

R E P O R T
OF THE
METEOROLOGICAL COUNCIL,

For the Year ending 31st of March, 1902,

TO THE
PRESIDENT AND COUNCIL

OF THE
ROYAL SOCIETY.

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



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(REPORT OF METEOROLOGICAL COUNCIL 1901-1902)

MAP SHOWING THE APPROXIMATE POSITIONS OF THE STATIONS FROM WHICH OBSERVATIONS HAVE BEEN RECEIVED.



For details of Information Received - See Appendix II.

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THE METEOROLOGICAL COUNCIL,

1901-1902.

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R E P O R T
OF THE
M E T E O R O L O G I C A L C O U N C I L,

For the Year ending 31st of March, 1902,

TO THE
PRESIDENT AND COUNCIL
OF THE
ROYAL SOCIETY.

No change has taken place in the Council during the year, the executive control of the business of the Council being vested in the body of directors appointed by the Royal Society. Constitution
of the
Council.

The arrangements indicated in last year's Report for the supply of instruments for the use of the National Antarctic Expedition were duly carried out. A brief summary of the list of instruments supplied is given on p. 14. A form of register for the meteorological observations was prepared and issued to the expedition. Antarctic
Expedition.

The Council received a request, in the first instance from representatives of the German and English Expeditions, and subsequently in more formal manner from the Secretary of State for Foreign Affairs at the instance of the German Ambassador, to assist in the collection of meteorological observations at noon G.M.T., during the period of the expeditions to be made aboard ships going south of latitude 30° South. In compliance with these requests, books for the registration of the observations were prepared in a form agreed upon by the German and English Committees, and issued to the Admiralty for the use of the Navy, and to a number of Shipping Companies and Merchant Ships, with an invitation to assist in the matter. International
Co-operation.

In the Report for last year the Council noted that the question of initiating an inquiry into the occurrence and distribution of fogs in London was under consideration. Further communication took place with the London County Council, and on the 20th October, 1901, the Council were informed that the General Purposes Committee of the County Council was prepared to recommend a grant of £250 for the purpose of the Inquiry, upon London Fog
Inquiry.

certain terms which are set forth at length in the correspondence reprinted in Appendix I. The report of the General Purposes Committee was approved at the meeting held on the 22nd October, 1901, on the understanding that the Council would be prepared to initiate the inquiry in the winter. Accordingly, on the 6th November, the Council appointed Capt. Alfred Carpenter, R.N., D.S.O., to conduct the inquiry in accordance with a programme drawn up in consultation with the Secretary. Observations of the occurrence and duration of fog were commenced forthwith at many of the stations of the London Fire Brigade. These were afterwards supplemented by observations at some of the stations of the Metropolitan Police, at Battersea Park (London County Council), Regent's Park (Royal Botanic Society), and by some private individuals. Permission was also obtained from the Lord Great Chamberlain and the Office of Works, for mounting apparatus for the continuous record of temperature on the Victoria Tower of the Palace of Westminster, from the Dean of St. Paul's for a similar arrangement on the Golden Gallery of the Cathedral, and from the Rector of St. Margaret's, Westminster, and the Vicar of Christ Church, Westminster, for a thermometer screen to be placed in the latter churchyard. Mr. D. Mair of the Civil Service Commission, took charge of a self-recording thermometer for Banstead, and the Admiralty were good enough to arrange for observations of fog to be made at the Coast Guard Stations in the lower reaches of the Thames. Observations of the temperature of the river were also initiated at the river stations of the London Fire Brigade. The arrangements for observation were not completed until the middle of December, so that the fogs in the earlier part of the winter were not fully discussed, and those that occurred in October and the early part of November are not represented at all in the special observations. The observations were discontinued for the summer on the 5th April, except on Victoria Tower and St. Paul's Cathedral where the instruments are still maintained. The report prepared by Capt. Carpenter, embodying the results of the observations, has already been received and will be issued in due course. The Council desire to acknowledge the assistance received from many public bodies and private persons in carrying out the observations for this inquiry.

Royal
Meteorological Society
Kite
Experiments.

At the end of October the Council received an application from the Royal Meteorological Society to assist in providing means for carrying out the experiments on the exploration of the upper air by means of kites. For the furtherance of this object, a sum of money had been granted to a Committee of the British Association, and the grant had been supplemented by the Royal Meteorological Society which had initiated the enterprise and appointed a Committee to carry it out. The Council regard the exploration of the upper air by means of kites or balloons as a very important department of meteorological research, although, as they have already pointed out (Report 1900, p. 22), "there are special difficulties attending the prosecution of such experiments in England." In order to facilitate the experiments the Council have undertaken to provide the instruments that are necessary for the establishment of a base station at the site chosen for the experiment.

Towards the close of the year the Council were informed by the Registrar-General, that on account of his advanced age, Mr. J. Glaisher, F.R.S., was relinquishing his meteorological work in connexion with the periodical reports. For very many years Mr. Glaisher has supplemented the official records and tables supplied by the Royal Observatory, Greenwich, for the weekly, quarterly, and annual reports and summaries of the Registrar-General, by returns based upon the contributions of volunteer observers in different parts of the country. The Registrar-General requested the Council to furnish periodical reports and statistics of the weather, to replace those with which Mr. Glaisher's name had been so long and so notably connected. The Council recognised that the arrangements of the Office enabled them to continue the work without any special re-organisation, and took steps to continue the weekly reports from April 1st, 1902. They also initiated arrangements for providing the quarterly and annual reports in due course. The Council have for some years past performed a similar service for the Registrar-General for Ireland; the Scottish Registrar-General's reports are supplied by the Scottish Meteorological Society. The change in the arrangements of the Registrar-General for England, seemed to afford a suitable occasion for bringing the returns published by the three Registrars-General into similar form, particularly as regards the monthly summary, and steps have been taken to ascertain the views of those interested in the matter upon this suggestion. It is hoped that an effective understanding may be arrived at before the end of the June Quarter, 1902.

Meteorological Reports for the Registrar-General.

Application has been received from the Mersey Docks and Harbour Board for a revision of the table of Velocity Equivalents of the Beaufort Wind Scale, which was adopted by the Board of Trade on the recommendation of the Meteorological Committee in 1872. Very much important work has been done in this country and abroad, tending to the more accurate instrumental measurement of wind velocities and their correlation with the figures of the Beaufort Scale, in recent years. The subject is, however, a difficult one, partly because of the substitution of steam for sailing ships for which the Beaufort Scale was arranged, and partly because the instrumental readings are very much affected by the exposure, depending upon the site chosen; but materials for the formation of a more accurate table of equivalents undoubtedly exist. The staff of the Office is already fully occupied with work, and the Council have in consequence been unable to take up effectively the question of wind measures.

Wind Measurements.

In the course of the year the Council have received from the Foreign Office a considerable number of meteorological observations, as well as observations of the lake levels, from stations in Uganda and East Africa. A list of the stations at which the observations have been made will be found in Appendix II., p. 67. The observations are at present filed for reference. The Council have under consideration the desirability of publishing annually a summary of the meteorological observations from these and other British Colonies and Foreign stations. They have, however, been unable at present to provide for the reduction and tabulation of

Observation in Uganda.

the observations. They recognise the importance of making some early provision, especially for the East African Colonies, as the Committee of the British Association which has tabulated the reports for publication in the annual volume of the Association for ten years past, has now ceased to exist.

Telegraphic
Reports from
Malta.

The Council were informed by M. Mascart, that the telegraphic reports from Malta to the Paris Meteorological Office, from which the *Bulletin International* is issued, had been suspended, owing to a re-arrangement of the service of weather telegrams by the Italian Government. The Council thereupon applied to the Colonial Office, and are glad to report that the daily telegraphic service from Malta to Paris has been re-established. They desire to acknowledge their obligation to Mr. Chamberlain, and to the Government of Malta, for their assistance in this matter.

Meeting of
the Inter-
national
Committee.

At the Congress of Meteorologists at Paris in 1900, it was left an open question whether the International Meteorological Committee, appointed by the Paris Conference of 1896 (of which the Secretary of the Council is a member), should meet in 1902 or 1903, and where the place of meeting should be. Correspondence has passed upon the subject, and a strong preference for a meeting to take place in England has been expressed. It has been finally arranged that a meeting shall be held at Southport during the session of the British Association in that town, in 1903.

Paris
Exhibition,
1900.

A diploma of Grand Prix and a bronze medal have been received from the authorities of the Paris Exhibition of 1900, through the British Commission, in recognition of the Exhibit of Charts and Publications prepared by the Office.

Magnetic
observations
at Valencia.

The magnetic observations at Valencia which were initiated at the request of the late Professor Fitzgerald, have been continued at the request of a Committee consisting of the Earl of Rosse, Professor Joly, and Mr. Maxwell H. Close.

Organization
of the Office.

The administration of the Office remains in the charge of the Secretary, with the assistance of Commander Campbell Hepworth, C.B., R.N.R., the Marine Superintendent, and a staff of 39 clerks and attendants.

No important change has taken place in the staff during the year; some attention has, however, been devoted to a revision of the internal arrangements of the Office. In the first place, it seemed that the progressive improvement in telegraphic communication both in this country and on the continent, justified an attempt to economise the interval between the hour of observation at the reporting stations, and the receipt of the reports in the Meteorological Offices in this country and abroad. Moreover, it was evidently desirable to utilise as far as possible for the service of Weather Telegraphy, the early hour adopted for taking the daily observations transmitted to the Office by France, Germany, Denmark and Scandinavia, where the morning observations are made at 7 o'clock. These considerations led to opening the Office at 8 a.m. instead of 8.30 as heretofore, and to other changes incidental thereto. At the same time, with the co-operation

of the International Committee, attention has been paid to the time occupied in the transmission of the messages, and this has been in consequence somewhat abbreviated. As indicated in the Report for last year, the Council contemplated changing the hour of observation in the British Isles, from 8 a.m. to 7 a.m., in order to render the service of the Daily Weather Report, and of the Storm Warnings, more efficient, but the telegraphic charges incidental to such a change, on account of the fees payable for the special opening of Post Offices at the observing stations, are prohibitive.

In the second place, the Council have recognised that some revision of the organization of the Office was necessary, in order to enable the public to take adequate advantage of the meteorological information from all parts of the world, which is preserved in the Office. With this object, a statistical department has been organised in the largest and most accessible room in the building which has been altered for the purpose, where accommodation is provided for persons who desire to consult the records preserved in the Office, or to inspect the instruments used for meteorological observations. The department is dependent mainly on the staff of the land branch.

These changes have necessitated some minor changes in the other departments of the Office.

The memorandum respecting the supply of information to the public, has been revised and brought up to date. It is reprinted as Appendix II. of this report. Separate copies can be obtained on application to the Secretary.

Supply of
Information
to the Public

The Council have to acknowledge as heretofore the assistance which has been afforded to them by volunteer observers at sea and on land. On this occasion they desire specially to acknowledge their indebtedness to the captains and officers of ships traversing the North Atlantic, for reports of ice and observations of sea temperatures forwarded to the Office for the Pilot Charts. They desire, also, to express their thanks for the co-operation of the various Steamship Companies and Mercantile Marine Associations in this matter. In this connexion the following may be named: White Star; Cunard; American; Dominion; The Atlantic Transport Co.; Gulf Transport; Johnston; Allan; Elder Dempster; Norfolk and North American; Messrs. Scrutton, Sons & Co.; Messrs. F. Leyland & Co.; Messrs. T. & J. Harrison & Co.; Liverpool Steamship Owners' Association; Liverpool Shipowners' Association; Mercantile Marine Service Association; Merchant Service Guild; and London Shipmasters' Society. Mr. T. G. Benn, of Newton Reigny, has continued to afford much assistance in connexion with the Daily Weather Reports and the testing of forecasts, and to the names mentioned last year in recognition of valuable information received by telegraph or by post for the Daily Reports from Bath, Clacton-on-Sea, Birmingham, Hastings, Eastbourne, Brighton, Worthing, Llandudno, Rhyl, Southport, Manchester, Darwen, must now be added those of Mr. G. Paul and Dr. J. E. O'Connor, who send a daily telegram on behalf of the local authorities of Harrogate and Lowestoft respectively.

Acknow-
ledgments.

Summary
of the work
of the Office.

The work of the Office may be briefly summarised under the following heads :—

I. OCEAN METEOROLOGY.—The collection, tabulation and discussion of meteorological data for all parts of the ocean traversed by British ships. The preparation and issue of charts or other publications exhibiting the results obtained from the discussion of the observations.

The issue of meteorological instruments for use on board the ships of the Royal Navy, and for observers belonging to the Merchant Service. With this is associated the supply of instruments to the Telegraphic Reporting Stations, &c.

II. WEATHER TELEGRAPHY.—The collection of observations transmitted by telegraph, three times in each day, from selected stations in the British Isles (chiefly on the coasts), and on the Continent of Europe, the preparation of a Daily Report embodying the observations, and of forecasts of weather based upon them, and the issue of warnings to ports on the coasts of the United Kingdom whenever there are indications of the approach of severe storms.

III. CLIMATOLOGY.—The collection of information of various kinds from observatories and other land stations in the British Isles, and from stations in British possessions or in Foreign countries, with the view of extending the accurate knowledge of the meteorological conditions obtaining in the various districts in which the observations are made, and of the changes to which they are subject.

IV. LIBRARY.—For the preservation of weather maps and other publications issued by the Colonies and Dependencies of the British Empire, and by Foreign Countries, so that they may be available for consultation by those requiring information as to the weather in various parts of the globe.

V. MISCELLANEOUS INVESTIGATIONS.

VI. PUBLICATIONS.

VII. FINANCE.

All the branches of the Office are utilised for the preparation of replies to inquiries on questions connected with the weather, which are made from time to time by public bodies or by private persons.

Details of the work of the Office during the past year are given below under the headings which have been enumerated.

PART I.

OCEAN METEOROLOGY.

The arrangements for the systematic collection of data with respect to the meteorology of the ocean from the Royal Navy and the Mercantile Marine have been continued as heretofore. An indication of the system adopted is given in Appendix II., p. 53.

Collection of Information.

The stock of instruments at the various dockyards at home and abroad for the supply of the Royal Navy has been maintained, and it has been found necessary, in order to meet the requirements of the Navy, to increase the establishment at the Cape of Good Hope and at Hong Kong. The total number of instruments of all kinds which have been issued by the Office in the course of the year for the use of the Navy is 1,037. Particulars as to the numbers of different kinds of instruments and their disposition at the close of the year are given in Appendix V., p. 86.

Supply of Instruments to the Navy.

The number of merchant ships supplied with instruments and log books during the year has been 98, as compared with 83 in the previous year. Taking into account the ships which had instruments in their possession at the beginning of the year, the approximate number of ships of the merchant service employing instruments belonging to the Office for observations during the year was 141.

Supply of Instruments to the Mercantile Marine.

The total number of instruments of all kinds issued by the Office during the year to the Mercantile Marine was 592. Details of the supply are given in Appendix VI.

The meteorological observations made on board H.M. ships are reported to the Admiralty. The information has been placed at the disposal of the Council as in former years.

Information received.

The meteorological logs received by the Office during the year from Officers of the Navy or from the Mercantile Marine numbered 128. A list is given in Appendix IV.

Of the whole number of logs received, 110 have been classed as "excellent" or "very good."

The following list shows the number of vessels observing, for the different lines of route :—

North Atlantic	35	Eastern, via Suez Canal ...	10
Mediterranean	6	Far Eastern, via Cape of	
South America (East Coast)	9	Good Hope	22
" " (West ")	8	Far Eastern, via Suez	
South Africa	12	Canal	26
Eastern, via Cape of Good		Pacific	26
Hope	0	Polar	0

Appendix III. (p. 77) contains a list of the observers who, during the past year, have contributed logs classed as "excellent." The Council take this opportunity of expressing their best thanks to those who have thus assisted them. Several of these observers

have co-operated with the Office for many years. The names which appear in the list for the first time are as follows :—

Observer's Name.	Ship.
Glegg, R.	S.S. "Macduff."
Hay, C. W.	S.S. "Aorangi."
Lyon, F. C. A., R.N.R.	S.S. "Victoria."
McAllister, D.	S.S. "Bhamo."
Phillips, J. D. S.	S.S. "Warrimoo."
Robinson, E.	"Sierra Lucena."

Recognition
of "excellent"
observers.

As a mark of recognition of valuable co-operation, the Council have presented various publications of the Office (*see* Appendix II., p. 72) to observers who have returned well-kept logs.

Death of
observers.

The Council note with great regret the death of four of their old observers. Captain E. J. Griffin, R.N.R., who died suddenly at Southampton in July, 1901, for many years an observer for the Office, had kept 24 meteorological logs; Captain C. W. Kennedy, who had also kept several logs; Captain R. G. Murray, of the P. & O. s.s. "Britannia"; and Captain William Watson, R.N.R., the Chief Superintendent of the Cunard Steamship Co., who was for many years an excellent observer.

Supple-
mentary
Information.

A complete meteorological log is a record of observations taken every four hours with instruments as supplied by the Office. It extends over a period of four months. The issue of the Monthly Pilot Charts of the Atlantic and Mediterranean enables the Council to make effective use of less elaborate material referring to shorter voyages, and the gradual development of the facilities for obtaining adequately tested instruments, through the co-operation for a long period of the authorities of the Kew Observatory with the Council, has made it possible to extend the number of trustworthy observations available for the discussion of special problems of ocean meteorology. The Council have, accordingly, taken steps to obtain meteorological registers from the captains and officers of ocean-going ships who use their own instruments. The arrangements made for this purpose are of two kinds. First, an abbreviated form of meteorological log has been prepared in which the officers enter particulars of the instruments used and their corrections, as well as the observations of pressure, temperature, &c., taken with them; and secondly, single sheets for the returns of daily observations of sea temperature, together with reports upon the positions of ice, have been prepared and issued to the ships of many of the transatlantic lines.

Air and Sea
Tempera-
tures at
Stations on or
near the
Coast.

For many years past, by arrangement with the Admiralty and the Trinity House, observations of air and sea temperature have been taken at a number of coast-guard stations, light-houses, and light-vessels. Under the re-organisation of the Office referred to, a more systematic examination of the returns of sea temperature

is made, and the material thus obtained is utilised to supplement the observations received from ocean-going ships.

The information as to the temperature of the sea, compiled from the sources indicated, has been sufficient for the Council to issue with each number of the Monthly Pilot Charts a subsidiary map of the distribution of temperature in the water of the Atlantic, as represented by the means for the month. The maps thus prepared are issued within six weeks of the close of the month in which the observations are taken. For the months recently dealt with the number of observations tabulated extends to some four thousand per month. The Council are of opinion that the material thus compiled and discussed may afford the means of tracing the connexion that may exist between the temperature of the ocean and the meteorological conditions of the neighbourhood of the British Isles.

Use of
Information
received.

Besides continuing the issue of the Monthly Pilot Charts already referred to, and the examination of all logs and documents received, the marine department of the Office has been engaged upon the series of Monthly Wind Charts of the South Atlantic Ocean and the South American Coastal regions.

This work was begun in 1893 and has occupied a considerable portion of the time of the department from that date. The Coastal Wind Charts for South America, embodying the general result of upwards of 250,000 observations, have been completed in the course of this year, and have been issued as a publication of the Hydrographic department of the Admiralty. Since the completion of this portion of the work the department has taken up the discussion of the meteorological data for the Indian Ocean, extending to 30° S., with a view to the preparation of monthly wind charts for that region to supplement the work on the district from the Cape to New Zealand which was issued in 1899.

Climatological Information for the Admiralty.—Information has been supplied bearing upon the climatic conditions and showing the meteorological results for various places in the Bay of Bengal and in the China Seas.

Information
supplied
for the
Admiralty.

Hydrographic notices have been extracted from the meteorological logs and forwarded to the Admiralty. Among those sent during the year were notes by Captain J. D. S. Phillips, R.M.S. "Warrimoo"; Captain F. C. Mullan, F.R.G.S., S.S. "Reynolds"; Captain W. S. Ralph, S.S. "Falls of Keltie"; Captain R. Belding, Barque "Harold"; Captain W. B. Holmes, S.S. "Matatua."

