -	Coast Guard -	Pressure and temperature four times daily, with wind and weather at noon.	
†Stamford (Ketton Hall) -	Fred. Coventry -	Pressure, temperature (max., min., min. on grass), rainfall, and wind once daily.	
Stranraer -	P. Doran -	Pressure, wind, and weather once daily.	
†Sudbury -	W. Bayley Ransom -	Pressure, temperature (dry-bulb, max., min.), wind, cloud, and rainfall, once daily, with general remarks.	
Swineshead (Boston) -	J. H. Brown -	Daily rainfall	From January 1892.
Synbister, Shetland -	J. S. Nicolson -	Pressure and temperature twice daily.	
Tarbert, Harris -	Donald Bethune -	Pressure and wind twice daily.	
Tortland Bay -	John Dover, B.A., F.R. Met. Soc.	Full return for 9 a.m.	
†Union Hall (Glandore) -	Coast Guard -	Pressure, temperature, and wind, twice daily.	
Westray (Orkney) -	Capt. J. Hewison -	Pressure, temperature, and wind, twice daily.	

NOTES.—In addition to the above a daily record of observations made at the Royal Observatory, Greenwich, is kindly supplied by the Astronomer Royal. The Stations marked "†" belong to the Royal Meteorological Society; those marked "§" belong to the Scottish Meteorological Society those marked thus † have been inspected during the year.

APPENDIX XV.

ACCESSIONS TO THE LIBRARY DURING THE YEAR ENDING
31ST MARCH 1892.

|| (**Abbe, C.**)—A relation between meteorology and the grasshopper or locust pest. Read before the Nat. Acad. Sc. 8°. (*Amer. Nat.*, 1880, Oct., p. 735.)

—— On the selection of a prime meridian. 4°. [Printed for delivery before the Internat. Conf. on Oct. 13, 1884, but afterwards withdrawn.]

|| ——— The Signal Service bibliography of meteorology. la. 8°. Washington, 1887. (*Bull. Phil. Soc. Washington*, x.)

|| ——— William Babcock Hazen. la. 8°. (*Pop. Sc. Monthly*, xxxi., 1887, May, p. 112.)

|| [———] Sketch of James Pollard Espy. la. 8°. (*Pop. Sc. Monthly*, 1889, April, p. 834.)

|| ——— A plea for terrestrial physics. la. 8°. Salem, 1890. (*Proc. Amer. Assoc. Adv. Sc.*, xxxix., 1890, p. 65.)

|| ——— An account of progress in meteorology. 1879–81, 1882, 1883. 3 vols. la. 8°. Washington, 1883–84. (*Smithsonian Rep.*, 1881, 1882, 1883.)

|| ——— An account of recent progress in dynamic meteorology. la. 8°. Washington, 1890. (*Smithsonian Rep.*, 1888, p. 355.)

|| ——— Notice of localities in St. Helena that have special interest to scientists. la. 4°. (*St. Helena Guardian*, 1890, April 3.)

* **Abercromby, Hon. R.**—Signs in the sky. la. 8°. (*Good Words*, 1890, Aug., p. 518.)

Adelaide Observatory.—Meteorological observations made at the Adelaide Observatory, and other places in South Australia and the northern territory, during the year 1889, under the direction of **C. Todd**. sm. 8°. Adelaide, 1891.

[———] Rainfall in South Australia and the Northern Territory during 1890; with weather characteristics of each month. By **C. Todd**. 8°. Adelaide, 1891.

|| **Aguilar Santillán, R.**—Bibliografía meteorológica Mexicana correspondiente al año de 1890. la. 8°. (*Mem. Soc. Alzate Mexico*, vi.)

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|| **Veeder, M. A.**—The zodiacal light. la. 8°. Rochester, N.Y., 1891. (*Proc. Roch. Acad. Sc.*, i., p. 137.)

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|| **Vincent, J.**—Cirro-stratus et alto-stratus. 4°. (*Mém. cour. et mém. sav.trang., acad. R. sc. &c. Belgique.*, lii., 1891.)

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* **Washington.**—Correspondence respecting the International Marine Conference, held at Washington, 1888–89. sm. f°. London, s.a.

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——— Report of the Secretary of Agriculture. 1889, 1890. 2 vols. la. 8°. Washington, 1889–90.

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——— Charts showing the average monthly cloudiness in the United States. 1a. f°. Dated, Washington, 1891.

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——— Mean temperatures and their corrections in the United States. By **A. McAdie**. 1a. 4°. Washington, 1891.

——— Monthly Weather review. 1891, Jan.—Dec. and Suppl. 4°. Washington, 1891–92.

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——— War Department weather map. 1891, Jan. 1.—Dec. 31. 1a. f°. Sheets.

|| ——— **United States Naval Observatory.**—Magnetic observations at the United States Naval Observatory, 1888 and 1889, by **J. A. Hoogewerff**. 4°. Washington, 1890. (*Washington Obsns.*, 1886, App. 1.)

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|| **Whipple, G. M., and Dines, W. H.**—Report of the wind force Committee on experiments with anemometers conducted at Hersham. Drawn up by G. M. Whipple and W. H. Dines. 1a. 8°. (*Quart. Journ. R. Meteor. Soc.*, xiv., 1888, p. 253.)

Whympers, E.—How to use the aneroid barometer. 8°. London, 1891.

|| **Wigert, T.**—Trombe de Wimmerby le 4 Juillet, 1890. Note communiquée le 12 Nov. 1890. 8°. Stockholm, 1891. (*K. Svenska Vet.-Akad. Handl.*, Bd. xvi.)

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|| ——— **Nadel-Inclinatorium modificirter Construction.** sm. f°. St. Pétersbourg, 1890. (*Mém. Acad. Imp. Sc. St. Pétersb.*, vii^e sér., xxxvii., No. 6.)

|| **Wild, H.**—Über den Einfluss der Aufstellung auf die Angaben der Thermometer zur Bestimmung der Lufttemperatur. sm. 8°. St. Petersburg, 1891. (*Repert. Meteor.*, xiv., No. 9.)

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|| **Wollny, E.**—Untersuchungen über das Verhalten der atmosphärischen Niederschläge zur Pflanze und zum Boden. No. 4. Die Durchfeuchtung des Bodens seitens der atmosphärischen Niederschläge. 8°. (*Forschungen auf dem Geb. Agrik.-phys.*, Heidelberg, xiv., Heft 1, 2.)

|| ——— Untersuchungen über die Permeabilität des Bodens für Wasser. 8°. (*Forschungen auf dem Geb. Agrik.-phys.*, Heidelberg, xiv., Heft 1. u 2.)

* **Wormell, R.**—Plotting, or graphic mathematics. sm. 8°. London, s.a.

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Zi-ka-wei, Observatoire Magnétique et Météorologique.—Bulletin mensuel. Tome xvi., année 1890. sm. 8°. Zi-ka-wei, 1891.

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————— **Schweizerische Meteorologische Central-Anstalt.**—Annalen. 1889. Der "Schweiz. meteor. Beob." xxvi. Jahr. 4°. Zürich, s.a.

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APPENDIX XVI.

ACCOUNT OF RECEIPTS and PAYMENTS for the year ending 31st March 1892.

RECEIPTS.			PAYMENTS.		
£	s.	d.	£	s.	d.
Balance from year 1890-91 -	3,101	1 2	ADMINISTRATION:	£	s. d.
Parliamentary Vote -	15,300	0 0	Payment of Council -	992	10 0
Repayment of expenses charged under—			Secretary -	800	0 0
(1.) Incidental expenses -	12	14 6	Salaries and wages -	793	6 0
(2.) Expenses incidental to International Meteorological Congress -	18	10 0	Rent, fuel, and lighting	702	11 2
(3.) Observatories	10	14 10	Incidental and contingent expenses:—		
	41	19 4	Attendance, cleaning, &c. -	389	11 9
SUPPLY OF INFORMATION:			Furniture and fittings	201	13 11
D.W. Charts and Forecasts -	247	13 11	Expenses incidental to International Meteorological Congress -	33	2 9
6 p.m. Charts -	25	0 0	Pensions -	186	16 4
Information for Press Agencies, &c. -	121	13 11			4,099 11 11
Telegrams -	61	10 2			904 5 2
	455	18 0	SPECIAL RESEARCHES	-	-
SALE OF INSTRUMENTS, &c.:			LAND METEOROLOGY:		
Royal Navy (A) 25 12 3			Observatories and stations -	3,645	11 2
Mercantile Marine account (B) 40 5 4			Salaries:—Discussion and reduction of observations -	1,271	4 0
M.O. account -	46	0 2			4,916 15 2
	111	17 9	WEATHER INFORMATION AND FORECASTS:		
Commissions executed for Colonial and Foreign Institutions, &c. (C) -	199	15 6	Telegraphic reports and storm warnings	2,600	19 1
Commission charged on work done for Colonies, &c. -	18	4 11	Salaries:—Preparation and issue of reports and forecasts -	1,825	12 1
					4,426 11 2
			INSPECTIONS:		
			Salaries and travelling expenses -	-	-
					584 0 11
			OCEAN METEOROLOGY:		
			Salaries:—Discussion and reduction of observations -	1,670	12 0
			Expenses incidental to the supply of instruments:—		
			Proportion for care and issue of instruments -	200	0 0
			Royal Navy -	254	11 5
			Mercantile Marine -	223	13 8
			Distant island and coast stations -	26	12 11
					2,375 10 0
			Commissions executed for Colonial and Foreign Institutions, &c. -	-	-
					218 14 6
			BALANCE:		
			Cash at Bank -	1,613	14 9
			„ at Office -	89	13 1
					1,703 7 10
£ 19,228 16 8					£ 19,228 16 8