SUPPLY AND STOCK OF INSTRUMENTS.

Information as to the supply and stock of instruments for the Royal Navy and Mercantile Marine has already been given (page 11).

Royal Navy
and
Mercantile
Marine.

Antarctic Expedition.

In accordance with the arrangement referred to in last year's Report, the following instruments were obtained and supplied for the use of the National Antarctic Expedition :—

2 Marine Barometers.	3 Maximum Thermometers, —30° to 90°.
2 Station Barometers.	2 8-inch Raingauges, with duplicate receivers, cans, and glasses.
3 Large Aneroids.	2 Special Thermometer Screens.
6 Watch Aneroids.	2 Specially - constructed Sun- shine Recorders and Cards.
3 Barographs.	1 Dines' Self-registering Tube Anemometer.
2 Portable Hypsometers.	1 Robinson's Anemometer.
12 Mercurial Thermometers, 0°-100° F.	1 Assmann's Psychrometer.
12 Mercurial Thermometers, —40°-90°.	1 Exner's Electrometer.
12 Low range Spirit Thermo- meters.	1 Aitken's Dust Counter.
6 Sling Thermometers.	1 Standard Spirit Thermo- meter.
3 Thermographs (Richard's).	5 Piche's Evaporation Gauges.
2 Hygrographs (Richard's).	6 Hydrometers.
8 Solar Radiation Thermo- meters.	12 Spare Tubes for Anemo- meter.
2 Earth Thermometers.	
2 Terrestrial Radiation Ther- mometers.	

Stations.

The instruments at the telegraphic reporting stations have been maintained in proper order and replaced when necessary.

Instruments have been obtained for a number of new stations of the second order.

Fishery Barometers.

Fishery barometers have been supplied to Mallaig and to Burra Isle on the application of the Fishery Board for Scotland. There are now 228 stations on the coast of the British Isles supplied by the Council with barometers for the benefit of sailors and fishermen. Of these, 67 stations are in England, 7 in Wales, 64 in Ireland, 85 in Scotland, 4 in the Isle of Man, and 1 in Jersey. A list of the stations is given in Appendix II., p. 54.

The fishery barometer is in each case placed in charge of some responsible person who undertakes the duty of forwarding to the Office a chart of the readings of the barometer and thermometer during each month.

Aneroid Barometers.

At the suggestion of the National Physical Laboratory a new specification has been adopted for the tests to be satisfied by the Aneroid Barometers issued to the Navy.

Breakage of Instruments in Transit.

From time to time losses of a serious character have occurred in consequence of the breakage of instruments, particularly of barometers, in transit by rail or sea. Safe transmission to the Cape of Good Hope has been found to be particularly difficult. The Council have taken the matter into consideration and have decided to make use of cases for barometers specially designed to obviate the risk of breakage. For other instruments liable to breakage they have found it necessary to modify the pattern adopted, and in some cases to decline to forward them by rail.

PART II.

WEATHER TELEGRAPHY AND FORECASTS.

Daily reports, giving the state of the weather over the British Isles and the adjacent parts of the Continent at 8 a.m. and the changes which have taken place in the previous 24 hours, together with forecasts of the probable weather over the United Kingdom for the period ending at noon on the following day, have been regularly issued to certain public offices and institutions, to the press, and to subscribers. Similar reports referring to the weather at 6 p.m., with forecasts for the following civil day, have been issued each evening for the morning editions of the daily papers.

Daily
weather
Reports.

No change has taken place in stations which send daily telegraphic reports. They are marked with the letter "T" in the list given in Appendix II. (p. 58). The same Appendix contains at p. 63 a list of the Foreign Stations from which daily telegrams have been received at the Office.

Telegraphic
reporting
stations.

In addition to the stations which belong to the regular service of the Office the Council have had the advantage of daily telegraphic reports from the Azores (through the courtesy of the Portuguese Government and the Eastern Telegraph Company), from Newton Reigny, Penrith, and from Bath (*see* p. 9).

Inspection of the Telegraphic Reporting Stations.—The stations marked in the list in Appendix II., p. 58, have been inspected during the year. The Reports of the Inspectors show that efficiency has been maintained.

Inspection of
the Stations.

Discussion and Publication of the Information received.—A detailed account of the manner in which the meteorological information received by telegraph is utilised for the preparation of the Daily Weather Report was last given in Appendix X. of the Report for 1891. An account of modifications introduced in the form of the Daily Weather Report in August, 1900, was given in the Report for 1900-1, p. 15. No important change has been introduced in the past year.

The Daily
Weather
Report.

The morning and evening observations of the Telegraphic Reporting Stations appear on the first page. The two charts on the second page, representing the morning distribution of pressure, wind and sea disturbance, and of temperature and weather respectively, are supplemented by three smaller charts. One represents the barometric distribution over the whole of Europe at 8 a.m. of the preceding day in order that the general atmospheric changes may be more readily traced. Another represents mean morning isotherms for the British Isles for periods of one or two months, so that the distribution of temperature for the day may be easily compared with the normal distribution for the season as estimated for a period of thirty years. The third represents, in alternate fortnights, the distribution of monthly extremes of temperature over the British Isles during the thirty years 1871-1900, and the distribution of monthly average rainfall for the thirty-five years 1866-1900, together with the average number of rain days in the month at the Telegraphic Reporting

Station for the thirty-year period 1871-1900, estimated in a similar manner. These charts are varied from time to time to represent other statistical results of interest.

The information as to the weather in the British Islands has been supplemented by telegraphic reports sent daily from volunteer observers, by data as to sunshine for the preceding day from a number of coast stations which report by post, and by postal reports of maximum and minimum temperature, rainfall, and sunshine for a number of inland stations which have proved a useful addition to the telegraphic reports of the first page.

**Distribution
of Daily
Weather
Reports.**

The arrangements for the issue of the Reports have remained as previously reported. About 300 copies of the Reports have been distributed daily, without charge, to Government Offices and public institutions, to seaports for public exhibition, to newspapers, to correspondents of the Office, and to foreign meteorological institutions. The issue to subscribers has amounted to about 160 copies. The provisional arrangement for the sale of single copies of the Daily Weather Report at a penny each, from about 3 o'clock of the afternoon of the day of issue, has been continued. The places where single copies can be obtained have been, as before, viz., the Meteorological Office, the railway bookstalls of the following terminal railway stations in London: Victoria (S. E. & C. and L. B. & S. C.), Charing Cross, St. Pancras, King's Cross, and Euston. The public demand for this accommodation, as indicated by the number of copies purchased, is not large, but the Council have thought it undesirable to discontinue the arrangement until it has had a further trial.

**Display of
information
in front of
the Office.**

Display at the Meteorological Office in London of Information as to the Weather on British Coasts.—At 9.30 a.m. and 3 p.m. every week day the substance of the reports received by telegraph, as to the state of the weather and of the sea at the following stations: Yarmouth, Dover (Dungeness), Portland Bill, Scilly, Holyhead, and Valencia, has been displayed, as heretofore, on the balcony of the Office, at 63, Victoria Street, S.W. At the same hours charts have been suspended in the portico of the street door, exhibiting the latest information from all our coasts, and the latest forecasts and storm warnings that have been issued.

**Weather
Forecasts.**

Weather Forecasts.—The means adopted for the distribution of the forecasts drawn up in the Office have been continued during the past year. They are detailed in Appendix II., pp. 42-45.

Copies of the 11 a.m. forecasts based on the 8 a.m. observations have been regularly called for by messengers from newspapers or news agencies, and printed copies have been delivered to subscribers and distributed for exhibition as follows: in the City, at the Mansion House, Lloyd's Rooms, Messrs. R. & J. Beck's, Cornhill, and Messrs. de la Rue & Co.'s, Bunhill Row; in the West End, in the Libraries of the House of Lords and the House of Commons; at Messrs. Elliott's, Leicester Square; Messrs. Stanford's, Charing Cross; Messrs. Negretti & Zambra's, Regent Street; and at the Office, 63, Victoria Street.

At the request of the Admiralty forecasts for the S.W. of England and the Bay of Biscay have been regularly supplied to the

Commander-in-Chief, Devonport, and other forecasts for separate districts have been sent by telegraph to certain provincial newspapers.

3.30 *p.m.* *Harvest Forecasts*.—During the summer months (June to September inclusive) the special service of afternoon forecasts for the benefit of agriculturists and others was arranged as last year, and special telegraphic reports of observations at 2 p.m. were obtained for this purpose. These forecasts are sent by telegraph to those who express a wish to receive them regularly, and who defray the cost of the telegrams. The number of recipients of the forecasts for various periods in the summer of 1901 was 65. Of these—

2	received forecasts for district	1	Scotland, E.
3	„	2	England, N.E.
5	„	3	England, E.
22	„	4	Midland Counties.
18	„	5	England, S.
6	„	7	England, N.W.
7	„	8	England, S.W.
1	„	9	Ireland, N.
1	„	10	Ireland, S.

There were no recipients in districts 0 Scotland, N., and 6 Scotland, W.

8 *p.m.* *Forecasts*.—These are based upon the 6 p.m. observations and are distributed with the evening report to the representatives of newspapers and news agencies for insertion in the morning papers. The number of copies so distributed has not been materially changed in the course of the year.

The number of inquiries for forecasts by telegraph in accordance with the revised arrangement with the Post Office indicated on p. 44 was 207. There were also 326 personal inquiries for forecasts or other weather information during the year, including a large number of inquiries on the part of representatives of the press for special information upon any unusual occurrence in connexion with the weather.

Telegraphic and personal inquiries for forecasts.

No important changes have been made in the supply of transcripts of observations received by telegram. It has long been the practice to prepare specially drawn maps for the “Times,” and for some time past transcripts of observations have been furnished to the “Daily Mail.” During the past year arrangements for a special transcript to be furnished by telegram to the “Liverpool Journal of Commerce” have been in operation. The Liverpool Underwriters’ Association has for many years past received a daily telegram from the Office of observations at a number of coast stations. The “Daily Telegraph” has been supplied with special observations made at Valencia at 10 p.m. each night. A tabular statement of the weather at 8 a.m. each day at a number of coast

Transcripts of observations

stations, arranged with a view to the fishing industry, and a weekly summary have been prepared for the "Fish Trades Gazette." For these services a charge has been made.

The arrangements for sending to the United States Weather Bureau a daily message by cable reporting the 8 a.m. observations at a number of British and European stations have been in operation throughout the year.

Results of Forecasts.

A comparison for the year of the Forecasts for the United Kingdom issued at 8.30 p.m., with the subsequent weather actually experienced, is given in detail in Appendix IX. The complete success, partial success, partial failure, and complete failure of the forecast, are estimated according to definite rules which are designed to eliminate bias as far as possible.

It will here suffice to state that partial success means that the Forecast was correct for more than half the elements dealt with at the places of observation situated in the district in question, and a similar interpretation is to be applied to the term partial in the case of the failures.

The detailed comparison of the Forecasts with actuality may be summarised as follows :—

SUMMARY of RESULTS of 8.30 p.m. FORECASTS, 1901-1902.

Districts.	Per-centages.				
	Complete Success.	Partial Success.	Partial Failure.	Complete Failure.	Sum of Successes, Complete and Partial.
SCOTLAND, N. ...	54	31	10	5	85
" E. ...	55	28	13	4	83
ENGLAND, N.E. ...	58	28	11	3	86
" E. ...	57	28	11	4	85
MIDLAND COUNTIES ...	61	24	12	3	85
ENGLAND, S. ...	60	27	11	2	87
SCOTLAND, W. ...	67	19	9	5	86
ENGLAND, N.W. ...	58	25	13	4	83
" S.W. ...	58	27	11	4	85
IRELAND, N. ...	54	27	12	7	81
" S. ...	53	28	13	6	81
Summary ...	58	26	12	4	84

In order to test the success of the Forecasts of the year in comparison with those of previous ones, the following table has been drawn up. It shows for each year of the decade 1892-1901 the percentages of complete and partial successes of the Forecasts issued at 8.30 p.m. It will be noticed that the highest degree of complete success was obtained in 1893 and 1901, and that the number of complete successes in 1901 was considerably above the average for the whole decade.

PER-CENTAGES of SUCCESS in the FORECASTS for the whole of the BRITISH ISLES.

Year.	Complete Success.	Partial Success.	Sum of Successes, Complete and Partial.
1892	46	33	79
1893	59	25	84
1894	56	27	83
1895	55	25	80
1896	54	27	81
1897	55	26	81
1898	55	28	83
1899	55	27	82
1900	57	27	84
1901	58	26	84
Average	55.0	27.1	82.1

The forecasts for the N.W. district of England issued during 100 days of the current year have again been independently checked by Mr. T. G. Benn of Newton Reigny, who brought out a much larger percentage of successes (total and partial) than that shown by the checking made in the Office.

Storm Warnings for the Coasts of the United Kingdom.—Warnings of coming storms have been dispatched by telegraph to stations on the coast supplied with signals to be hoisted as warnings to mariners of expected storms. The signals are defined in Circular 717 of the Board of Trade, issued in February, 1874.

Storm Warnings

A list of the stations is given in Appendix II., p. 45. At the end of March, 1902, there were 234, of which 125 were in England and Wales, 70 in Scotland, 32 in Ireland, 4 in the Isle of Man, and 3 in the Channel Islands.

In their last report the Council expressed their regret that very few of the stations have any provision for exhibiting warning signals after dark, so that a telegram sent in the winter months on account of observations received in the afternoon or evening may remain in many cases unheeded until after daylight on the following morning. The Council have made detailed inquiry into the facilities which exist for the exhibition of signals after dark. In the course of this inquiry and from independent sources they have learned that very serious delay is liable to occur occasionally in the delivery of the evening telegrams conveying storm warnings on account of their arrival after the hour of closing of the rural telegraph offices. Having regard to the fact that the warnings are intended to prevent avoidable loss of life and property at sea, the Council hope to be able to make arrangements by which the drawbacks incidental to the existing arrangements can be avoided.

A comparison has been made in the Office between the warnings issued during the year and the subsequent weather actually experienced, in accordance with the method indicated in the Report for 1888-9, Appendix VII., p. 64.

The Council have again to acknowledge their obligations to the Trinity House, the Irish Lights Office, the Scottish Meteorological Society, and the Mersey Docks and Harbour Board, for the loan of the log books of Lightships and Lighthouses for the purpose of this comparison.

The results of the comparison are given in Appendix VIII.

Comparison
of results for
1901 with
previous
years.

The following table contains a statement of the amount of success of storm warnings in the decade 1892-1901 :—

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.
1892	488	59.4	31.2	90.6	6.8
1893	480	60.8	28.6	89.4	7.1
1894	502	68.5	23.5	92.0	6.0
1895	523	63.3	26.4	89.7	8.0
1896	467	67.7	23.8	91.5	2.9
1897	596	60.1	31.7	91.8	4.5
1898	581	59.8	27.5	87.3	4.5
1899	504	59.3	31.9	91.2	4.8
1900	512	66.2	25.8	92.0	6.3
1901	498	62.3	26.1	88.4	7.4

The Council have again to acknowledge the courtesy of Lloyd's in forwarding observations from a number of their signal stations.

PART III.

CLIMATOLOGY.

I.—BRITISH ISLES.

The Council do not attempt to deal completely with the details of the climatology of the British Isles, but they receive returns of various kinds from stations in all parts of the kingdom. Some of these returns are from the stations which are supported by the Office, but the greater number are furnished by volunteer observers. A complete alphabetical table of the stations which furnished returns in the year ended on March 31, 1902, is given in Appendix II., p. 58. The nature of the information supplied is indicated by the letters in the sixth column of the table, which are explained on pp. 56-57. To facilitate reference the same letters are used in the enumeration of the different classes of stations which is given here, although the lettering is not consecutive.

Classification
of Stations.

For the purposes of classification meteorological stations are, by International agreement, divided into three orders as follows :—

Stations of
the First
Order.

I. *Stations of the First Order* are observatories which furnish continuous records of the barometric pressure and the temperatures of the dry-bulb and wet-bulb, as well as continuous

records of rainfall, wind, and bright sunshine, with frequent eye observations of the weather and of the kind and amount of cloud.

At the observatories connected with the Office the registration of the barometer and the wet-bulb and dry-bulb thermometers is photographic, according to the system established by the Meteorological Committee in 1868. The wind registration is by the Kew pattern Robinson anemograph, with 9-in. cups and 2-ft. arms. The rain records are by Beckley's float rain gauge, and the records of sunshine by the Campbell-Stokes sunshine recorder.

In addition to the observatories which are completely equipped, self-recording instruments of various kinds have been installed at other stations, and their records are forwarded to the Office. The whole number of stations provided with self-recording instruments may accordingly be subdivided as follows:—

A. *Fully equipped Observatories.*

B. *Anemograph Stations*, at which continuous records of wind are obtained.

C. *Barograph Stations*, which supply records of pressure derived from self-recording aneroid barometers.

S. *Sunshine Stations.*

II. *Stations of the Second Order.*—This name is limited to stations which supply normal climatological data—viz., observations of pressure, of the dry-bulb and wet-bulb thermometers, the direction and force of the wind, the amount and kind of cloud, and the state of the weather taken twice daily at properly correlated hours; together with measurements of rainfall, maximum and minimum temperature, taken once daily at the appropriate hours. The selected hours of observation for the British Isles are 9 a.m. and 9 p.m. *local time*, and stations at which the observations comply in all respects with this specification may be called Normal Climatological Stations. They are indicated in the table of Appendix II. by the letter D.

Stations of
the Second
Order.
Normal
Climatologi-
cal Stations.

At many of the stations of the Second Order in this country sunshine records are added, but though eminently desirable they are not included in the International specification.

Observations of "grass minimum" and "solar maximum" thermometers are sometimes added to the returns of normal stations.

III. *Stations of the Third Order.*—All other stations which furnish climatological data not so complete as those of normal stations, or data derived from observations at other than the normal hours, are classed as Third Order Stations. This class technically includes the Telegraphic Reporting Stations, because the hours of observation at these stations are 8 a.m. and 6 p.m. *Greenwich time*, instead of 9 a.m. and 9 p.m. *local time*; and there is a difference of practice as regards the time of reading the

Stations of
the Third
Order.

maximum and minimum thermometers, although the instruments used are the same, and the amount of information is quite as full as that from normal stations. The stations included in this class may be subdivided into the following groups :—

- T. *Telegraphic Reporting Stations*, giving observations at 8 a.m. and 6 p.m. (Greenwich mean time) ; some also at 2 p.m.
- G. *Other Climatological Stations*, with the same equipment as a normal station, but giving readings once a day only, or at hours differing from 9 a.m. or 9 p.m.
- F. *Weekly Weather Report Stations*, supplying weekly returns of observations of rainfall and of the maxima and minima of temperature taken at 9 a.m. daily.
- R. *Rainfall Stations*, which supply monthly returns of daily observations of rainfall, with remarks on the weather.
- H. *Fishery Barometer Stations*. These are stations, enumerated in Appendix II., p. 54, to which fishery barometers have been lent. A daily observation of the barometer and of the attached thermometer is read and entered upon a chart.

Sea temperature stations.

IV. *Sea Temperature Stations* (IV.), at which observations of the temperature of the sea and of the air are taken twice daily.

First order stations.
Observatories.

A. STATIONS OF THE FIRST ORDER : OBSERVATORIES.—The Council have continued to maintain the observatory at Valencia (Cahirciveen), and have also continued their contributions to the maintenance of the meteorological observatories at Kew, Falmouth, Aberdeen, and Fort William,* at which the self-recording instruments, installed by the Council, are under the management of the National Physical Laboratory, the Royal Cornwall Polytechnic Society, the University of Aberdeen, and the Scottish Meteorological Society respectively. From the observatories complete records of the meteorological elements, together with the appropriate tabulations and eye observations, have been, with one exception, regularly received. The returns from Fort William which had fallen into arrear owing to the indisposition of the staff, have been nearly made up. The arrangement with the observatories at Glasgow and Stonyhurst, under which copies of the traces of the self-recording instruments are supplied to the Office, have been likewise continued.