In the year 1891-92 the sum of 1,527*l.* 6*s.* 1*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to clerks, and rental of private wires.

APPENDIX XVII.

LIST OF PUBLICATIONS, &c. issued under the Authority
of the Meteorological Council.

OFFICIAL.

- No. 1. Report of the Meteorological Committee for 1867. 1s.
2. Instructions for Meteorological Telegraphy. New Edition, 1891. Prepared for the use of observers exclusively.
3. Fishery Barometer Manual. (New edition, 1887.) 6d.
4. Charts showing the Surface Temperature of the South Atlantic Ocean in each Month of the Year. 2s. 6d.
5. Report of the Meteorological Committee for 1868. 5d.
6. Report of the Meteorological Committee for 1869. 10d.
7. Quarterly Weather Report for 1869.—Parts I. to IV. 5s. each.
8. Barometer Manual. (Out of print. See Nos. 3, 24, 40, 60, and 61.)
9. Quarterly Weather Report for 1870.—Parts I. to IV. 5s. each.
10. Report of the Meteorological Committee for 1870. 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 that Part of the Atlantic lying North of 30° N., for the Eleven Days ending 8th February 1870. With Book of Charts, 5s.
14. Quarterly Weather Report for 1871.—Parts I. to IV. 5s. each.
15. Report of the Meteorological Committee for 1871. 10d.
16. Quarterly Weather Report for 1872.—Parts I. to IV. 5s. each.
17. Report of the Meteorological Committee for 1872. 1s.
18. Contributions to our Knowledge of the Meteorology of the Antarctic Regions. 2s.
19. Quarterly Weather Report for 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. 1873. 1s.
22. Report of the Meteorological Committee for 1873. 4d.
23. Report of the Proceedings of the Conference on Maritime Meteorology held in London, 1874. 2s.

LIST OF PUBLICATIONS, &c.—*continued.*

- No. 24. Instructions in the Use of Meteorological Instruments.
[Reprinted 1892.] 2s. 6d.
25. Quarterly Weather Report for 1874.—Parts I., II., and IV.,
5s. each. Part III., 5s. 9d.
26. Report of the Meteorological Committee for 1874. 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 the Meteorology of Japan. By Staff-Com-
mander Thomas H. Tizard, H.M.S. *Challenger*. 1s.
29. Report of the Meteorological Committee for 1875. 4d.
30. Quarterly Weather Report for 1875.—Parts I.—IV.
5s. each.
31. Report of the Meteorological Committee for 1876–7. 3s. 5d.
32. The Meteorology of the North Atlantic during August 1873,
with 31 Synoptic Charts. With Book of Charts. 15s.
33. Quarterly Weather Report for 1876 (New Series).—Part I.,
6s.; Parts II., III., and IV., 5s. each.
34. Contributions to our Knowledge of the Meteorology of the
Arctic Regions.—Vol. I.: Part I., 2s.; Part II., 10s.;
Part III., 6s.; Part IV., 5s.; Part V., 6s.
35. Report of the Meteorological Council for 1877–8. 1s.
36. Report of the Proceedings of the Second International
Meteorological Congress at Rome, 1879. 1s. 6d.
37. Report on the Meteorology of Kerguelen Island. By Rev.
S. J. Perry, S.J., F.R.S. 3s.
38. Report of the Meteorological Council 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 W. Clement
Ley, M.A. 1s.
41. Report of the Meteorological Council for 1879–80. 1s.
42. Report of the Meteorological Council for 1880–81. 1s. 2d.
43. Meteorological Charts for the Ocean District adjacent to the
Cape of Good Hope, with accompanying Remarks.
Charts, 25s.; 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., by Capt. H.
Toynbee, F.R.A.S. 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.
47. Rainfall Tables of the British Isles for 1866–80. Compiled
by G. J. Symons, F.R.S. 7s. 6d.
48. Report of the Meteorological Council for 1881–2. 1s.
49. Quarterly Weather Report for 1879. (New Series.)
Parts I., II., and III., 6s. each; Part IV., 5s. 6d.
Appendices and Plates. 27s.
50. Quarterly Weather Report for 1880. (New Series.)
Parts I. and II., 6s. each; Part III., 4s.; Part IV., 6s.
Appendices and Plates. 28s.

LIST OF PUBLICATIONS, &c.—continued.

- No. 51.* Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1881. (New Series.) Part I., 10s. 6d. Parts II., III., and IV., 21s. each.
52. Quarterly Weather Report for 1877. (New Series.) Part I., 10s.; Part II., 5s.; Part III., 4s. 6d.; Part IV., 6s. Appendices and Plates. 27s.
53. Meteorological Atlas of the British Isles. 5s. 6d.
54. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1882. Parts I. and II., 20s. each; Part III., 22s. 6d.; Part IV., 26s.
55. Quarterly Weather Report for 1878. (New Series.) Parts I., II., III., and IV., 6s. each. Appendices and Plates. 28s.
56. Sunshine Records of the United Kingdom for 1881. 4s.
57. Meteorological Observations at Stations of the Second Order for the year 1880. 34s. 6d.
58. Report of the Meteorological Council for 1882-3. 10½d.
59. Charts showing the Surface Temperature of the Atlantic, Indian, and Pacific Oceans. 21s.
60. Principles of Forecasting by means of Weather Charts. By the Hon. Ralph Abercromby, F.R.Met.Soc. (Second edition, revised.) 2s.
61. A Barometer Manual for the Use of Seamen. 1s. 3d.
62. Monthly Weather Reports for 1884. Jan., Feb., March, May—Nov., 1s. 6d. each. April (with 2 Appendices), 2s. 6d. Dec., 1s. 9d.
63. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1883. Parts I., II., and III., 21s. each; Part IV., 30s.
64. Report of the Meteorological Council for 1883-4. 1s. 2d.
65. Monthly Weather Reports for 1885. Jan. to Dec., 1s. 6d. each.
66. Meteorological Observations at Stations of the Second Order for the year 1881. 35s.
67. Report of the Meteorological Council for 1884-5. 4s. 4d.
68. Monthly Weather Reports for 1886. Jan. to Dec., 1s. 6d. each.
69. Meteorological Observations at Stations of the Second Order for the year 1882. 35s.
70. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1884. Part I., 12s.; Part II., 10s.; Part III., 10s. 6d.; Part IV., 15s.
71. Synchronous Weather Charts of the North Atlantic and the adjacent Continents. Aug. 1, 1882, to Sept. 3, 1883. Parts I. to IV. (33 sheets each.) 17s. each.
72. Report of the Meteorological Council for 1885-86. 8d.
73. Meteorological Observations at Stations of the Second Order for the year 1883. 30s.
74. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1885. Parts I. and II., 11s. each; Part III., 10s. 6d.; Part IV., 12s.

* For the years 1874-1880 the Hourly Readings were issued in lithographed form. Price 20s. per annum.

LIST OF PUBLICATIONS, &c.—*continued*.