The Council have also made a contribution to the Scottish Meteorological Society towards the cost of the hourly observations at the summit of Ben Nevis.

Ben Nevis observatories.

No change has been made in any of the arrangements for the first order stations during the year. In the Report for last year it was intimated that the Scottish Meteorological Society had requested the Council to continue the grant to the Fort William Observatory for another year beyond October, 1901, the time when the notice to discontinue the grant would have expired.

* The observatory at Fort William has no Anemograph, the site being unsuitable for observations of wind.

The Council complied with this request and decided to continue the grant until December, 1902.

As already mentioned, the letters in column 6 of the table in Appendix II., p. 58, indicate the nature of the information received by the Office from the several stations. In many cases more elaborate observations are taken, although they are not reported to the Office. For example, the Radcliffe Observatory at Oxford is a fully equipped observatory of the First Order, the Observatory of the Mersey Docks and Harbour Board at Bidston, the Fernley Observatory of the Corporation of Southport, the Gillibrand Observatory of the Corporation of Darwen, the Observatory of the Birmingham and Midland Institute at Edgbaston, and the Meteorological establishments at St. Helen's and at Plymouth, possess many valuable self-recording instruments.

B. ANEMOGRAPHIC STATIONS.—Anemometers have been maintained by the Office (in addition to those at the stations of the first order) at Armagh,* Deerness (Orkney), Holyhead, Shields, Yarmouth, and Scilly, and for a part of the year at Fleetwood. At Phoenix Park, Dublin, the Council's Anemometer is in charge of the staff of the Ordnance Survey, who send up the records; and the Council also receive the records from the Duke of Northumberland's Anemometer at Alnwick, and from that of the Irish Board of Works at Kingstown. The Anemometers are of the standard Robinson pattern, except at Scilly and Phoenix Park, where they are of smaller size. The Anemometer at Fleetwood has been temporarily dismantled for the reconstruction of the building on which it was erected. At Kew, Holyhead, and Scilly Dines' pressure tube instruments have also been maintained for the purpose of comparison, and at Holyhead a pressure plate instrument and a bridled Robinson Anemometer have been kept at work for experimental purposes.

Anemographic stations.

Early in the year representations were made to the Council by Sir J. Fayrer, Bart., F.R.S., on behalf of the Royal Cornwall Polytechnic Society, that it was desirable to supplement the Meteorological equipment of the Falmouth Observatory by the addition of a Dines' Anemograph having especially in view the record of gusts, and its importance in matters connected with shipping. After careful consideration, the Council decided to apply to the Admiralty for permission to erect an Anemograph of the type mentioned on the Tower of Pendennis Castle, which affords a better exposure than the Observatory Building, and to place it in charge of the Chief Officer of the Coast Guard. The Admiralty has assented to the suggestion, and the War Office has consented to the necessary arrangements for periodical visits for supervision and inspection. The Council have accordingly decided to carry out the installation of the Anemograph in the course of the current year.

Dines' Anemograph for Falmouth

C. BAROGRAPHIC STATIONS.—A number of the Telegraphic Stations are supplied by the Council with self-recording aneroid barometers for use in reporting, and in addition the Council receive every week the traces from a number of barographs

Barograph stations.

* The observatory at Armagh is also provided with a Beckley's self-recording rain gauge, the records of which are regularly sent to the Office.

belonging to private observers. The stations from which barograms have been received during the past year are Fulbeck (Rev. V. F. Willson); Kilkenny (the Marquis of Ormonde); the Athenæum Club; Penbedw (Mr. H. W. Buddicom); Waterford (the Harbour Authorities); Forgardenny, Perth (Mr. C. L. Wood); Hampstead (Mr. H. R. Beeton); Rochford, Tenbury (Rev. J. Tomson.) The Duke of Devonshire has sent weekly thermograph curves from Chatsworth, and thermograms have also been received from Hawarden Bridge, Chester (Messrs. J. Summers & Sons).

Sunshine stations.

S. SUNSHINE STATIONS.—Complete returns of the original cards for the year have been received from 67 stations. The returns from Oswaldkirk were discontinued in the course of the year, those from Aspatia (Principal J. Smith Hill, B.A.), Broadstairs (the Town Council), Dunmow (Mr. T. Hacking), and Haverfordwest (Mr. J. W. Phillips) were commenced; the returns from Plumstead and York, which had been discontinued, have been recommenced.

In addition to these records, which are all from instruments of the Campbell-Stokes design, tabulations of the daily amount of sunshine have been received from 22 other stations for insertion in the Weekly Weather Report. Of these, six were derived from the records of the Jordan recorder, which depends upon the exposure of sensitive paper to the sun's light, and the others from the Campbell-Stokes instruments.

The distribution of the Sunshine Stations on the 31st March was as follows :—

SUNSHINE STATIONS (89) AT MARCH 31, 1902.

Stations.	No.	Stations.	No.
Scotland, N.	6	England, N.E.	6
„ E.	5	„ N.W. and N. Wales	15
„ W.	2	„ Midland Counties	8
Ireland, N.	2	„ E.	10
„ S.	5	„ S.	17
Channel Islands	3	„ S.W. and S. Wales	10

Additional stations desired.

The Council would welcome additional observations, especially from Scotland and Ireland and the inland parts of Wales and of the south-west of England.

For the purpose of uniformity in the returns, they deem it desirable that the observations should be made with the Campbell-Stokes instrument, and they are in consultation with the National Physical Laboratory with a view to drawing up a standard specification of the instrument that shall lead to strict comparability of the records.

Callendar Self-recording Thermometer.—In the autumn of 1900 the Council accepted an offer of the Cambridge Scientific Instrument Company to instal on trial a Callendar Self-recording Electrical Thermometer, by which the temperature of a platinum wire exposed in a screen on the roof at the Office is recorded on a drum in one of the working rooms. After a prolonged trial,

during which some improvements were effected in the adjustments of the instrument, it was found to work satisfactorily and to give a valuable record of the fluctuations of temperature. As such a record seemed to be of special importance in connexion with the fog inquiry, it was decided to purchase the instrument primarily with a view to that inquiry, but it is expected that it will prove a valuable addition to the resources of the Office for experimental purposes of various kinds. A reproduction of one of the sheets of record showing the sudden fall of temperature at the commencement of a shower of rain on May 5 is given in Appendix X., p. 116.

D. Stations of the Second Order, Normal Climatological Stations.—These stations, as well as many of the sunshine stations, and all the stations enumerated under F, G, and R, are maintained by private persons or local authorities or institutions, who provide their own outfit of instruments. Returns for 1901 were received from 80 stations. The returns are of two kinds: first, detailed daily records of pressure, temperature and other data on a form which is known as the International Form A; and secondly, monthly summaries of the daily observations for the year on the International Form B. All the observers, numbering 45, who send their reports directly to the Office make their returns monthly on the first form. The arrangement with the Royal Meteorological Society and the Scottish Meteorological Society, under which the Societies forward to the Office returns already prepared for publication, some on Form A and others on Form B, has been continued. Their returns are incorporated with those received directly from the observers and prepared for publication in the Office. Under this arrangement the Royal Meteorological Society has forwarded to the Office copies of observations from 4 stations on Form A and from 12 on Form B, and the Scottish Meteorological Society observations from 3 stations on Form A and from 16 on Form B. The stations from which these returns have been received are marked *M.* and *S.* respectively in the list of stations in Appendix II.

The stations of the Second Order for 1901 were distributed as follows:—

Stations.	No.	Stations.	No.
Scotland, N.	7	England, N.E.	10
" E.	7	" N.W., and N. Wales	8
" W.	9	" Midland Counties	12
Ireland, N.	4	" E.	7
" S.	4	" S.	7
Channel Islands	0	" S.W., and S. Wales	5

The Council have to regret the discontinuance during the year of the return of observations from Glenlee, Kirkcudbrightshire (Mr. W. Melville), from which observations have been received for upwards of 15 years. They record with regret the death of Colonel Cooper, of Markree Castle, Collooney, from whose observatory they have received a very valuable series of observations. It is hoped that the series may still be continued. They

also have to regret the death of Sir J. H. Gilbert, F.R.S., of Rothamsted, who was for many years a valued correspondent of the Office.

Normal returns of observations have been commenced from the Cally, Kirkcudbrightshire (Mr. G. H. Murray's estate), Canterbury (Mr. A. Lander), and the Countess of Warwick's Agricultural College at Dunmow (Mr. T. Hacking).

T. Telegraphic Reporting Stations.—These have been already referred to in Part II. The observations from these stations for each month are repeated at the end of the month on a special form of return, from which the telegraphic reports can be corrected, if necessary, before being used for statistical purposes.

G. Other Climatological Stations.—A return of daily observations at 9 a.m. at Rauceby Hall, Lincolnshire, by General Willson, commenced from January, 1901, and a similar return from Lisdoonvarna has been commenced by Mr. J. J. McGrath.

F. Weekly Weather Report Stations.—Weekly returns for the Weekly Weather Report (*see* p. 48) are received from several Normal Climatological Stations as the letters in Column 6 of the Table of Stations will show. By the arrangement which has already been referred to the returns for 10 stations are forwarded weekly by the Royal Meteorological Society, and for 7 by the Scottish Meteorological Society.

There are few changes to record on the stations belonging to this group. Through the death of Mr. J. Conroy, of Londonderry, the Council have lost the assistance of an enthusiastic observer who supplied the observations of a normal station for many years, and latterly contributed a return for the Weekly Weather Report. The Rev. D. Macrae has removed from Lairg, and no one has yet been found to continue the observations at that station. Mr. G. Paul, Meteorologist to the Borough of Harrogate, has sent a weekly return in addition to the daily telegraphic report already mentioned.

The telegraphic reports from Bath (*see* p. 9) furnish an additional set of returns for the weekly report.

R. Rainfall Stations.—There have been a considerable number of changes in these stations. Returns from Bexhill and Pennington have ceased, and others have been commenced from Brandon (Lieut.-Col. B. E. Spragge, D.S.O.); Glenarm (The Earl of Antrim); Gruline, Isle of Mull (Mr. J. W. Weller); Caistor, Lincolnshire (Mr. T. Ford); Kirkby Lonsdale, 2 stations (Mr. J. K. Picard and Mr. R. A. Clarke); Kinlochewe (The Hon. W. Peel, M.P.); while Mr. G. E. Elland's observations, which formerly came from Watford, are now taken at Harefield.

Sea
Temperature
stations.

W. Sea Temperature Stations.—Daily observations of the temperature of the sea-surface have been taken since 1879 at a number of stations. The observations for the three years 1879–1882 were used in the preparation of the "Meteorological Atlas," published in 1883.

The stations from which returns were received during the past year comprised 16 English and 3 Irish Light Vessels, 4 Coast-guard Stations in England, 12 in Scotland, and 12 in Ireland,

together with stations at Kingstown (Sandy Cove), Holyhead, St. Ann's Head, and Scilly. Twelve of these stations are situated on the Atlantic seaboard, 11 in the Irish Sea and North Channel, 2 in St. George's Channel, 3 in the Bristol Channel, 7 in the English Channel, and 16 in the North Sea.

The returns are now being used in connexion with monthly charts of the surface temperature of the North Atlantic Ocean, which it is intended to embody in the Pilot chart for the current year.

Inspection of the Stations.—In order to secure uniformity of method and to guard against instrumental errors, the stations classified under the heads A, B, C, D, S, and T are regularly inspected, while the others are visited as opportunity offers. The stations of Class II., which belong to the Royal Meteorological Society, are visited by an Inspector appointed by that Society. In accordance with the recommendation of the Treasury Committee (1877), a contribution towards the cost of this inspection is made by the Office. The rest of the stations are visited from time to time by the Inspectors of the Office. During the past year Dr. Buchan visited the Scottish stations, Mr. W. N. Shaw, Secretary, took charge of the inspection of the stations in South Ireland and South Wales. The other parts of England, Wales, and Ireland were visited by Commander Campbell Hepworth, C.B., R.N.R., Marine Superintendent, Mr. F. Gaster, Mr. R. H. Curtis, Mr. J. A. Curtis and Mr. F. J. Brodie. The inspection of the principal observatories and of some of the anemographic stations was carried out, as in previous years, by Messrs. T. W. Baker and E. G. Constable, of the Kew Observatory. In the list of stations given in Appendix II., p. 58, the year when each station was last visited by an Inspector from the Office, is indicated by the figures in the seventh column.

Extracts from the reports of the Inspectors are given in Appendix VII., p. 88. A report on the instruments maintained by the Council at the Kew Observatory, in the charge of the National Physical Laboratory, is also given, together with some notes on the work of the Ben Nevis Observatories, forwarded by Dr. A. Buchan in reply to a request from the Council.

The whole list of stations sending returns to the Office during the year 1901-1902 may be summarised as follows:—

Number and Description.						Class.	Nature of the Information received. (See p. 56).
8	Observatories	...	...	...	...	I.	A.
10	Anemograph stations	...	...	...	...	—	B.
20	Barograph stations	...	...	...	...	—	C.
82	Sunshine stations	...	...	...	...	—	S.
82	Second Order stations	...	...	...	...	II.	D.E.
28	Telegraphic stations	...	...	...	...	III.	T.
51	Weekly Weather Report stations	...	...	...	...	III.	F.
21	Climatological stations	...	...	...	...	III.	G.
55	Rainfall stations	...	...	...	...	III.	R.
17	Fishery Barometer Stations	...	...	...	...	—	H.
51	Sea Temperature stations	...	...	...	...	—	W.

Returns for Registrar-General for England and Wales.

This list does not include the stations from which observations are now being contributed for the Reports of the Registrar-General for England and Wales, because the returns to the Office did not commence until after the close of the financial year.

Use of the information from climatological stations.

The information collected from the stations is carefully arranged and kept ready for reference. The returns required for the current publications of the Office referred to in Part VI., p. 31, are examined, checked and prepared for the press; the information is also utilised in other ways.

Reports supplied to Registrar-General for Ireland.

Weekly results of the Temperature and Rainfall Observations are prepared and regularly supplied to the Registrar-General for Ireland from 6 of the Irish stations for use in his "Weekly Return of Births and Deaths," while a full table of Monthly and Quarterly results from seven stations is prepared in the Office, and supplied to him at the beginning of each quarter for publication in his "Quarterly Return of Marriages, Births, and Deaths."

Rainfall observations.

Copies of observations at Rainfall Stations have also been sent for the use of the British Rainfall Organisation to Dr. H. R. Mill and Mr. Sowerby Wallis.

Ben Nevis observations.

A transcript of Ben Nevis observations has been sent to Dr. Hergesell at his request, in connexion with the International Aeronautical Investigation.

Miscellaneous inquiries.

The information is also used to furnish replies to inquiries. During the year upwards of 72 requests for statistical information of more or less extensive character have been dealt with. Some of these have been required for use in scientific inquiries, but the greater number have been from firms of solicitors and have reference to disputed claims for damages and other legal actions and ask principally for statistics of heavy rains, winds and fogs.

Among the inquiries of the former kind which have been dealt with during the past year may be mentioned the following :—

Mr. H. P. Meares, Penrhyn Quarry.—As to the rainfall in North Wales during the last 10 years.

Messrs. Walkers, Parker, & Co.—As to the prevalence of westerly and south-westerly winds at Bagillt, Flintshire. Also as to the number of rainy days and the proportion of wet days with westerly and south-westerly winds.

Mr. Henry King.—As to the maximum temperature in the sun observed in the N.E. of England during the last few years.

The Director of Works, Admiralty.—As to the average monthly rainfall at Portsmouth.

Mr. R. F. O'Connor.—For daily rainfall near Oakham for the years 1899, 1900, and 1901.

Mr. J. T. Pearson.—As to the maximum and minimum temperatures in London and Lancashire for the past few years, and as to the weight of vapour contained in the air at different temperatures.

Professor Karl Pearson, F.R.S.—As to barometric records for a twenty-year period, from a series of stations in the Atlantic.

FOREIGN AND COLONIAL STATIONS.

A list of documents received from Foreign and Colonial Stations in the course of the year is given in Appendix II., p. 67.

Of these stations, one, St. Helena, has an anemograph in addition to the usual climatological instruments. Six are in Cyprus and have been in operation since 1882. Six are in the Bahamas, of which five send in lighthouse registers. Three are in the West Indies. Ten are on the West Coast of Africa. Three are on the Mediterranean Coast. Two are in Central or South America. One in the Falkland Islands, one at Teneriffe, and one in Madagascar.

The returns from distant stations have been largely used for the compilation of meteorological information for the Admiralty. (*See* p. 13.)

Observations chiefly relating to the Lake Levels and Rainfall of several stations on the Victoria Nyanza have been received from the Foreign Office, as well as transcripts or printed copies of observations of various kinds at a number of stations in British East Africa. There is at present no satisfactory provision for the discussion and publication in a collected form of these observations. At the request of the Foreign Office copies of the observations included in the earlier returns were sent to the Royal Geographical Society and to Mr. Ravenstein for publication. The Committee of the British Association for reporting on the climatology of Africa, of which Mr. Ravenstein was chairman, has now lapsed, and no other provision has yet been made.

Uganda
observations

PART IV.

LIBRARY.

The main part of the Library consists of the weather maps and other publications of the Weather Offices of different countries, and meteorological reports and publications received from all quarters of the globe. Most of these are presented or obtained by way of exchange, but a few standard works and serial publications are purchased. Each work, immediately on receipt, is entered on a card under the author's name, and is subsequently entered in a classified catalogue under the subject to which it refers. The Library consists at present of about 16,500 volumes and pamphlets.

Appendix XI., p. 124, gives a list of the additions to the Library during the year. These amounted to over 500 books and pamphlets.

The most important additions to the Library acquired by purchase have been the daily synoptic charts of the North Atlantic and adjacent countries, for the year from December 1895 to November 1896, prepared by the German and Danish Meteorological Authorities jointly, Hann's encyclopædic treatise on meteorology, Arctowski's *Aurores Australes—Résultats du voyage du S. Y. Belgica en 1897-1898-1899*—and other works relating to the Antarctic regions.

Among the presents to the Library are included the jubilee volume of the Austrian Central-Anstalt für Meteorologie und Erdmagnetismus, and two volumes of Annals of the Mont Blanc Observatory. Dr. F. Parkes Weber has presented two volumes on climatology, health resorts, and mineral springs, for the compilation of which the Office contributed a number of meteorological statistics. Dr. Weber's volumes form vols. 3 and 4 of "A System of Physiologic Therapeutics," published in Philadelphia under the editorship of S. S. Cohen. The Council have also received a number of meteorological works presented by the Royal Meteorological Society.

The Library is available for the use of students and others between the hours of 10 a.m. and 4 p.m. A number of persons have availed themselves of this accommodation, and in particular Sir Norman Lockyer, K.C.B., in connexion with his researches upon the periodicity of rainfall in Equatorial and Southern latitudes, and Professor Karl Pearson, F.R.S., and Miss Cave Brown Cave in connexion with their work on the correlation of barometric readings in different parts of the globe.

PART V.

MISCELLANEOUS INVESTIGATIONS.

Seasonal
variation of
temperature.

The inquiry into the seasonal variation of the temperature of the air of the British Isles, initiated by the Secretary, with the assistance of Mr. R. Waley Cohen, B.A., has been completed. The inquiry was directed towards tracing the connexion between certain peculiarities disclosed by the harmonic analysis of the curves of seasonal variation of temperature and the occurrence of winds from different points of the compass and the temperatures associated therewith. The results have been embodied in a paper contributed to the Proceedings of the Royal Society.

Miscella-
neous.

The comparison of anemometers at Holyhead has been continued.

The reduction and tabulation for the Royal Society of the observations of the "Southern Cross" Antarctic Expedition have been completed, as likewise the preparation of data books from the logs of ships south of latitude 40° S. for the use of the Antarctic Expedition.

The Council have thought it desirable to draw up a brief statement of the conspicuous features of the weather during the year 1901 for the purposes of future reference, and this is printed in Appendix X.

In connexion with the balloon ascents, arranged by international agreement, Prof. Hergesell, of Strassburg, Chairman of the International Sub-Committee for Aeronautics, again requested the co-operation of the Council in the collection of cloud observations for the day preceding and the day following, as well as for the day of each ascent. The following observatories co-operated in this matter during the first year of the balloon ascents:—Greenwich, Kew, Oxford, Glasgow, Rousdon, Valencia, Falmouth, Liverpool, Stonyhurst, and Aberdeen. They forwarded to the Office observations of clouds for the three appropriate days of each month, for transmission to Prof. Hergesell, who undertook the necessary arrangements for collating the results. At Prof. Hergesell's request, similar observations have continued at the following observatories:—Greenwich, Kew, Glasgow, Valencia, Falmouth, Liverpool, Aberdeen, and Ben Nevis.

International
co-operation
for Balloon
Research.

In the previous year the Council gave permission to Mr. F. J. Brodie to use unpublished data belonging to the Office for the compilation of a paper on the Gales of the British Islands during the last thirty years. A paper on the subject has been completed and presented to the Royal Meteorological Society, and a further discussion of the material is in progress.

PART VI.

PUBLICATIONS.

The Daily Weather Report, embodying the reports obtained from the Telegraphic Reporting Stations and some additional information, as indicated on pp. 42 and 57, has been regularly issued.

Daily
Weather
Report.

The number of subscribers has been about 160.

Supplements showing the mean monthly values for 30 years of the several elements at the Reporting Stations have been issued.

Applications for free copies of one or more of the current publications of the Office, from the Cambridge Philosophical Society's Library, the Meteorological Institute at Aachen, the National Physical Laboratory, the Irish Department of Agriculture, and the Egyptian Survey Department, have been granted.

The Weekly Weather Report is based upon the observations furnished by the Telegraphic Reporting Stations, supplemented by those from a number of stations which are climatological, classified under the heading F of pp. 58-66, and it includes, also, others from a number of additional Sunshine Stations. It is issued every Thursday, and gives a summary of the weather, in the week ending on the previous Saturday, for agricultural and sanitary purposes. Statistics as to the mean temperature,

Weekly
Weather
Report.

rainfall, and sunshine for the week are given, and these are compared with the average values for a number of years. Statistics of "accumulated temperature" are also given. A brief explanation of the mode of compilation of these statistics is given in Appendix II., p. 49.

Each week's report contains, also, three weather maps, and a weather summary for each day, which enable the reader to follow the changes of weather and its relation to barometric changes over the whole of Europe. The weekly reports have been regularly issued.

Monthly,
Quarterly,
and Annual
Supplements.

The Monthly Supplements have also been continued, but from the commencement of 1902 they have been modified in form and in the extent of the information included. The monthly summaries, which give full statistical information about the various meteorological elements, were confined to the stations of Daily Weather Report, and nearly all of these are on the coast. In order to make the survey of the weather for the month more representative of the various local conditions of the British Isles, an effort has been made to include summaries from a number of Normal Climatological Stations, which furnish full information similar, except in some unimportant details, to that derived from the Telegraphic Stations. The complete summary of returns from these stations has hitherto only been printed in the annual volume of observations at stations of the second order which is issued two years or more after the close of the period to which the observations refer. The observers at a number of Normal Climatological Stations were accordingly invited to send in their monthly sheets within a few days of the close of the month. In response to this invitation returns have been received from Deerness, Strathpeffer, Cockle Park, Cambridge, Hollesley Bay, Dunmow, Sheffield, Birmingham, Bramley, Southampton, Glasgow, Cronkbourn (Isle of Man), Stonyhurst, Plymouth, Armagh, Markree Castle, and Dublin (Phoenix Park), and arrangements have been made for sending the monthly summaries to the press within 16 days of the close of the month, so that it can be issued within the month following the one to which the information refers. The opportunity was also utilised to improve the summary in some of its details. The charts of the distribution of pressure and wind, temperature, rainfall, and the paths of cyclonic depressions are continued, but they have been arranged so as to face the descriptive text.

The usual annual and quarterly summaries (*see* p. 49) have been issued.

Quinquennial
Supplement.

An appendix is in preparation to complete the volume of the Weekly Weather Report for 1901, which will give mean values for 91 stations based upon observations as follows:—Rainfall for 35 years, 1866–1900, number of rain days, maximum temperature, minimum temperature, and mean temperature for 30 years 1871–1900; bright sunshine actual and percentage duration for 20 years 1881–1900.

First Order
Stations.

Observatories of the First Order.—After careful examination of the curves traced by the instruments, and of the measurements of the curves made at the observatories, the readings for each

hour are tabulated, and from them a volume is prepared giving the means of the readings for the several hours, of barometric pressure, temperature, wind, rainfall, and sunshine, for each consecutive group of five days, for the months, and for the year.

The form adopted for the presentation of these observations has been varied from time to time. For some years the curves themselves were reproduced. From 1874 to 1886 the hourly readings at the several observatories were published; but from 1887 the plan now in use, of giving the five-day means, was adopted, while in the volume for 1895, at the suggestion of the International Conference at Paris, the hourly readings at Kew and Valencia were included in addition, and this was continued in the volume for 1898 prepared in the current year.

Means of the meteorological elements for each hour of the day over a long period of years are also occasionally prepared; and the harmonic components are calculated for the curves representing the diurnal variation of pressure and temperature for the hourly means thus obtained for the several months over which the observations extend.

Second Order Stations. Normal Climatological Stations.—The returns from all the Second Order Stations are arranged to give monthly means of pressure and temperature at 9 a.m. and 9 p.m., with the means of maximum and minimum temperature for the month, as well as data concerning rainfall, the direction and force of the wind, &c. These are arranged in a Form "B," adopted for International use by the Meteorological Congress at Rome in 1879; while for certain selected stations the details of the actual observations made at 9 a.m. and 9 p.m. are set out *in extenso* in a Form "A," adopted in a similar manner. These returns are prepared with a view to the publication of an annual volume, which is entitled "*Observations at Stations of the Second Order*," of which twenty-four volumes have been issued, the last being that for 1898.

The volume for 1898 is, as regards the "A" list, the same as that for 1897, except that observations at Ladylaw are substituted for those at Wolfelee. To the "B" list four stations have been added, namely, Morpeth (Cockle Park Farm), Chester, Hollesley Bay, and Woburn Farm, Bedfordshire, the experimental station of the Royal Agricultural Society.

Publications on Marine Meteorology.—The issue of Monthly Pilot Charts for the North Atlantic and Mediterranean (*see* p. 53) has been continued.

The completion at the end of 1900 of thirty years of continuous meteorological records at four of the observatories in connexion with the Office has been made the occasion for the preparation of a volume dealing with the means and extremes of temperature at a number of stations in the British Isles. The main feature of the publication is the reproduction of the average seasonal variation of temperature by the reproduction of the thirty years averages for each day of the year at the four observatories Aberdeen, Kew, Falmouth, and Valencia, with diagrams exhibiting the average and extreme temperatures, and the results of the harmonic analysis of the curves of mean daily temperature.

To these tables and curves have been added diagrams of diurnal variation of temperature at the four observatories, and tables giving the means and extremes of temperature for each month and for the year at 117 stations in the British Isles, exhibiting results of observations of varying duration, but in no case for less than 15 years.

It is intended to issue a supplement giving data whereby the means for 30 years at any station can be approximately determined; when those for a number of stations have been ascertained, by comparison of results for shorter periods with those of the neighbouring stations possessing longer records.

A complete list of the publications which have been issued by the Office is given in Appendix II., p. 72, and in Appendix XII., p. 151, is given a list of important contributions to meteorology, which have not been issued as separate publications, but have been included in various Reports issued by the Office since 1866.

FINANCE.

Appendix XIII., p. 157, shows the receipts and payments during the year ending 31st March 1902. The amount voted by Parliament was £15,300, as in the previous year, and the miscellaneous receipts amounted to £1,725 14s. 9d.

The following abstract of expenditure shows the true net charge against the Parliamentary grants of this and the preceding year, together with the increase or decrease in 1901-2, as compared with the previous year :—

NET EXPENDITURE.	1900-1.	1901-2.	Increase.	Decrease.
GENERAL ADMINISTRATION :				
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
<i>Payment of Council and Secretary</i>	1,545 11 0	1,470 12 6	—	74 18 6
<i>Office</i>	912 9 0	967 1 2	54 12 2	—
<i>Rent, Fuel, and Lighting</i>	736 5 2	724 19 9	—	11 5 5
<i>Alterations to premises and contingencies</i> ...	331 16 1	528 13 1	196 17 0	—
<i>Expenses incidental to International Meteorological Congress</i> ...	26 5 11	—	—	26 5 11
SPECIAL RESEARCHES ...	803 14 3	899 0 3	95 6 0	—
LAND METEOROLOGY ...	3,399 7 4	3,530 6 11	130 19 7	—
WEATHER INFORMATION ...	3,488 10 7	3,233 9 6	—	255 1 1
INSPECTIONS ...	401 10 2	401 4 2	—	0 6 0
OCEAN METEOROLOGY ...	1,916 19 10	2,527 10 5	610 10 7	—
SUPERANNUATION ...	2,682 0 0	2,016 3 0	—	65 17 0
Total	£ 15,644 9 4	16,299 0 9	1,088 5 4	433 13 11

NOTES.—The increase under "Ocean Meteorology" is chiefly due to the purchase of instruments for the Royal Navy. The sum of £1,490 13s. 8d. was paid to the Post Office during the year 1901-2 on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

R. STRACHEY,
Chairman.

APPENDIX.

APPENDIX I.

CORRESPONDENCE WITH THE LONDON COUNTY COUNCIL WITH REGARD TO AN INQUIRY INTO THE OCCURRENCE AND DISTRIBUTION OF FOGS IN LONDON.

From the SECRETARY to the CLERK of the LONDON COUNTY COUNCIL.

Meteorological Office,
63, Victoria Street, S.W.,
November 21st, 1900.

SIR,

I AM directed by the Meteorological Council to ask you to bring before the County Council of London the following suggestion regarding an inquiry into the occurrence and distribution of fogs in the London District and their relation to other atmospheric and local conditions.

1. The suggestion arises from applications which have been received at the Meteorological Office from the Electric Supply Department of one of the Local Boards of Works and from some of the Electric Supply Companies of London for special forecasts or warnings of the approach of fogs.

2. The occurrence and distribution of fog are subject to variations of so local, and apparently so capricious, a character that the general forecasts drawn up by this Office for the South of England do not meet the requirements of the case; and the information that can at present be procured from day to day by the Office is not sufficient to justify an attempt to issue such special forecasts of fog for the individual districts of London as would meet these requirements.

3. The Council are fully conscious of the importance of a more precise knowledge of the conditions which govern the distribution of fog, not only for the lighting industry, but for many other interests of the population of London, but the funds at their disposal are not sufficient for the investigation of the local details of the atmospheric conditions on which the formation of fog depends in individual districts. These funds are not more than sufficient to enable the Office to deal generally with the meteorology of the British Isles and neighbouring seas and of the oceans traversed by British ships, for which objects the Parliamentary grant was from the outset specifically appropriated; and the Council has no staff at its disposal by whom local investigations can be undertaken.

4. The Council are of opinion that the appropriate mode of procedure in this present case would be to initiate a special inquiry during the winter months into the conditions associated with the

development and distribution of fog in London and its vicinity, and for that purpose (1) to obtain records from properly selected positions in various parts of London ; (2) to collate these records with the general atmospheric conditions at the time of the observations as shown by the information regularly furnished to this Office ; and (3) as far as possible to ascertain the character of the information requisite for anticipating the occurrence of fogs in particular localities.

5. To carry out this suggestion it appears to the Council that it would be necessary to retain, for a limited period, the special services of a gentleman of suitable scientific qualifications. The course to be adopted at the conclusion of the initial investigation thus carried out would be a matter for further consideration.

6. The Meteorological Council have thought that it would not be beyond the province of the London County Council to provide the means of undertaking such an inquiry, which could not be satisfactorily carried out without the co-operation of many local authorities or bodies, and which in itself is one that may be reasonably expected to lead to ameliorations of the conditions of life in the Metropolitan area of some importance.

7. If, therefore, the County Council could provide for the special expenses incidental to the inquiry, and for the keeping of suitable records in the several districts, the Meteorological Council would, for their part, undertake the superintendence of the inquiry, and would afford any facilities which the organisations of the Office enable them to supply.

I am further directed to say that if the County Council is disposed to give its favourable consideration to the proposal, the Meteorological Council will be glad to furnish any further particulars that may be desired of the form which, in their opinion, the inquiry should take, and an estimate of the special expenses which would be incurred in its prevention.

I am, &c.,
W. N. SHAW,
Secretary.

The Clerk to the
County Council of London.

From the CLERK of the LONDON COUNTY COUNCIL to the
SECRETARY.

M.O. 1597.

SIR,
County Hall, Spring Gardens, S.W.,
19th October, 1901.

REFERRING to your letters of the 21st November, 1900, and 19th July last, with reference to the proposed inquiry into the occurrence and distribution of fogs in the London district, and their relation to other atmospheric and local conditions, and to the interviews which my representatives have had with you on the subject, I have now to inform you that the General Purposes

Committee, by whom the matter has been considered, has decided to recommend the Council to accede to the suggestion of the Meteorological Council, and to recommend a contribution of £250 for the purposes of the investigation.

I enclose a copy of the report which will be submitted to the Council, from which you will see that there is no power to expend the money during the present financial year, but I understand that if the assurance which will be given if the recommendation of the Committee is adopted, the Meteorological Council will probably be prepared to at once take steps to institute the inquiry.

I should be much obliged if you would kindly inform me whether that supposition is correct.

The report will be submitted to the Council on Tuesday next, and I will let you know on Wednesday morning whether the Council has adopted the report and recommendation.

I am, &c.,

G. C. GOMME,

Clerk of the Council.

The Secretary,
Meteorological Office.

LONDON COUNTY COUNCIL.

EXTRACT from the REPORT of the GENERAL PURPOSES
COMMITTEE to the COUNCIL on 22nd OCTOBER, 1901.

Inquiry into the occurrence and distribution of fogs in London.

1. We have had under consideration a letter from the Secretary of the Meteorological Office, stating that it is proposed to hold an inquiry into the occurrence and distribution of fogs in the London district, and their relation to other atmospheric and local conditions, and asking for the co-operation and assistance of the Council in the conduct of the inquiry. The Meteorological Council make the suggestion consequent on applications which have been received from the electric supply department of one of the local authorities and from some of the electric supply companies of London for special forecasts or warnings of the approach of fogs; and on account of the general importance of the subject to the inhabitants of London. It is pointed out that the occurrence and distribution of fog are subject to variations of so local and apparently so capricious a character that the general forecasts drawn up for the south of England do not meet the requirements of the case; and the information that can at present be procured from day to day by the Meteorological Office is not sufficient to justify an attempt to issue such special forecasts of fog for the individual districts of London as would meet those requirements.

The Meteorological Council are fully conscious of the importance of a more precise knowledge of the conditions which govern the distribution of fog, not only for the lighting industry, but for many other interests of the population of London, but the funds at their disposal are not sufficient for the investigation of the local details of the atmospheric conditions on which the formation of fog depends in individual districts. These funds, we understand, are not more than sufficient to enable the Office to deal generally with the meteorology of the British Isles and neighbouring seas and of the oceans traversed by British ships, for which objects the parliamentary grant was from the outset specifically appropriated, and the Meteorological Council has no staff at its disposal by whom local investigations could be undertaken.

The mode of procedure suggested by the Meteorological Office is the initiation of a special inquiry during the winter months into the conditions associated with the development and distribution of fog in London and its vicinity; and for that purpose (1) to obtain records from properly selected positions in various parts of London; (2) to collate these records with the general atmospheric conditions at the time of the observations as shown by the information regularly furnished to the Office; and (3) as far as possible to ascertain the character of the information requisite for anticipating the occurrence of fogs in particular localities.

The Meteorological Council suggest that it would not be beyond the province of the London County Council to provide the means of undertaking such enquiry, which could not be satisfactorily carried out without the co-operation of many local authorities or bodies, and which in itself is one that might be reasonably expected to lead to ameliorations of some importance of the conditions of life in the London area. The Council is therefore asked to provide for the special expenses incidental to the inquiry and for the keeping of suitable records in the several districts, the Meteorological Council, for their part, undertaking the superintendence of the inquiry and affording any facilities which the organisation of their Office enables them to supply. As a matter of fact the subject has already received the attention of the medical officer and the chief officer of the Fire Brigade, and the firemen of the Council are trained to take the necessary observations which are daily made at some of the fire stations.

We have carefully considered the proposal made by the Meteorological Office, and there can be no doubt that the benefits that would be derived by the inhabitants of London and its vicinity would be immeasurable if the evil effects arising from the occurrence of fog could even to a slight extent be guarded against. It would therefore seem desirable that every facility should be given by the Council for an inquiry to be made of the nature suggested. The matter has been carefully considered, and the following course of action is proposed :—

1. That a gentleman of suitable scientific qualifications be engaged by the Meteorological Council for a limited

period to formulate instructions and a scheme of observations, and to conduct the investigation,

2. That the observations be taken at the various fire brigade stations and by men of the Fire Brigade; and also, if it can be so arranged, at other institutions of the London County Council.
3. That the returns be sent from the various stations (and any other institutions selected) direct to the Meteorological Office.
4. That the Meteorological Council do arrange with the police authorities for observations to be taken at selected positions outside the county of London.
5. That all responsibility as to the conduct of the investigation and any published results of such investigation do rest with the Meteorological Council.
6. That a copy of the complete returns and 12 copies of a report thereon by the Meteorological Council be supplied to the London County Council, and that the Council do contribute a sum of £250 for the investigation.

We are of opinion that these proposals would represent a satisfactory and practicable arrangement, and we understand that the Fire Brigade Committee would raise no objection to the use of the fire stations and men as proposed, and that the chief officer of the fire brigade is prepared to conduct the work so far as the brigade is concerned, provided the instruments intended to be used for the observations are the ordinary hygrometric instruments such as are used in the Royal Navy.

As we have said, we are strongly of opinion that if the evil effects arising from the occurrence of fog could even to a slight extent be guarded against, a very great benefit would be conferred upon the inhabitants of London, and we think the Council may properly accede to the proposal of the Meteorological Office.

As regards the powers of the Council to make the proposed contribution of £250, the solicitor advises that the only way in which the Council could expend that sum for the present purpose would be to take advantage of the power conferred on the Council by the General Powers Act of 1893 to expend the sum of £1,000 in any one year in investigating subjects of general importance to the inhabitants of the county. The £1,000 for the present financial year has been already appropriated, and the Council is therefore unable to make the contribution until April next. We understand, however, that provided they are given an assurance that the Council will be prepared to contribute the sum mentioned, the Meteorological Council will probably be prepared to at once take steps for instituting the inquiry; and having regard to the desirability of obviating the loss of a year before commencing the investigations, we have decided to recommend the Council, in accordance with Standing Order No. 269, to sanction (subject to the passing at the annual maintenance vote) an expenditure next year of a sum of £250.

We have submitted to the Finance Committee, as required by the standing order, a memorandum intimating our intention of submitting the present report, and now recommend—

- (a) That the Council do concur in the suggestion that it should assist, on the lines set out in the above report, in the initiation of a special inquiry into the conditions associated with the development and distribution of fog in London and its vicinity, on the understanding that all responsibility for the conduct of such investigation do rest with the Meteorological Council ;
 - (b) That, subject to the passing of the annual maintenance vote, the Council do contribute in the next financial year a sum of £250 for the investigation.
-

APPENDIX II.

THE METEOROLOGICAL OFFICE, 63, Victoria Street, London, S.W.