- No. 75. Report of the Meteorological Council for 1886–87. 8*d*.
 76. Charts showing the Mean Barometric Pressure over the Atlantic, Indian, and Pacific Oceans. 10*s*. 6*d*. Supplementary Chart, 6*d*.
 77. Monthly Weather Reports for 1887. January to April, 1*s*. 6*d*. each. May to December, in wrapper, 12*s*.
 78. Meteorological Observations at Stations of the Second Order for the year 1884. 32*s*.
 79. Report of the Meteorological Council for 1887–88. 1*s*.
 80. Daily Weather Charts for the period of six weeks ending June 25, 1885, to illustrate the tracks of two cyclones in the Arabian Sea. 10*s*.
 81. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1886. Parts I., II., and III., 10*s*. 6*d*. each. Part IV., 12*s*. 6*d*.
 82. Meteorological Observations at Stations of the Second Order for the year 1885. 31*s*.
 83. Meteorological Observations at the Foreign and Colonial Stations of the Royal Engineers and the Army Medical Department. 1852–1886. 23*s*.
 84. Report of the Meteorological Council for 1888–89. 5½*d*.
 *85. Weekly Weather Report for the year 1888. Vol. V. Second Series. 4*d*. per week. With Appendices and Monthly Supplements, priced separately.
 86. Weekly Weather Report for the year 1889. Vol. VI. Second Series. 6*d*. per week. With Appendices and Monthly Supplements, priced separately.
 87. Weekly Weather Report for the year 1890. Vol. VII. Third Series. 6*d*. per week. With Appendices and Monthly Supplements, priced separately.
 88. Meteorological Observations at Stations of the Second Order for the year 1886. 25*s*.
 89. Meteorological Observations made at Sanchez, Samaná Bay, St. Domingo. 1886–88. By the late W. Reid, M.D. 8*s*. 6*d*.
 90. Cyclone Tracks in the South Indian Ocean. From information compiled by Dr. Meldrum, C.M.G., F.R.S. 7*s*.
 91. Report of the Meteorological Council for 1889–90. 7½*d*.
 92. Meteorological Charts of the portion of the Indian Ocean adjacent to Cape Guardafui and Ras Hafún. 6*s*.
 93. Harmonic Analysis of Hourly Observations of Air Temperature and of Pressure at British Observatories. 12*s*.
 94. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1887. 16*s*.
 95. Meteorological Observations at Stations of the Second Order for the year 1887. 24*s*.
 96. Weekly Weather Report for the year 1891. Vol. VIII., Third Series. 6*d*. per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 30*s*.

* The publication of the Weekly Weather Report began in February 1878. Annual subscription, 1878–1883, 12*s*. 6*d*.; 1884–1887, 21*s*. 2*d*.

LIST OF PUBLICATIONS, &c.—continued.

- No. 97. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1888. 20s.
98. Ten Years Sunshine in the British Isles, 1881–90. 2s.
99. Report of the Meteorological Council for 1890–91. 5½d.
100. Weekly Weather Report for the year 1892. Vol. IX., Third Series. 6d. per week. With Appendices and Monthly Supplements, priced separately. Annual Subscription, including Supplements and Appendices, Post paid, 30s.
101. Meteorological Observations at Stations of the Second Order for the year 1888. (In the Press.)
102. Report of the International Meteorological Conference at Munich in 1891. (In the Press.)
103. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1889. 15s.
104. Report of the Meteorological Council for 1891–92.

NON-OFFICIAL.

- No. 1. Report of an Inquiry into the Connexion between Strong Winds and Barometrical Differences.—By Robert H. Scott, Director of the Office. 6d.
2. Report to the Committee of the Meteorological Office on the Meteorology of the North Atlantic.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. 1s.
3. Report to the Committee of the Meteorological Office on the Use of Isobaric Curves.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. 1s.
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. 6d.
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. 6d.
6. Report of the Proceedings of the Meteorological Conference at Leipzig. 1872. 1s.
7. Notes on the Form of Cyclones in the Southern Indian Ocean.—By C. Meldrum, M.A., F.R.S. [Out of Print.]
8. Report on Weather Telegraphy and Storm Warnings. Presented to the Meteorological Congress at Vienna. 1873. 6d.
9. Report of the Permanent Committee of the First International Meteorological Congress at Vienna for 1874. 1s. 6d.

LIST OF PUBLICATIONS, &c.—continued.

- No. 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. 1s. 6d.
11. Report of the Permanent Committee of the First International Congress at Vienna for 1876. With Supplement. 2s.
12. Reports to the Permanent Committee of the First International Meteorological Congress at Vienna on Atmospheric Electricity, Maritime Meteorology, and Weather Telegraphy, 1878. 2s.
13. Report of the Permanent Committee of the First International Congress at Vienna for 1878. 6d.
14. Report of the International Meteorological Committee. Meeting at Berne, 1880. 1s.
15. Report of the Second Meeting of the International Meteorological Committee, held at Copenhagen, August 1882. 2s. 6d.
16. Report of the Third Meeting of the International Meteorological Committee, held at Paris, September 1885. 1s.
17. Report of the Fourth Meeting of the International Meteorological Committee, held at Zürich, September 1888. 4d.
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