STATEMENT OF PROVISIONS FOR THE SUPPLY OF INFORMATION TO THE PUBLIC.

COUNCIL.

Directors :

Lieutenant-General Sir Richard Strachey, R.E., G.C.S.I., LL.D.,
F.R.S., Chairman.

Mr. Alexander Buchan, M.A., LL.D., F.R.S., F.R.S.E.

Professor George Howard Darwin, M.A., LL.D., D.Sc., F.R.S.

Rear-Admiral Sir William J. L. Wharton, K.C.B., F.R.S., Hydro-
grapher to the Admiralty.

Mr. William Napier Shaw, M.A., Sc.D., F.R.S., Secretary.

Other Members of the Council :

The Earl of Rosse, K.P., D.C.L., LL.D., F.R.S.

Mr. John Young Buchanan, M.A., F.R.S., F.R.S.E.

Mr. William Henry Dines, B.A., Pres. Roy. Met. Soc.

Professor Arthur Schuster, Ph.D., F.R.S., F.R.A.S.

Mr. Robert Henry Scott, M.A., D.Sc., F.R.S.

Marine Superintendent :

Commander Campbell Hepworth, C.B., R.N.R.

The Meteorological Office was established in the year 1867 under the control of a Committee appointed by the Royal Society, at the instance of the Board of Trade, the Admiralty, and the Treasury, to take over the duties of the Meteorological Department of the Board of Trade, which had been established in 1854.

The Office was accordingly charged with the duty of collecting meteorological reports by telegraph from stations in the British Isles and their immediate neighbourhood, with a view to the issue of storm warnings and forecasts of weather; of collecting for public use statistics about the weather from land stations in the British Isles and elsewhere; of providing trustworthy meteorological instruments for observations to be taken aboard the ships of the Royal Navy and the Mercantile Marine, and of compiling and

discussing the information upon Ocean Meteorology derived therefrom ; and of promoting the practical applications of the science of meteorology by special researches.

A parliamentary grant was assigned for the maintenance of the Office. Changes have been made from time to time in the arrangements, and the control is now vested in a body of Directors appointed by the Royal Society.

The Office receives a large number of daily reports, and has gradually accumulated a valuable store of information about the weather in all parts of the world. The arrangements specified below have been made to enable the public to take advantage of this information.

Office hours.

The Office is open for general inquiries between the hours of 10 a.m. and 4 p.m. on week days (Saturdays, 1 p.m.), and for telegraphic inquiries from 8.30 a.m. to 8 p.m. on week days, and from 6 to 8 p.m. on Sundays.

A. TELEGRAPHIC INFORMATION.

DAILY WEATHER REPORTS. FORECASTS AND STORM WARNINGS.

Daily
information
received.

Between 8 a.m. and 10 a.m. telegraphic messages are received daily, reporting meteorological observations at 25 stations (*see* list of stations, p. 56.) in the British Isles, chiefly on the coast, and at 29 stations on the Continent of Europe. The observations in the British Isles are made at 8 a.m., and on the Continent partly at 7 a.m. and partly at 8 a.m. A certain number of stations report evening observations (6 p.m.), also by telegram, and those that do not report in the evening include the evening observations with the following morning reports, so that a complete schedule of morning and evening observations is drawn up daily. The information refers to the readings of the barometer, dry and wet bulb thermometers, maximum and minimum thermometers, rainfall, and in some cases, sunshine, with estimates of the direction and force of the wind, and reports of the weather and state of the sea.

These reports are supplemented by telegraphic reports from the Azores, through the courtesy of the Portuguese Government and the Eastern Telegraph Company, and by a number of additional observations made at various stations in the United Kingdom, and sent either by telegram or by post through the courtesy of private persons or local officials. Moreover, the "Bulletin International," published in Paris, reproducing meteorological telegrams from the whole of Europe, is received by post on the morning of the day after publication, and supplements the information previously received in the Office by telegram.

The telegraphic information is tabulated and charted by about 10 a.m. for the morning observations, and 7 p.m. for the evening ones. A general report is then drawn up, and forecasts of the weather for the twenty-four hours following the next noon, or midnight, as the case may be, are formulated.

A Daily Weather Report, which includes a transcript of the observations for the day, with some of those for the previous day, illustrative charts, descriptive remarks on the state of the weather, and forecasts for the several districts of the British Isles, is prepared for press and sent to the lithographers at 12 noon daily, except Sundays and Bank Holidays. It is ready for issue by 2 p.m., and is then delivered by hand or posted by book post at 2.30 p.m. to those addresses which can be reached in the regular course of post on the same day. Copies for those who are outside this limit are posted by the evening mails.

Daily
Weather
Report.

The Daily Weather Report may be obtained on payment at the Meteorological Office of a subscription in advance (for not less than a quarter of a year ending at the official quarter days, *e.g.*, March 31, June 30, &c.) at the rate of £1 per annum for delivery by book post, £2 for delivery, where feasible, by hand. Single copies, price 1*d.* each, can be obtained after 3 p.m. on the day of issue at the Office, and at Messrs. W. H. Smith & Son's railway bookstalls at the following terminus stations:—Victoria, Charing Cross, King's Cross, St. Pancras, Euston.

Subscrip-
tions.

Subscribers for the Daily Weather Report receive monthly lists of "Corrections and Additions," and occasional supplements giving statistical meteorological results for the stations sending daily telegraphic reports.

Special advance copies of the descriptive remarks on the state of the weather and forecasts, based upon the morning or evening observations, are prepared at 11 a.m. and 7.30 p.m. respectively, and supplied gratis to the representative of any newspaper or press agency calling for them at the Office, at the hours named.

Reports for
the Press.

As far as practicable the Council make arrangements for daily or weekly reports of the state of the weather, in special form, upon terms which may be had upon application at the Office personally or by letter.

Printed copies of the morning forecasts for all districts are ready at 11 a.m., and are distributed by hand to clubs and societies situated in or near Pall Mall at a charge of 10*s.* per annum. They are sent by post at a charge of 2*s.* 6*d.* per official quarter or any part thereof, in addition to the cost of transmission. Copies of the evening forecasts are sent by post for a similar charge.

Printed
forecasts.

For the purposes of the forecasts of weather the British Isles are divided into eleven districts, as indicated in the accompanying map. A written copy of the latest forecast for a single district can be obtained at the Office between 9.30 a.m. and 8 p.m. upon payment of 6*d.* A written copy of the latest information in possession of the Office as to the state of the weather in any district of the British Isles, and for the neighbouring parts of the continent of Europe, can be obtained in like manner. The latest reports, with a map, are exhibited as early as possible for the information of the public at the entrance to the Office, and abbreviated reports for a few coast stations are displayed in the Street, on the balcony of the Office.

Written
forecasts for
separate
districts, and
other extracts
from the
daily Reports.

FORECAST DISTRICTS.



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

Inquiries by
telegraph.

By arrangement with H.M. Postmaster-General the latest information as to the state of the weather in various parts of the United Kingdom, or the Continent, and forecasts for one day in advance can be obtained from the Meteorological Office, upon payment at any Postal Telegraph Office of a fee of 6*d.* in addition to the cost of a telegram of inquiry addressed "Weather, London," and of the reply. Ten words, in addition to the address, must be allowed for the reply.

Telegrams of inquiry should state the nature of the information required, and the name and address to which the information is to be sent, as in the following examples :—

To "Weather, London."

Latest Information from [Straits of Dover].

or,

Latest Forecast for [Forfarshire].

or,

Next Forecast for [Dublin].

From (Name), (Address).

Inquiries by
post.

The latest information for any district, or the latest forecast, will be sent by telegraph to any address if a request be received by post stating when the information or forecast is to be sent, and enclosing 6*d.* in addition to the cost of a telegram, allowing ten words in addition to the address. It should be noted that forecasts are prepared for issue at 11 a.m. and 7.30 p.m. To avoid delay, letters of request for information or forecasts should be marked on the outside "Forecast Branch."

Forecasts for a single district will be sent regularly to public bodies for exhibition without any charge beyond the cost of the telegrams, and to private persons at additional charge of 3*d.* per telegram for a forecast for a single district, and 6*d.* for two or more districts.

Harvest
forecasts.

The Council have made arrangements for a special service of afternoon reports during the season of the Hay and Corn Harvests (June 1st to September 30th), whereby they are enabled to issue

a special series of forecasts daily (Sundays excepted) at 3.30 p.m. The forecasts for any district are supplied by telegraph to agriculturists and others upon prepayment of the cost of the telegrams (nine words daily, in addition to the address) for the period during which the forecasts are required. Forms of application for these forecasts can be obtained at the Office.

The Postmaster-General 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.

As far as practicable the Council, upon application, will make arrangements for the transcription of the whole or a selection of the morning or evening telegraphic reports, to be sent by telegraph, in code form, to newspapers or public associations desiring to make use of this means of accelerating the distribution of the latest information about the weather. The special terms for this service can be obtained on application to the Office.

Transcripts
of the
observation

STORM WARNINGS.

The Office issues notices of threatening atmospherical disturbances on or near the coasts of the British Islands (free of charge) to ports and fishing stations recommended by responsible local authorities.

Storm
signals.

The fact that one of these notices has been received at any station is made known by hoisting a black canvas cone, 3 feet high, and 3 feet wide at base, which has the appearance of a triangle when hoisted. The telegram directing the cone to be hoisted is exhibited near the signal staff.

At dusk, whenever a signal ought to be flying if it were daylight, a night signal, consisting of three lanterns hung on a triangular frame, may be hoisted in place of the cone.

The Meteorological Office supplies the canvas cone, but does not supply the lanterns. In all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as flagstaff and gear, oil, &c., and also as to the keeping of the apparatus in repair, painting, &c.

The following is a list of the stations to which storm-warning telegrams are sent :—

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.	Storm Warning Stations
SCOTLAND, N.E. Lerwick. Scalloway. Dunrossness. Sumburgh Hd. L.H. Noup Head L.H. Stromness. Kirkwall. Cantick Head L.H. Holborn Head. Dunnet Head.	IRELAND, S.W. Tuskar L.H. New Ross. Dunmore East. Dungarvan. Minehead L.H. Youghal. Queenstown. Cork. Passage. Kinsale.	ENGLAND, S.W. The Lizard. Falmouth. Pendennis. Mevagissey. Mount Batten. *Plymouth. †Devonport. Prawle Point. Teignmouth. Exmouth.	ENGLAND, N.E. Berwick-on-Tweed. Cullercoats. Tynemouth. South Shields. Souter Point L.H. Sunderland. Hartlepool. †Middlesborough. Redcar.	

[Continued.]

* Telegrams only exhibited.

† Arrangements made for showing signals or illuminating the cone at night.

LIST OF STORM-WARNING STATIONS—*continued.*

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, N.E.— <i>cont.</i>	IRELAND, S.W.— <i>cont.</i>		ENGLAND, N.E.— <i>cont.</i>
Wick.	Kinsale (Old Head).		Whitby.
Tarbet Ness L.H.	Galley Head L.H.		Filey.
Avoch.	Castletownshend.		Flamborough Hd.
Inverness.	Fastnet Rock L.H.		Bridlington.
Nairn.	Brow Head.		Hull.
Burghead.	Tralee.		Goole.
Lossiemouth.	†Limerick.		Grimsby.
Buckie.	Loophead L.H.		Boston.
†Port Knockie.	Galway.		
Cullen.			
Portsoy.	IRELAND, N.W.		
Banff.	Killybegs L.H.		
Fraserburgh.	†Tory Island L.H.		
Peterhead.	Lough Swilly L.H.		
†Aberdeen.	Rathmullan.		
Girdleness L.H.	Malin Head.		
	Portrush.		
	Port Ballintrae.		
	Ballycastle.		
SCOTLAND, E.	IRISH SEA.	ENGLAND, S.	ENGLAND, E.
*Stonehaven.	†Belfast.	Guernsey.	Sutton Bridge.
Montrose.	Donaghadee.	St. Helier's	Lynn.
Scurdy Ness L.H.	Burr Point.	(Jersey).	Sheringham.
Broughty Ferry.	Howth.	Gorey	Cromer.
Dundee.	Kingstown.	Portland L.H.	Great Yarmouth.
St. Andrews.	Pt. of Ayre (I. of M.)	Weymouth.	Southwold.
Anstruther.	Ramsey "	Anvil Point L.H.	Orford Ness L.H.
Pittenweem.	Douglas "	Poole.	Ipswich.
Buckhaven.	Castletown "	Hurst Castle L.H.	Harwich.
Methil.	Silloth.	Southampton.	Gunfleet L.H.
Wemyss, West.	Maryport.	Hamble.	
Burntisland.	Workington.	Yarmouth.	
Grangemouth.	†Whitehaven.	Cowes.	
Bo'ness.	Barrow.	Ryde.	
Granton.	Walney I. L.H.	St. Catherine's Pt.	
†Newhaven.	Morecambe.	Portsmouth.	
†Leith.	Fleetwood.	Littlehampton.	
Fisherrow.	Blackpool.	Brighton.	
Dunbar.	Lytham.	†Newhaven.	
Cockburnspath.	†Southport.		
St. Abb's Head.	Formby.		
Eyemouth.	Liverpool.		
	Runcorn.		
	Hoyle.		
	New Brighton.	ENGLAND, S.E.	
SCOTLAND, N.W.	Connah's Quay.	Beachy Head.	
Fair Isle L.H.	Penmaenmawr.	Eastbourne.	
C. Wrath L.H.	Port Penrhyn.	†Hastings.	
Stourhead L.H.	Point Lynas L.H.	Rye.	
Port of Ness.	Skerries L.H.	Sandgate.	
Stornoway.	Holyhead.	Folkestone.	
Island Glass L.H.	South Stack L.H.	Dover.	
Portnaguran.	Caernarvon.	Deal.	
	Port Dinorwic.		

[Continued.]

* Telegrams only exhibited.

† Arrangements made for showing signals or illuminating the cone at night.

‡ Communication temporarily interrupted.

LIST OF STORM-WARNING STATIONS—continued.

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, W.	ST. GEORGE'S CHANNEL.	ENGLAND, S.E.— <i>cont.</i>	
*Glasgow.			
†Greenock.	Aberystwyth.	Ramsgate.	
Rothesay.	Milford.	Margate.	
Lamlash.		Faversham.	
Carradale.		Sheerness.	
Campbelton.	BRISTOL CHANNEL.	Chatham.	
Mull of Cantire L.H.		Greenhithe.	
Rhuvaal L.H.	Small's L.H.		
Rhinns of Islay L.H.	Caldy L.H.		
Ardrossan.	†Tenby.		
Girvan.	Pembrey.		
Ballantrae.	Llanelly.		
Cairn Ryan.	Swansea.		
Corsewall Point	Briton Ferry.		
L.H.	Porthcawl.		
Mull of Galloway	Nash L.H.		
L.H.	Penarth.		
	Cardiff		
	(Bute Dock).		
	Do. (Barry Dock).		
	Newport.		
	Weston-super-Mare.		
	Burnham.		
	*Bridgwater.		
	Lundy Island.		
	Ilfracombe.		
	Bull Point L.H.		
	*Barnstaple.		
	Appledore.		
	Hartland Pt. L.H.		
	Boscastle.		
	Port Isaac.		
	Newquay.		
	Hayle.		
	Godrevy L.H.		
	St. Ives.		
	St. Sennen.		
	Newlyn, West.		
	Penzance.		
	Scilly.		

* Telegrams only exhibited.

† Arrangements made for showing signals or illuminating the cone at night.

B. INFORMATION RECEIVED WEEKLY.

METEOROLOGICAL STATISTICS FOR AGRICULTURAL AND
SANITARY PURPOSES.WEEKLY WEATHER REPORT, WITH MONTHLY AND ANNUAL
APPENDICES.Weekly
Weather
Report.

The Weekly Weather Report, which has been continued in its present form since 1890, is published on Thursdays, and gives, for the week ended on the preceding Saturday, a summary of temperature, rainfall, and duration of bright sunshine in the United Kingdom for agricultural and sanitary purposes. To this is added a series of maps showing the distribution of pressure and wind over the whole of Europe at 8 a.m. and 6 p.m. on each day, and the temperature, weather, and sea disturbance at 8 a.m. each day. The maps for each day are accompanied by a brief account of the distribution of weather for that day and the changes that have taken place. There is also appended a general summary of the weather over Europe for the week.

For the maps and descriptive account, the daily telegraphic reports are used, and are supplemented by the information contained in the "Bulletin International" already referred to (p. 42), so that the area represented is much larger than that covered by the Daily Weather Report.

For the statistical summaries, the information from the 25 telegraphic reporting stations in the British Isles is supplemented by weekly returns of daily observations of maximum and minimum temperature and rainfall supplied by volunteer observers from 51 other stations, marked F in the list on pp. 58 to 63, and by a number of observations of duration of bright sunshine at stations marked A or S in the list, which brings up the number of stations making sunshine returns to 71. The summaries refer to districts which are identical with the forecast districts of the Daily Weather Report, and they are grouped into wheat producing districts and grazing districts.

In the data for temperature are included not only statistics of mean and extreme temperatures for the week, but also weekly and progressive statistics of accumulated temperature, of which the following brief explanation may be given.

Tables of
Accumulated
Temperature.

The tables of *Accumulated Temperature* are designed to give persons engaged in agriculture better means for 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. They 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 the base (42° F.) continued for 24 hours, or any other number of degrees for an inversely proportional number of hours.

The following are the rules for computing, from the observed maxima and minima, the accumulated temperature above or below 42° F. for a weekly period :—

1. Obtain the mean temperature, from the means of the seven observed maxima and minima, suitably corrected for non-periodic changes of temperature.

2. In obtaining the accumulated temperature four cases may occur, to which the following rules will apply :—

Conditions of Temperature.	To obtain the daily Accumulated Temperature.	
	Above 42° F.	Below 42° F.
If the minimum is <i>above</i> 42° F., or <i>equal</i> to 42° F.	Subtract 42° F. from the mean.	There is none.
If the minimum is <i>below</i> 42° F., but the mean for the day is <i>above</i> 42° F.	From the difference between the mean for the day and the minimum deduct the accumulated temperature below 42° F., calculated as stated in the next column.	The required quantity is the excess of 42° F. over the minimum, multiplied by the coefficient 0.4.
If the mean for the day is <i>below</i> 42° F., but the maximum is <i>above</i> 42° F.	The required quantity is the excess of the maximum over 42° F., multiplied by the coefficient 0.4.	From the difference between the mean for the day and the minimum deduct the accumulated temperature above 42° F., calculated as stated in the preceding column.
If the maximum is <i>below</i> 42° F., or <i>equal</i> to 42° F.	There is none	Subtract the mean from 42° F.

In each of the above cases the result will be the average *daily* value, and must be multiplied by 7 in order to obtain the value for the whole week.

The coefficient varies with the duration of the period, and also with the base temperature.

The coefficient given in the second and third rules of the preceding table is for a weekly period, and for the base temperature 42° F. The following are its values for other base temperatures :— for 32° F., 0.4 ; for 52° F., 0.33 ; for 62° F., 0.25.*

Subscribers for the Weekly Weather Report receive also the following supplements and appendices :—

I. A *Monthly Supplement* giving (1) a complete summary of the observations at the Telegraphic Reporting Stations; (2) a summary of maximum and minimum temperature, rainfall, and sunshine at the additional stations which furnish weekly

Monthly, annual, and quinquennial Supplements to the Weekly Weather Report.

* A full explanation of the principles on which these rules are based will be found in Appendix II. to the Quarterly Weather Report for 1878.

returns, with in each case—for most of the stations—the differences from the average pressure, temperature, rainfall and sunshine; (3) four maps showing the monthly distribution of barometer and wind, the movements of barometric depressions, the distribution of mean temperature, and the distribution of rainfall.

Beginning with the present year this Monthly Supplement has been enlarged, and the numbers from January, 1902, contain complete tables of results for 45 stations, namely: 25 telegraphic stations and 20 selected stations of the second order, together with a summary of temperature, rainfall and sunshine, or one or more of these elements, at 69 other stations.

II. An *Appendix*, issued annually, containing (1) quarterly and annual summaries of the rainfall and mean temperature of each district compared with the corresponding quarter, or the whole year, for each of certain recent years, and with each of the corresponding five yearly means for thirty-five years;

(2) A table of the driest and wettest, the coldest and warmest corresponding quarters and years since 1866;

(3) The totals for periods of four weeks and five weeks of rainfall, accumulated temperature and sunshine, together with the progressive totals for each period of the quarter.

III. An *Appendix*, also issued annually, giving weekly and progressive totals of rain days, rainfall, accumulated temperature, and duration of sunshine with percentage of its possible amount for the whole year for the several districts.

IV. An *Appendix* computed every fifth year and giving the weekly and progressive values of the different elements in the five years and for the whole period since 1881.

V. An *Appendix* which also appears every fifth year and gives for each district a comparison of the mean of the average temperature of successive weeks for the preceding five years, with the corresponding value for the whole period defined above.

VI. An *Appendix*, which is also prepared every fifth year, giving the monthly averages of rainfall, rain days, maximum temperature, minimum temperature, mean temperature, duration of bright sunshine and percentage of possible bright sunshine, for as many as possible of the stations included in the Weekly Weather Report.

Advance
copy for the
use of
newspapers.

An advance copy of the MS. of the Report is prepared on Tuesday in each week, and is supplied free of charge to newspapers, together with the weekly summary which occupies the first page of the Report.

The Report is published every Thursday afternoon by the Publishers to the Stationery Office, Messrs. Eyre & Spottiswoode, East Harding Street, E.C., Oliver & Boyd, Edinburgh, and E. Ponsonby, 116, Grafton Street, Dublin. The annual subscription is £1 10s., post paid. Single copies are sold at 6d. each, exclusive of postage, and the separate appendices are priced at from 4d. to 1s.

C. OTHER INFORMATION FROM STATIONS IN THE BRITISH ISLES.

The Council maintain a fully equipped meteorological Observatory at Valencia (Cahirciveen), Co. Kerry, Ireland. They have also established instruments and subsidised the observatories at Kew, Falmouth, Aberdeen, and those at the foot and the summit of Ben Nevis. They receive in return curves and hourly tabulations of pressure, dry bulb temperature, wet bulb temperature, rainfall, direction and velocity of the wind, together with sunshine records from the five observatories first named, and copies of the hourly readings from the summit of Ben Nevis.

Observatories with self-recording instruments.

An annual volume embodying the results of the observations at the five Observatories is published in the usual way. That for 1898 has recently been issued, price 37s. 6d.

In return for an annual grant they also receive duplicates of the curves from the self-recording instruments at Glasgow, Armagh, and Stonyhurst, and the tabulations of these curves are available if required.

Anemographic records are also received from Alnwick Castle, Deerness, Dublin, Fleetwood, Kingstown, Holyhead, North Shields, Scilly and Yarmouth.

Sunshine returns are received from 89 stations, 67 of which furnish a continuous record from the Campbell-Stokes Recorder, while the remaining 22 stations report the daily amounts.

Continuous records of pressure by some form of self-recording aneroid are received from 18 stations.

Continuous records of temperature are received from two stations in addition to the observatories.

Normal climatological stations, equipped and maintained by volunteer observers or by local authorities at their own expense, supply monthly returns of readings of all the meteorological elements at 9 a.m. and 9 p.m. each day.

Normal Climatological Stations.

The following extract from the complete Form will show the headings under which observations are recorded :

Twice daily (at 9 a.m. and 9 p.m.).															Once daily.									
Barometer.		Temperature.		Humidity.†		Wind.		Cloud.		Weather.		Rain.		Temp.		Extra Observations.								
Attached Thermometer.	Uncorrected.	Corrected and reduced to 32° Fahr. at mean sea level.		As read.		Corrected.		Dew point.	Elastic Force of Aqueous Vapour	Percentage.	Direction.	Force (0-12).	Amount (0-10).	Form.	Direction of lower Stratum, whence coming.	At time of Observation.	Since last Observation.	At 9 a.m.	Estimated duration.	Corrected readings at 9 p.m.		Duration of Bright Sunshine.	Weather Symbols.	Remarks.
		Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Max.	Min.																	

† Deduced from readings of dry-bulb and wet-bulb.

An annual volume embodying the results of these observations is published; that for 1898 has recently been issued, price 22s. 6d.

Other
stations,

Other Climatological Stations (including those which have already been referred to as contributing weekly returns) equipped and maintained in like manner, furnish periodical returns with less extensive information than that supplied by the normal climatological stations, or information of the same extent but with different hours of observation. Other stations furnish weekly readings of sea temperature.

The names of all the stations in the British Isles from which information of any kind is received, and a statement of the nature of the information, are given in the list of stations appended hereto, pp. 58 to 63.

Supply of
information.

The returns thus collected, whether published in the manner described or in manuscript, may be consulted or copied at the Office between 10 a.m. and 4 p.m., by any person, by permission of the Secretary. Extracts from them are supplied to any person making written application to the Secretary specifying precisely the details of the information required. For these extracts a charge is made to cover the cost of the time required for selecting and making them. The extracts will, if required, be attested by a sworn declaration before a Commissioner for oaths, at a fee of £1 1s. (in addition to the charge of 1s. 6d. made by the Commissioner for oaths). A special fee of £2 2s. for each day's attendance is charged if a representative of the Council is required to attend in court with reference to the statements contained in the extracts supplied.

D.—INFORMATION FROM LAND STATIONS OUTSIDE THE BRITISH ISLES.

Periodical returns are received by the Council from stations in different British Colonies and dependencies, or in foreign countries, as follows :—Bahamas (six stations), Barbados, Beyrout, Brazil, British East Africa (12 stations), Falkland Islands, Cape Spartel, Cyprus (six stations), Eastern Soudan, British Guiana, Gibraltar, Gold Coast (eight stations), Lagos, Madagascar, Malden Island, Mauritius, Nyasaland,* Panama, Perim,* St. Helena (four stations), Sierra Leone, Sombbrero, Teneriffe, Uganda (nine stations), West Africa (three stations), and Zanzibar.

The nature of the information received from these stations is indicated on pp. 67–71.

The information contained in these returns is available upon the same terms as that contained in the returns of British Stations.

E.—THE LIBRARY.

In return for copies of publications issued by the Council, the Office receives the weather reports and other publications of the official meteorological organisations of the world, and of many private organisations.

The library has also gradually acquired a large collection of pamphlets and books bearing upon meteorological subjects. These publications are available, free of charge, for the purposes of study and research, upon application at the Office, between the hours of 10 a.m. and 4 p.m.

* Observations from these Stations are exceptional.

F.—MARINE OBSERVATIONS.

The information as to the meteorology of the sea collected by the Office since 1855, is contained in a large number of logs kept by the officers of the Royal Navy, or of the Mercantile Marine, and forwarded to the Office. The information is regularly discussed and arranged according to the squares of latitude and longitude, embracing 10 degrees in each direction, and again sub-divided according to one degree squares. The information is then compiled statistically, and is represented by a series of publications, of which a list is appended. *See* p. 72.

A series of Pilot Charts of the North Atlantic and Mediterranean was commenced in April, 1901, and is still being issued. These are supplied by the Superintendents of the Mercantile Marine Offices at the principal British ports to captains and officers of merchant ships, at the price of 6*d.* each. Copies can also be obtained from the Admiralty Agents for the sale of charts, and from the Agents for H.M. Stationery Office at Edinburgh and at Dublin, at the price of 5*s.* for an annual series of 12 charts, or 6*d.* for each chart, in addition to the cost of transmission. Pilot charts.

The marine observations are by voluntary observers. Those officers whose names are on the list of observers for the Office receive the Pilot Charts free, and also receive from time to time copies of the other marine publications issued by the Office.

G.—SUPPLY OF INSTRUMENTS TO OBSERVERS.

In accordance with the terms of the Parliamentary grant the Council does not lend instruments for the use of observers except in the following cases :— Loan of instruments.

- (1.) To the Ships of the Royal Navy.
- (2.) To the Captains of Merchant vessels who undertake to keep a Meteorological log during their voyage and forward it to the Office.
- (3.) To the Telegraphic Reporting Stations in the British Isles.
- (4.) To the First Class Observatories in connexion with the Office.
- (5.) To a few Coast Stations in less frequented parts of the world where observations are deemed to be specially desirable.
- (6.) To fishing communities in remote districts of the British Isles, which are supplied on certain conditions with suitable mercury barometers.

The instruments supplied to the ships of the Royal Navy include mercury barometers, aneroid barometers, wet and dry bulb thermometers, maximum and minimum thermometers, thermometer screens and hydrometers.

The outfit of instruments lent to captains of merchant ships consists of one mercury barometer; six thermometers, with a screen; four hydrometers.

The supply of instruments to His Majesty's ships is conducted through the Admiralty. For this purpose stocks of instruments, in accordance with a fixed scale of establishment, are maintained at H.M. Dockyards at home and abroad. The officers of the Mercantile Marine are supplied either directly from the Office or through the following agents:—

Cardiff—T. L. Ainsley, Bute Dock.

Dundee—C. H. Brown, 33, Dock Street.

Glasgow—Messrs. D. McGregor & Co., 37 & 38, Clyde Place.

Greenock—Messrs. D. McGregor & Co., 32, Brymner Street.

Hull—Messrs. Castle & Co., Commercial Road.

Liverpool—Messrs. D. McGregor & Co., 39, South Castle Street.

Southampton—Captain D. Forbes, 169, High Street.

Sets of instruments are kept in working order at the Office in London, and at each agency, for the purpose of instructing observers in the method of observation.

Fishery barometers.

The Council have been in the habit of supplying Barometers for the use of fishing communities, after due inquiry into the requirements and the resources of the localities applying for them, where it is shown that the instrument will be of material service. As a condition for the loan the community is required to provide for the housing of the instrument and to keep and forward to the Office a record of daily readings. A copy of a manual specially compiled for the purpose accompanies the instrument, and is intended to point out in simple language the practical use of the Barometer, with a view to anticipating important changes in the weather in the neighbourhood of the fishing stations. The following is a list of stations that have been supplied with Fishery Barometers:—

LIST of PLACES supplied with FISHERY BAROMETERS.

Shetland Isles.—Balta Sound, Uya Sound, Burravoe, Nesting, Lerwick, Sandwick, Scalloway, Symbister, Hamnavoe.

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

Scotland, East coast.—Duncansbay, Freswick, Auchengill, Keiss, Ackergill, Staxigoe, Wick, Lybster, Dunbeath, Inver, Portmahomack, Ballintore, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Roseheart, Y.

Pitullie, Fraserburgh, Inverallochy, Pointlaw, Portlethen, Skateraw, Stonehaven, Arbroath, East Haven, 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, Lowestoft, Orford Haven, Felixstowe, Harwich, Brightlingsea, West Mersea, Maldon, Leigh, Margate, Deal, Kingsdown, Dover.

England, South coast.—Bognor, Ryde, Bembridge, Brixton, Atherfield, Ventnor, Yarmouth (Isle of Wight), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh Salterton, Exmouth, Cawsand, Mevagissey, Gorranhaven, Devoran, Portscatho, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn (2), Mousehole, Penberth, Porth Guarra.

England, South-West coast.—St. Ives, Hayle, Port Isaac, Boscastle, Bideford, Burnham, Highbridge, Weston-super-Mare.

Wales.—Briton Ferry, Swansea, Angle, Milford, Aberystwyth, 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, Glenarm, Greenore, Dundalk, Malahide, Howth, Kingstown (2), Bray, Wicklow.

Ireland, South coast.—Dunmore East, Dungarvan, Crosshaven, Kinsale, Union Hall, Castletownsend, Baltimore, Schull (2), Crookhaven, Castletown (Berehaven), Lawrence Cove, Ballydonegan, Ballycrovane.

Ireland, West coast.—Valencia, Dingle, Tralee, Ballyheigue, Tarbert, Kilredane, Kilronan, Galway, Spiddal, Elly Bay, Cleggan, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Malinmore, Portnoo, Burton Port, Kincaslugh, Bunbeg, Inniscoo.

Ireland, North coast.—Dunfanaghy, Rathmullen, Buncrana, Malin Head, Moville, Greencastle, Portstewart, Portrush, Port Ballintrae, Ballycastle (Co. Antrim).

Scotland, West coast.—Lamlash, Tarbert (Loch Fyne), Loch Ranza, Campbeltown, Carradale, Portnahaven, Portwemyss and Bowmore (Islay), Mallaig, Portree and Armadale (Isle of Skye), Isle of Soay, Kyle of Lochalsh, Plockton, Ardshean, Shieldaig, Gruinard, Badachro, Ullapool, East Mey, Gills, Stroma (2).

Hebrides.—Ness, Carloway, Marvaig, Crossbost, Stornoway, Portnaguran, Valtos, Obb, Bernera.

Supply of
instruments
on commis-
sion for
observers at
Land
Stations.

The Council are prepared to supply, at a cost of 5 per cent. in addition to their contract prices and the cost of carriage, trustworthy instruments for standard meteorological observations to those who are willing to send copies of their observations to the Office. The risk of breakage in transit must be undertaken by the consignee. The Council will also supply, free of cost, blank registers for the returns of the observations and forms for anemographs and sunshine recorders, and will, if desired, give advice about the site and exposure of the instruments.

A book of "Instructions in the use of Meteorological Instruments" has been prepared in the Office, and is sold by Messrs. Eyre and Spottiswoode, East Harding Street, E.C., and the other agents for the sale of Stationery Office publications, price 2s. 6d. A new edition of this publication is now being prepared.

For the supply of instruments on commission for observers, or for distant coast stations, application should be made to the Office.

H.—LIST of STATIONS in the BRITISH ISLANDS from which INFORMATION has been received at the METEOROLOGICAL OFFICE during the Year ended March 31st, 1902.

The Stations marked "S" are in connexion with the Scottish Meteorological Society, and those marked "R" are in connexion with the Royal Meteorological Society.

Where necessary, the name of the nearest well-known village or town has been inserted within brackets following the name of the station.

The nature of the information received from each station is indicated by letters in the sixth column, as follows:—

- A.—Continuous records of pressure, temperature, wind, sunshine, and rain, with eye observations of the amount, form, and motion of the clouds, and notes on the weather. (Observatories.)
- B.—Continuous record of the direction and velocity (or force) of the wind. (Anemographic Stations.)
- C.—Continuous record of pressure. (Barographic Stations.)
- D.—Monthly sheets, containing regular observations at 9 a.m. and 9 p.m. each day, local time, of pressure, temperature (dry bulb and wet bulb), wind, cloud, and weather, with the daily maximum and minimum of temperature, the daily rainfall, and general remarks on the weather. (Second Order Stations.)
- E.—Monthly means and summaries of observations taken at 9 a.m. and 9 p.m. each day as above. (Second Order Stations.)

- F.—The maximum and minimum temperature, and the rainfall for each day, with remarks on the weather. This information is received in the Meteorological Office each week for use in the "Weekly Weather Report."
- G.—Observations of the same kind as at Second Order Stations, but either—(a) less full, (b) taken only once daily, (c) taken at hours other than 9 a.m. and 9 p.m. (Third Order Stations.)
- H.—Monthly Charts of daily readings of the Fishery Barometer and attached Thermometer.
- R.—Monthly sheets containing the daily observations of the amount of rainfall, with remarks on the weather. (Third Order Stations.)
- S.—Continuous record of bright sunshine. (Sunshine Stations.)
- T.—Regular observations at 8 a.m. and 6 p.m. G.M.T. (and from some stations at 2 p.m. in addition), of pressure, temperature, wind and weather, with the daily maximum and minimum of temperature, the daily rainfall, and, where possible, the sea disturbance at 8 a.m. each day, and the daily amount of bright sunshine. This information is received each day by telegraph, for use in the "Daily Weather Report" and in the "Weekly Weather Report." (Telegraphic Stations.)
- W.—Daily observations of the temperature of the sea water. (Sea Temperature Stations.)
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	Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Infor- mation supplied, <i>see p. 56.</i>	Year of last inspection.
Stations in the British Isles.	Aberdeen Observatory ..	57 10	2 6 W.	46	Prof. C. Niven, F.R.S. ..	A. T. C	01
	" Cove Bay ..	57 9	2 5 "	—	Coastguard	W.	—
	Aberdovey	52 33	4 4 "	—	John Edwards	S.	—
	Adare	52 33	8 47 "	—	W. Bowles	R.	—
	Alnwick Castle	55 25	1 43 "	210	Robt. Kyle, for the Duke of Northumberland.	B. F.	01
	Ampleforth	54 12	1 5 "	349	Rev. J. B. McLaughlin, B.A., O.S.B.	D.	01
	Ardross Castle, N.B. ..	57 45	4 21 "	449	W. Minty	R.	—
	Arlington Court (Barnstaple) ..	51 8	3 58 "	813	Lady Chichester	F.	01
	Armagh Observatory ..	54 21	6 39 "	196	J. L. E. Dreyer, Ph.D. ..	B. D. F. S.	01
	Arran, North, Galway ..	53 6	9 40 "	—	Coastguard	H. W.	—
	Aspatia	54 46	3 21 "	250	J. Smith Hill, B.Sc. ..	D. S.	01
	Aspley Guise, Beds. ..	52 1	0 38 "	410	E. E. Dymond	S.	—
	Aysgarth, Yorks	54 18	1 58 "	646	Rev. F. W. Stow, M.A. ..	D.	99
	Bahama Bank Lightship ..	54 20	4 13 "	—	Light-keepers	W.	—
	Ballantrae, Ayrshire ..	55 6	5 0 "	—	Coastguard	W.	—
	Ballydonegan, Co. Cork ..	51 38	10 3 "	—	"	W.	—
	Ballyglass, Co. Mayo ..	54 17	9 52 "	—	"	W.	01
	Baltimore, Co. Cork ..	51 28	9 22 "	—	"	H.	99
	Bath	51 23	2 21 "	—	W. H. Symons, M.D., for the Corporation.	T. S.	01
	Bawtry (Hesley Hall) ..	53 27	1 4 "	65	B. J. Whitaker, J.P. ..	F.	99
	Belfast, Queen's College ..	54 35	5 56 "	61	John Wylie	D.	01
	Belvoir Castle (Grantham) ..	52 54	0 47 "	259	W. H. Divers, for the Duke of Rutland.	D.	00
	§ Ben Nevis	56 48	5 0 "	4,405	A. Rankin, for Directors of Ben Nevis Observatory.	A. E.	01
	§ Bennington, Herts. ..	51 54	0 5 "	407	Rev. J. D. Parker, LL.D. ..	E.	00
	§ Berkhamsted	51 46	0 34 "	400	E. Mawley, F.R. Met. Soc.	E.	00
	Bettws-y-Coed	53 6	3 48 "	628	Col. Wynne Finch	R.	—
	Bidston Observatory (Liver- pool). ..	53 24	3 4 "	188	W. E. Plummer, F.R.A.S.	D. T.	01
	Birmingham (Edgbaston) ..	52 28	1 56 "	534	Alf. Cresswell	D. S.	00
	Birr Castle (Parsonstown) ..	53 6	7 55 "	175	J. L. Roe, for the Earl of Rosse.	D. S. T.	01
	§ Blackpool	53 48	3 3 "	62	F. J. H. Coutts, M.D., D.P.H. for the Corporation.	F. S.	00
	Blackscd Point, Co. Mayo ..	54 6	10 4 "	37	A. Marshall	W. T.	01
	Bognor	50 47	0 40 "	—	H. C. L. Morris, M.D., for the Corporation.	S.	—
	Bolton	50 47	0 40 "	14	A. G. Thompson	G.	—
	Bolton	53 35	2 27 "	389	W. W. Midgley, for the Corporation.	G.	—
	Bournemouth	50 43	1 53 "	—	C. Dales, for Town Council	S.	01
	§ Braemar	57 0	3 24 "	1,111	J. Aitken, J.P.	D. F. S.	00
	Bramley, Surrey	51 11	0 33 "	148	J. Bartlett, M.A.	D.	00
	Brandon	52 27	0 37 E.	48?	Col. B. E. Spragge	R.	—
	Bray, Co. Wicklow	53 12	6 6 W.	—	Coastguard	H.	—
	Brighton	50 49	0 8 "	65	A. Newsholme, M.D., for the Corporation.	S.	96
	Broadstairs	51 21	1 26 E.	—	L. A. Skinner, for the Dis- trict Council.	S.	—
	Burnmouth (Avton, Berwick) ..	55 51	2 4 W.	—	Coastguard	W.	—
	Burntisland	56 4	3 14 "	—	"	W.	—
	§ Buxton	53 14	1 54 "	987	W. Pilkington	E.	01
	Caernarvon Bay Lightship ..	53 6	4 45 "	—	Light-keepers	W.	—
	Caistor	53 30	0 20 "	99?	Thos. Ford	R.	01
	Cahir	52 22	7 55 "	188	R. W. Smith, Junr.	S.	—
	§ Cally	54 52	4 12 "	—	W. Thomson, for G. H. Murray Stewart.	E. F.	—
	Cambridge	52 13	0 6 E.	83	Miss A. Walker, for Sir Robt. Ball, F.R.S.	S. D.	98
	Campden, <i>see</i> Hidcote. ..	51 16	1 5 "	39	A. Lander	D.	01
	Canterbury	52 25	5 1 W.	—	Light-keepers	W.	—
	Cardigan Bay Lightship ..	55 2	3 37 "	72	A. Peacock	E.	01
	§ Cargen	53 58	7 38 "	350?	Mrs. J. Godley and Miss Morrow.	R.	—
	Carrigallen, Co. Leitrim ..	51 23	0 32 E.	136	The Instructor in Survey- ing.	G.	99

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Infor- mation supplied, <i>see</i> p. 56.	Year of last inspection.
Chatsworth	53 14	1 37 W.	—	The Duke of Devonshire. K.G.	C.G.	—
Chaddle	52 58	1 57 "	646	J. C. Phillips	E. F.	99
Cheltenham	51 54	2 3 "	184	R. Tyrer, B.A.	E.	01
Chester (Hawarden Bridge)	53 12	3 1 "	—	F. B. Summers	F. C.	01
Churchstoke	52 31	3 5 W.	538	P. Wright, F.C.S.	D. F. S.	01
Cirencester	51 43	1 57 "	446	Prof. G. T. Locke, M.A. ..	F. S.	01
Clacton-on-Sea	51 48	1 9 E.	—	A. W. Shadick, for the Town Council.	T.S.	—
Cleggan, Co. Galway ..	53 33	10 8 W.	—	Coastguard	W.	—
Clifton	51 27	2 37 "	230	D. Rintoul, M.A.	F.	00
Cockle Park (Morpeth) ..	55 13	1 41 "	324	W. H. Hogg and J. H. J. Farquhar.	D. S.	01
Colly Weston	52 37	0 31 "	280	Miss A. Tasker	F.	01
Colwyn Bay	53 17	3 43 "	—	R. E. Lord, M.D., B.Sc. ..	S.	01
Coningbeg Lightship ..	52 2	6 40 "	—	Light-keepers	W.	—
Corbally (Limerick) ..	52 39	8 36 "	59	Poole Gabbett	R.	—
Cromarty	57 41	4 0 "	—	Coastguard	W.	—
Cronkbourne (Douglas) ..	54 10	4 29 "	137	A. W. Moore, M.A., C.V.O..	D. F. S.	01
Crookhaven	51 28	9 43 "	—	Coastguard	H.	90
Crosshaven	51 48	8 18 "	—	.. .. .	H.	01
Cuckfield, Sussex	51 1	0 9 "	389	John Howe	R.	97
Cullompton	50 51	3 23 "	202	T. Turner, J.P.	F. S.	01
Darwen, Lancashire ..	53 41	2 28 "	710	G. Mainland, for the Cor- poration.	G. S.	00
Deerness, Orkney Islands..	58 56	2 45 "	160	M. Spence	B. D. S.	01
Disserth (Llandrindod) ..	52 13	3 24 "	711	Rev. J. Le Herbert	R.	00
Donaghadee	54 38	5 32 "	40	W. Keown	T.	01
Doneraile, Co. Cork ..	52 13	8 34 "	266	Capt. J. W. Evans, J.P. ..	R.	—
Dover	51 7	1 18 E.	198	H. E. Stilgoe, C.E.	R.	96
Dublin, Botanic Gardens ..	53 23	6 16 W.	67	F. W. Moore, M.R.I.A. ..	D.	01
" City	53 20	6 15 "	47	Sir J. W. Moore, M.D. ..	D. F.	01
" Phoenix Park	53 22	6 21 "	155	Colonel Haynes, R.E. ..	B. D. S.	01
§ Dundee	56 28	2 56 "	160	J. Carnochan	D. S.	01
Dungeness	50 55	0 58 E.	26	W. H. Taylor and J. G. Williams.	T.	01
Dunmow	51 53	0 23 "	207	E. E. Hennessey, B.A., B.Sc., and Thos. Hacking.	D. F. S.	—
§ Dunrobin Castle	57 59	3 56 W.	12	D. Melville, for the Duke of Sutherland.	D.	01
Durham	54 46	1 35 "	336	Prof. R. A. Sampson, M.A.	D. F. S.	00
Dursley, Glos.	51 41	2 21 "	250	R. W. Pinney	R.	99
Eastbourne	50 46	0 17 E.	39	R. Sheward, for the Corpo- ration.	D. S.	00
East Goodwin Lightship ..	51 13	1 36 "	—	Light-keepers	W.	—
East Dereham	52 41	0 57 "	158	G. H. H. Cooper	R.	—
Edenfel (Omagh)	54 36	7 19 W.	300	Col. Buchanan, C.B.	F.	00
Edgbaston, <i>see</i> Birmingham.						
Edinburgh	55 57	3 12 "	253	Prof. J. B. Balfour, F.R.S..	S.	—
English and Welsh Grounds Lightship.	51 27	3 0 "	—	Light-keepers	W.	—
Ennis, Co. Clare	52 51	8 59 "	38	Miss A. L. Scott	R.	—
Ennistymon, Co. Clare ..	52 57	9 17 "	131	Rev. C. W. McDowell, M.A.	R.	—
Falmouth	50 9	5 4 "	167	E. Kitto	A. F.	01
Felixstowe	51 58	1 22 E.	76	Rev. J. G. Munday, M.A. ..	F. S.	00
Fleetwood	53 56	3 1 W.	—	M. S. Gaultier	B.	00
Forgandenny, Perth ..	56 21	3 29 "	175	C. L. Wood	C.	—
Forest Row, Sussex	51 7	0 2 E.	619	Rt. Hon. J. Bryce, D.C.L., M.P.	R.	—
§ Fort Augustus	57 8	4 40 W.	68	Rev. C. von Dieckhoff ..	E. F. S.	01
Fort William	56 49	5 7 "	31	A. Rankin, for Directors of Ben Nevis Observatory.	A. F.	01
Foynes, Co. Limerick ..	52 37	9 7 "	108	W. H. Ward, for Lord Monteagle, K.P.	F.	95
Fulbeck, Lincolnshire ..	53 3	0 37 "	185	Rev. V. F. Willson, M.A. ..	C. D.	01
Geldeston (Beccles)	52 28	1 31 E.	37	E. T. Dowson	D. F. S.	99
Glasgow	55 53	4 18 W.	180	Prof. L. Becker .Ph.D ..	A. D. F.	01

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Infor- mation supplied, <i>see</i> p. 58.	Year of last Inspection.
Glasnevin, <i>see</i> Dublin.						
Glenarm	54 58	5 56 W.	44	Earl of Antrim	R.	—
"	54 58	5 56 "	—	Coastguard	H.	—
Glencarron	57 30	5 14 "	480	D. D. Munro	E. F.	00
Glenlee	55 5	4 12 "	203	W. Melville	E. F.	01
Gordon Castle	57 37	3 6 "	101	C. Webster, for the Duke of Richmond and Gordon, K.G.	E.	00
Gorleston (Gt. Yarmouth)	52 35	1 43 E.	—	J. G. Bammant	H.	—
Gruline, Isle of Mull ..	—	—	100	J. W. Melles	R.	—
Harefield	51 36	0 29 W.	247	G. Eland	R.	—
Harrogate	54 0	1 33 "	—	G. Paul, for the Corpora- tion,	R. S.	—
Haslar Hospital	50 47	1 7 "	—	C. Seaman	H.	—
Hawarden Bridge, <i>see</i> Chester.						
Hastings, St. Helen's Cres.	50 51	0 34 E.	149?	Rev. H. H. Breton, M.A. ..	R.	00
" Waterworks	50 51	0 34 "	—	— Farnham, for the Cor- poration.	S.	00
Haverfordwest	51 48	4 58 W.	—	J. W. Phillips	S.	01
Hesley Hall, <i>see</i> Bawtry.						
Hereford	52 5	2 45 "	291	Rev. T. B. Harrington, O.S.B.	F.	01
Hidcote (Camden), Glos. ..	52 5	1 46 "	524	Major W. Wright, R.A. ..	R.	97
Hillington	52 48	0 33 E.	88	Rev. H. E. B. Folkes, M.A.	D. F. S.	99
Hollesley Bay, Suffolk ..	52 3	1 27 "	38	Prof. C. G. Freer Thon- ger, F.C.S.	D. S.	99
Holyhead, Harbour Office ..	53 18	4 39 W.	57	F. M. Cotton, C.E. ..	B. W.	01
" Sailors' Home	53 18	4 39 "	48	T. Chope	T.	01
Hoylake, Cheshire	53 23	3 12 "	—	L. G. Dashper	S.	01
Hurdlestown (Broadford), Co. Clare.	52 48	8 38 "	157	Lieut.-Col. W. O. Bentley, R.A.	R.	—
Kearsney Abbey (Dover) ..	51 8	1 17 E.	100?	C. W. Curtis	R.	96
" Chilton Farm	51 8	1 17 "	135	H. E. Stilgoe, C.E. ..	R.	—
Ketton Vicarage	52 38	0 32 W.	109	Rev. A. Swire	R.	99
Kew Observatory	51 28	0 19 "	18	C. Chree, D.Sc., F.R.S. ..	A.	00
Kilredane, Co. Clare	52 35	9 47 "	—	Coastguard	W.	—
Kilkenny	52 39	7 14 "	212	H. Carlton, for the Marquis of Ormonde, K.P.	C. F.	99
Killarney	52 4	9 30 "	174	E. H. Griffin, M.D. ..	G. F.	01
Killiney, Co. Dublin	53 16	6 7 "	249	R. O'Brien Furlong, C.B.	R.	95
Kingstown	53 17	6 8 "	—	H.M. Office of Works ..	B.	01
"	53 17	6 8 "	—	J. B. Power, for the Dist. Council.	G. S.	01
" (Sandy Cove)	53 17	6 8 "	—	Coastguard	W.	—
Kinlochewe	—	—	58	A. McLennan (for Hon. W. Peel, M.P.).	R.	—
Kirkby Lonsdale	54 12	2 36 "	—	J. K. Picard	R.	—
" (Norwood)	54 12	2 36 "	304	R. A. Clarke	R.	—
Kirkwall	58 59	2 57 "	—	Coastguard	W.	—
Kish Bank Lightship	53 19	5 55 "	—	Light-keepers	W.	—
Lahinch, Co. Clare	52 55	9 21 "	52	Miss I. F. K. Bowes ..	R.	99
Laig	58 1	4 22 "	335	Rev. D. Macrae	E. F.	01
Lamlash, Isle of Arran ..	55 32	5 8 "	—	Coastguard	H. W.	—
Laudale, Argyleshire	56 41	5 41 "	14	A. Fletcher, for T. H. G. Newton, M.A.	D. F.	01
Lednathie	56 45	3 7 "	719	W. Morrison, for P. Stor- month Darling.	E.	00
Leith	55 58	3 10 "	19	T. Richardson	T.	01
Leman and Ower Lightship	53 8	2 2 E.	—	Light-keepers	W.	—
Lerwick	60 9	1 8 W.	—	Coastguard	W.	—
Liscannor, Co. Clare	52 56	9 23 "	—	Coastguard	W.	—
Lisdoonvarna	53 1	9 17 "	358	J. J. MacGrath, L.R.C.P.I.	G.	—
Lissan, Co. Tyrone	54 41	6 45 "	300	—	E.	98
Littlestone-on-Sea	50 59	0 53 E.	—	H. T. Tubbs	G. S.	01
Llandinam, Montgomery ..	52 29	3 26 W.	500	John Owens	R.	—
Llandoverly	51 59	3 48 "	217	J. Watkins	F.	01
Llandudno	53 31	3 50 "	72	Wm. Little, for Town Council.	E. F. S.	01
London, Brixton	51 27	0 8 "	77	F. Gaster	T.	—
" Chelsea	51 29	0 10 "	—	T. W. E. Higgins, C.E. ..	R.	—

Station	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Infor- mation supplied, see p. 56.	Year of last Inspection.
London, City	51 31	0 5 W.	80	Messrs. De La Rue	S.	—
" Hampstead	51 34	0 10 "	—	H. R. Beeton	C.	—
" Pall Mall	51 30	0 7 "	—	Athenæum Club	C.	—
" Westminster	51 30	0 8 "	78	The Staff of the Met. Office	C. G.	—
" Westminster Training College.	51 30	0 8 "	—	H. A. Reatchlous, M.A. ..	S.	—
Londonderry	55 0	7 19 "	67	The late J. Conroy	F.	00
Loughborough	52 47	1 12 "	146	W. Berridge	T.	01
Lowestoft	52 29	1 44 E.	—	C. J. Heppell	H.	—
"	52 29	1 44 "	84	C. W. Edwards, for the Corporation.	E.S.	99
Lytham	53 44	2 58 W.	21	J. C. Fisher, M.A., M.B., for the Corporation.	D. S.	00
Machrihanish	55 25	5 45 "	16	J. Franklin Adams	G.	95
Maidenhead	51 30	0 43 "	99	G. H. Palmer	G.	99
Malin Head, Co. Donegal ..	55 23	7 24 "	230	Alfred Hailstone	T. C.	01
Mallaranny	53 55	9 40 "	119	Miss M. Kilsby	R.	—
Manchester, Oldham Rd. ..	53 29	2 13 "	190	J. Niven, M.A., M.B., for the Corporation.	D. S.	00
" Whitworth Park	53 28	2 14 "	125	Prof. Schuster, F.R.S., D.Sc.	D. S.	99
" Prestwich	53 32	2 17 "	320	T. R. H. Clunn, M.D. ..	D. F. S.	00
§ Marchmont	55 44	2 25 "	498	J. A. Wood	E. F. S.	98
Marcham-le-Fen	53 8	0 5 "	33	Mrs. G. L. Kime	R.	01
¶ Margate	51 24	1 24 E.	83	J. Stokes, J.P.	S.	00
Markree Castle, Co. Sligo ..	54 11	8 27 W.	122	F. W. Henkel, B.A., for the late Col. Cooper.	D. F. S.	01
Minard, Co. Kerry	52 7	10 8 "	—	Coastguard	W.	—
Morpeth, see Cocker Park.						
Mount Callan (Inagh), Co. Clare.	52 53	9 16 "	479	Lt.-Col. Tottenham	R.	98
Nairn	57 36	3 52 "	32	Miss Penny	T.	01
Newarp Lightship	52 45	1 53 E.	—	Light-keepers	W.	—
Newcastle, Co. Wicklow ..	53 5	6 6 W.	256	B. H. Steede, M.A., M.B. ..	D.	00
Newcastle-on-Tyne	54 59	1 36 "	152	N. H. Martin, F.C.S. ..	G. S.	01
Newchurch	51 41	2 48 "	—	C. Cullum	R.	—
Newmarket-on-Fergus	52 46	8 53 "	—	W. W. A. FitzGerald ..	R.	98
* Newport, Monmouth	51 35	3 0 "	—	C. Cullum	R.	00
Newton Hall	54 57	1 54 "	524	Rev. J. Seymour St. John	R.	—
Newquay, Cornwall	50 25	5 4 "	250 ?	A. Hardwicke, M.D., for the Town Council.	S.	00
"	50 25	5 5 "	—	Coastguard	W.	—
Newton Reigny (Penrith) ..	54 41	2 48 "	579	T. G. Benn	T. S. C.	01
Northallerton	54 20	1 26 "	129	W. Stead, C.E.	R.	95
North-West Lightship	53 31	3 31 "	—	Light-keepers	W.	—
¶ Norwood	51 20	0 6 "	220	W. Marriott	E.	—
§ Ochertyre	56 23	3 53 "	329	G. Croucher, for Sir P. K. Murray, Bt.	E. F.	01
Omagh, see Edenfel.						
Oswaldkirk, Yorkshire ..	54 12	1 3 "	510	R. Thompson	S.	96
Outer Dowsing Lightship ..	53 27	1 5 E.	—	Light-keepers	W.	—
Owers Lightship	50 39	0 41 W.	—	"	W.	—
Oxford	51 46	1 16 "	208	A. A. Rambaut, M.A. ..	T. S.	01
Pant-y-reos (Newport)	51 38	3 4 "	449	C. Cullum	R.	00
Parkstone, Dorset	50 43	1 56 "	197	R. Hawkesworth Barnes, B.A.	D.	00
Penbedw (Mold)	53 12	3 11 "	650	H. W. Buddicom	C.	—
Pennant Bay (Aberdour) ..	57 40	2 16 "	—	Coastguard	W.	—
Penrhyn Quarry	53 10	4 6 "	—	H. P. Meares, C.E.	R.	01
Peper Harow	51 11	0 40 "	199	John Warner	R.	—
§ Pinmore (Girvan)	55 12	4 49 "	187	P. Donald, for Capt. Hamil- ton.	E.	01
Plumstead	—	—	—	J. E. Waller	S.	01
Plymouth, The Hoe	50 22	4 8 "	116	H. Victor Prigg, C.E., for the Corporation.	D. F. S.	00
§ Poltalloch	56 8	5 30 "	132	D. S. Melville, for Lord Malcolm.	E.	00
Portland Bill	50 32	2 27 "	177	C. Smith	T.	01
Portrush	55 13	6 40 "	—	Coastguard	W.	—
Port Talbot	51 34	3 45 "	—	R. Milner, for Miss Talbot	S.	00
Prestwich, see Manchester.						

* See also Pant-y-reos and Ynis-y-bro.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Informa- tion supplied, <i>see</i> p. 56.	Year of last inspection.
Rauceby Hall	53 0	0 29 W.	125	General M. Willson ..	G.	01
Recess, Co. Galway ..	53 28	9 44 "	90	A. A. Smith	R.	—
Rhyl	53 19	3 29 "	—	A. A. Goodall, for Dist. Council.	S.	01
Ridgmont	52 1	0 36 "	291	H. M. Freear	D.	98
Ridlington	52 37	0 45 "	522	W. W. Wortley	R.	—
Roche's Point, Co. Cork	51 47	8 15 "	42	W. Kennedy and B. Kell- cher.	T.	01
Rochford (Tenbury) ..	52 18	2 36 "	316	Rev. John Tomson ..	C. R.	01
Rosewell	55 51	3 7 "	690	R. B. Mitchell, M.D. ..	E.	99
Rothamsted	51 48	0 22 "	368	T. Wilson	F. G. S.	99
Rothsay	55 50	5 1 "	115	J. Kay	E.	00
Rounton, Yorkshire ..	54 24	1 18 "	242	Sir I. L. Bell, Bart., F.R.S.	E.	99
Rousdon, Devon	50 43	3 0 "	515	Lady Peek	E.	01
Roxborough, Co. Limerick	52 35	8 36 "	111	A. W. Shaw	R.	95
Royal Sovereign Lightship	50 43	0 27 E.	—	Light-keepers	W.	—
Rugby	52 22	1 15 W.	379	St. J. B. Wynne Willson, M.A., and R. G. K. Lemp- fert, M.A.	G.	98
St. Ann's Head, Pembroke	51 41	5 11 "	150	G. H. Dunsford	T. S. W.	01
St. Aubin's, Jersey ..	49 12	2 11 "	25	J. Fisher	T.	01
St. David's, Pembrokeshire	51 53	5 16 "	215	W. P. Probert, LL.D. ..	D.	01
St. Helen's, Lancashire ..	53 28	2 45 "	151	F. Drew Harris, M.D., for the Corporation.	G.	00
St. Helier's, Jersey ..	49 11	2 6 "	—	Signal Officer, Fort Regent	S.	00
St. Leonard's	50 51	0 33 E.	178	H. Colborne, M.R.C.S., for the Corporation.	D. F.	00
" West Marina	50 51	0 32 "	—	T. Eldridge, for the Corpo- ration.	G.	00
St. Peter Port, Guernsey ..	49 32	2 32 W.	180	F. E. Carey, M.D.	S.	00
Salcombe, Devon	50 14	3 46 "	—	Coastguard	W.	—
Sandgate, Kent	51 4	1 9 E.	56	A. Robert Bowles, C.E. ..	R.	99
S Scarborough	54 18	0 24 W.	62	W. W. Larkin, for the Cor- poration.	D. F. S.	01
Schull	54 17	0 23 "	—	Coastguard	W.	—
Scilly Islands, St. Mary's ..	51 32	9 32 "	—	H.	H.	90
	49 56	6 18 "	65	A. Hicks	B. S. T.	00
Seafeld, Co. Clare	52 48	9 30 "	—	Coastguard	W. C.	—
Seaham Harbour	54 50	1 19 "	148	G. H. Aird	D.	00
Seven Stones Lightship ..	50 4	6 5 "	—	Light-keepers	W.	—
Shaftesbury	51 1	2 12 "	722	Miss L. H. Harris	F.	01
Shambles Lightship	50 31	2 20 "	—	Light-keepers	W.	—
Sheffield, Weston Park ..	53 23	1 29 "	429	E. Howarth, F.R.A.S. ..	D. S.	01
" Attercliffe	53 24	1 25 "	—	J. Robertson, M.D., B.Sc., for the Corporation.	S.	01
Sheephaven (Dunfanaghy)	55 11	7 53 "	—	Coastguard	W.	—
Shields, North	55 0	1 27 "	99	W. B. Clark	T.	01
" High Light- house.	55 0	1 27 "	—	T. Robson	B.	01
Shipwash Lightship	52 2	1 38 E.	—	Light-keepers	W.	—
Skipton	53 58	2 9 W.	567	W. Farrer	G.	99
Solway Lightship	54 48	3 32 "	—	Light-keepers	W.	—
Southampton	50 55	1 24 "	78	J. T. Cook and A. Vaughan, for Dir. Gen. of Ordnance Survey.	D. F. S.	00
Southport	53 39	2 59 "	37	J. Baxendell, for the Cor- poration.	G. S.	97
South Rock Lightship ..	54 25	5 22 "	—	Light-keepers	W.	—
Spiddal, Co. Galway	53 15	9 17 "	—	Coastguard	H.	90
Spurn Head	53 34	0 7 E.	26	A. S. Badcock	T.	01
Spurn Lightship	53 34	0 13 "	—	Light-keepers	W.	—
Stokesay (Craven Arms) ..	52 26	2 52 W.	370	Rev. W. La Touche, M.A., and Miss Tonkin.	D.	01
Stonyhurst College	53 51	2 28 "	375	Rev. W. Sidgreaves ..	A. D. F.	01
Stornoway	58 11	6 23 "	29	J. Mackenzie	T. S. C.	00
"	58 11	6 22 "	—	Coastguard	W.	—
Stranraer	54 54	5 2 "	—	"	H.	—
Strathpeffer Spa, N.B.	57 37	4 28 "	253	J. Tregelles Fox, M.D. ..	D. S.	01
Sumburgh Head (Shetlands)	59 51	1 17 "	126	Rev. W. Brand	T. C.	01
Sunderland	54 54	1 23 "	—	Coastguard	W.	—
Swarraton	51 8	1 11 "	310	Rev. W. L. W. Eyre, M.A.	F.	00
Symbister, Shetlands ..	60 14	1 25 "	—	J. S. Nicolson	H.	—
Syston, Leicester	52 43	1 5 "	178	S. K. Daniels	R.	96

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Infor- mation supplied, see p. 58.	Year of last Inspection.
Tealby, Lincolnshire ..	53 34	0 16 W.	251	Rev. S. Lewin, B.A. ..	D.	00
Teelin, Co. Donegal ..	54 38	8 39 "	—	Coastguard	W.	—
Temple Bruer, Lincolnshire	53 4	0 30 "	—	Miss G. Morley	R.	99
Tenby	51 41	4 42 "	79	R. J. Truscott, for the Cor- poration.	S.	00
Thurcaston (Leicester) ..	52 42	1 10 "	253	Rev. T. A. Preston, M.A. ..	S.	96
Torquay	50 28	3 31 "	286	F. Marsh, for the Cor- poration.	S.	00
Totland Bay, Isle of Wight	50 41	1 33 "	84	J. Dover, M.A.	G.	00
Union Hall, Co. Cork ..	51 33	9 8 "	—	Coastguard	H.	90
Uzon (Montrose)	56 40	2 28 "	—	Coastguard	W.	—
Valencia Observatory, Ca- hiriveen.	51 56	10 15 "	30	J. E. Cullum	A. T. C.	01
" Island, Glanleam	51 56	10 20 "	—	Miss E. FitzGerald	R.	01
" Knightstown	51 55	10 20 "	—	Coastguard	H.	01
Ventnor	50 36	1 13 "	80	Miss M. Gibson	S.	97
Wakefield	53 41	1 30 "	96	A. Clyde	E.	99
Waterford	52 16	7 7 "	—	Harbour Authorities	C.	01
Watergate (Emsworth) ..	50 56	0 55 "	236	W. M. Christy	R. S.	99
Watford	51 39	0 24 "	253 ?	G. E. Eland	R.	—
Wessington Court (Wool- hope).	52 1	2 35 "	—	S. Lomas, for Miss L. Grafton.	D.	01
Westbourne, Sussex ..	50 52	0 55 "	30	Rev. L. B. Birkett	S.	99
Whitchurch, Devon ..	50 32	4 6 "	593	E. E. Glyde	E.	01
Wick	58 27	3 6 "	80	J. Sinclair	T.	01
"	58 27	3 6 "	—	Coastguard	W.	—
Woburn (Ridgmont) ..	52 1	0 36 "	291	H. M. Freear	—	—
Wolfelee	55 23	2 39 "	587	W. Gordon	D.	98
Woolacombe, Devon ..	51 10	4 12 "	59	E. Henshall, C.E.	D.	01
Worsop	53 22	1 5 "	56	H. Mellish, J.P.	S.	90
Worthing	50 49	0 22 "	38	C. Kelly, M.D., for the Cor- poration.	S.	99
Yarmouth, Norfolk ..	52 37	1 43 E.	10	G. T. Watson	B. T. C.	01
Yarmouth, Isle of Wight	50 42	1 29 W.	—	Coastguard	H.	—
Ynis-y-bro (Newport) ..	51 38	3 3 "	115	C. Cullum	R.	00
York, The Museum ..	53 57	1 5 "	56	H. M. Platnauer, B.Sc. ..	D.	01
" Bootham	53 57	1 5 "	105	Hugh Richardson, M.A. ..	S.	01

In addition to those already mentioned, reports are received daily from the following Continental Stations.

Station.	Authority	Station.	Authority.
Haparanda	Meteorological Office, Stock- holm.	†The Helder	Bureau Central Météorologique, Paris.
Hernösand		Brussels	
†Stockholm		Cape Gris Nez	
Wisby		†Brest (St. Mathieu) ..	
Karlstad	Meteorological Institute, Christiania.	Lorient (Ile de Groix) ..	
Bodø		*†Rochefort (Ile d'Aix) ..	
†Christiansund		†Biarritz	Deutsche See- warte, Ham- burg.
*†Skudesnaes		†Paris	
Færder		Belfort	
	Meteorological Institute, Copenhagen.	Lyons	
†The Scaw		Nice	
Fanø		Perpignan	Observatory, Lisbon.
Cuxhaven		Berlin	
	Deutsche See- warte, Ham- burg.	Frankfort	
		Munich	
		Corunna	
		†Lisbon	
		Azores (P. Delgada) ..	

Note.—The stations marked with an asterisk (*) report also at 2h. p.m., and those with dagger (†) at 6h. p.m.; Lisbon reports at 4h. p.m. instead of 6h. p.m.
The Helder does not send reports at 6 p.m. on Sundays.

LIST OF BRITISH STATIONS ARRANGED UNDER COUNTIES.

County.	Station.	Nature of the Information supplied. <i>see p. 56.</i>	County.	Station.	Nature of the Information supplied. <i>see p. 58.</i>
England:—			England— <i>cont.</i>		
Bedford ..	Aspley Guise ..	S.	Lancashire ..	Manchester, Prestwich.	D. F. S.
	Ridgmont ..	D.		St. Helen's ..	G.
Berkshire ..	Maidenhead ..	G.		Southport ..	G. S.
Buckingham ..				Stonyhurst ..	A. D. F.
Cambridge ..	Cambridge ..	D. S.	Leicester ..	Belvoir Castle ..	D.
Cheshire ..	Bidston ..	D. T.		Loughborough ..	T.
	Chester, Hawarden Bridge.	F. C.		Syston ..	R.
	Hoylake ..	S.	Lincoln ..	Thurcaston ..	S.
Cornwall ..	Falmouth ..	A. F.		Caistor ..	R.
	Newquay ..	S.		Fulbeck ..	C. D.
	Do. ..	W.		Mareham-le-Fen ..	R.
	Scilly ..	B. C. S.		Rauceby ..	G.
		T. W.		Tealby ..	D.
Cumberland ..	Aspatria ..	D. S.	Middlesex ..	Temple Bruer ..	R.
	Newton Reigny ..	C. S. T.		Harefield ..	R.
Derby ..	Buxton ..	E.		London:—	
	Chatsworth ..	C. G.		Chelsea ..	R.
Devon ..	Arlington ..	F.		City ..	S.
	Cullompton ..	F. S.		Hampstead ..	C.
	Plymouth ..	D. F. S.		Pall Mall ..	C.
	Rousdon ..	E.		Westminster ..	G. S.
	Salcombe ..	W.		Do. ..	C.
	Torquay ..	S.	Monmouth ..	Newchurch ..	R.
	Whitchurch ..	E.		Newport ..	R.
	Woolacombe ..	D.		Pant-y-rhos ..	B.
Dorset ..	Parkstone ..	D.		Ynis-y-bro ..	R.
	Portland Bill ..	T.	Norfolk ..	East Dereham ..	R.
	Shaftesbury ..	E.		Geldeston ..	D. F. S.
Durham ..	Durham ..	D. F. S.		Hillington ..	D. F. S.
	Seaham ..	D.		Yarmouth ..	B. C. T.
	Sunderland ..	W.	Northampton ..	Colly Weston ..	F.
Essex ..	Clacton-on-Sea ..	T. S.	Northumberland ..	Alnwick Castle ..	B. F.
	Dunmow ..	D. F. S.		Cockle Park, Morpeth.	D. S.
Gloucester ..	Cheltenham ..	E.		Newcastle-on-Tyne.	G. S.
	Cirencester ..	F. S.		Newton Hall ..	R.
	Clifton ..	F.		North Shields ..	B. T.
	Dursley ..	R.	Nottingham ..	Hesley Hall, Bawtry	F.
	Hidecote ..	R.		Worksop ..	S.
Hampshire ..	Bournemouth ..	S.	Oxford ..	Oxford ..	S. T.
	Haslar ..	H.	Rutland ..	Ketton ..	R.
	Southampton ..	D. F. S.		Ridlington ..	R.
	Swarraton ..	F.	Shropshire ..	Stokesay ..	D.
	Totland Bay ..	G.	Somerset ..	Bath ..	S. T.
	Ventnor ..	S.	Stafford ..	Cheadle ..	E. F.
Hereford ..	Yarmouth ..	H.	Suffolk ..	Brandon ..	R.
	Hereford ..	F.		Felixstowe ..	F. S.
	Wessington Court ..	D.		Gorleston ..	H.
Hertford ..	Bennington ..	E.		Hollesley Bay ..	D. S.
	Berkhamsted ..	E.		Lowestoft ..	E. S.
	Rothamsted ..	F. G. S.		Do. ..	H.
	Watford ..	R.	Surrey ..	Bramley ..	D.
Huntingdon ..				Brixton ..	T.
Kent ..	Broadstairs ..	S.		Kew ..	A.
	Canterbury ..	D.		Norwood ..	E.
	Chatham ..	G.	Sussex ..	Peper Harow ..	B.
	Dover ..	R.		Bognor ..	G.
	Dungeness ..	T.		Do. ..	S.
	Kearsney ..	R.		Brighton ..	S.
	Do. (The Abbey) ..	R.		Cuckfield ..	R.
	Littlestone-on-Sea ..	G. S.		Eastbourne ..	D. S.
	Margate ..	S.		Forest Row ..	R.
	Plumstead ..	S.		Hastings ..	R.
	Sandgate ..	R.		Do. Water-works.	S.
Lancashire ..	Blackpool ..	F. S.		St. Leonards ..	D. F.
	Bolton ..	G.		Do. West Marina	G.
	Darwen ..	G. S.		Watlington Park ..	R. S.
	Fleetwood ..	B.		Westbourne ..	S.
	Lytham ..	D. S.			
	Manchester ..	D. S.			
	Do. Whitworth Park.	D. S.			

County.	Station.	Nature of the Information supplied, see p. 56.	County.	Station.	Nature of the Information supplied, see p. 56.
England—cont.			Scotland—cont.		
Sussex—cont.	Worthing ..	S.	Cromarty ..	Cromarty ..	W.
Warwick ..	Birmingham ..	D. S.	Strathpeffer Spa ..	—	D. S.
	Edgbaston.	—		—	—
Westmoreland ..	Rugby ..	G.	Dumbarton ..	—	—
	Kirkby Lonsdale ..	R.	Dumfries ..	—	—
Wiltshire ..	Do. Norwood ..	R.	Edinburgh ..	Edinburgh ..	S.
Worcester ..	—	—		Leith ..	T.
Yorkshire ..	Rochford ..	C. R.		Rosewell ..	E.
	Ampleforth ..	D.	Elgin ..	—	—
	Aysgarth ..	D.	Fife ..	Burntisland ..	W.
	Harrogate ..	R. S.	Forfar ..	Dundee ..	D. S.
	Northallerton ..	R.		Lednathie ..	E.
	Oswaldkirk ..	S.		Uzon ..	W.
	Rounton ..	E.	Haddington ..	—	—
	Scarborough ..	D. F. S.	Inverness ..	Ben Nevis ..	A. E.
	Do. ..	W.		Fort Augustus ..	E. F. S.
	Sheffield ..	D. S.		Fort William ..	A. F.
	Do. Attercliffe ..	S.		Cove Bay ..	W.
	Skipton ..	G.	Kincaidine ..	—	—
	Spurn Head ..	T.	Kinross ..	—	—
	Wakfield ..	E.	Kirkcudbright ..	Cally ..	E. F.
	York, The Museum ..	D.		Cargen ..	E.
	Bootham ..	S.		Glenlee ..	E. F.
				Glasgow ..	A. D. F.
			Lanark ..	—	—
			Linlithgow ..	—	—
			Nairn ..	Nairn ..	T.
			Orkney ..	Deerness ..	B. D. S.
				Kirkwall ..	W.
			Peebles ..	—	—
			Perth ..	Forgandenny ..	C.
				Ochtertyre ..	E. F.
			Renfrew ..	—	—
			Ross ..	Ardross Castle ..	R.
				Glencarron ..	E. F.
				Kinlochewe ..	R.
				Stornoway ..	C. S. T.
				Do. ..	W.
				Wolfelee ..	D.
			Roxburgh ..	—	—
			Selkirk ..	—	—
			Shetlands ..	Lerwick ..	W.
				Sumburgh Head ..	C. T.
				Symbister ..	H.
			Stirling ..	—	—
			Sutherland ..	Dunrobin Castle ..	D.
				Lore ..	E. F.
			Wigton ..	Sirraeraer ..	H.
Wales:—			Ireland:—		
Anglesey ..	Holyhead (Harbour Office).	B. W.	Antrim ..	Belfast ..	D.
	Do. (Sailors' Home).	T.		Glenarm ..	R.
				Do. ..	H.
Brecknock ..	—	—		Portrush ..	W.
Cardigan ..	—	—		Armagh ..	B. D. F. S.
Carmarthen ..	Llandovery ..	F.		—	—
Carnarvon ..	Llandudno ..	E. F. S.	Armagh ..	Ennis ..	R.
	Penrhyn Quarry ..	R.		Ennistymon ..	R.
	Bettws-y-Coed ..	R.		Hurdlestown ..	R.
Denbigh ..	Colwyn Bay ..	S.		Kilreegan ..	W.
Flint ..	Penbedw ..	C.		Lalinch ..	R.
	Rhyl ..	S.		Liscannon ..	W.
Glamorgan ..	Port Talbot ..	S.		Lisdoonvarna ..	G.
Merioneth ..	Aberdovey ..	S.		Mount Callan ..	R.
Montgomery ..	Churchstoke ..	D. F. S.		Newmarket-on-Fergus ..	R.
	Llandinam ..	R.		Seafeld ..	W.
Pembroke ..	Haverfordwest ..	S.		Ballydonegan ..	W.
	St. Ann's Head ..	T. S. W.		Baltimore ..	H.
	St. David's ..	D.		Crookhaven ..	H.
	Tenby ..	S.		Crosshaven ..	H.
Radnor ..	Disserth ..	R.		Doneraile ..	R.
				Roche's Point ..	T.
				Schull ..	H.
				Union Hall ..	H.
Islands:—				Malin Head ..	C. T.
Isle of Man ..	Cronkbourne ..	D. F. S.		Sheep Haven ..	W.
Jersey ..	St. Aubin's ..	T.		Teelin ..	W.
	St. Helier's ..	S.		Donaghadee ..	T.
Guernsey ..	St. Peter Port ..	S.			
Scotland:—					
Aberdeen ..	Aberdeen ..	A. T. C.			
	Do. ..	W.			
	Braemar ..	D. F. S.			
	Pennant Bay ..	W.			
	Gruline, Isle of Mull ..	R.			
Argyll ..	Landale ..	D. F.			
	Machrihanish ..	G.			
	Poltalloch ..	E.			
Ayr ..	Ballantrae ..	W.			
	Pinmore ..	E.			
Banff ..	Gordon Castle ..	E.			
Berwick ..	Burnmouth ..	W.			
	Marchmont ..	E. F. S.			
Bute ..	Lamlash ..	W. H.			
	Rothsay ..	E.			
Caithness ..	Wick ..	T.			
	Do. ..	W.			
Clackmannan ..	—	—			

County.	Station.	Nature of the Information supplied, see p. 56.	County.	Station.	Nature of the Information supplied, see p. 56.
Ireland—cont.			Ireland—cont.		
Dublin	Dublin (City) ..	D. F.	Limerick	Adare	R.
	Do. (Phoenix Park)	B. D. S.		Corbally, Limerick	R.
	Do. (Botanic Gds.)	D.		Foynes	F.
	Killiney	R.		Roxborough ..	R.
	Kingstown	B.	Londonderry ..	Londonderry ..	F.
	Do.	G. S.	Longford	—	—
	Do. Sandy Cove.	W.	Louth	—	—
Fermanagh ..	—	—	Mayo	Sallyglass	W.
Galway	Arran	H. W.		Blacksod Point ..	T. W.
	Cleggan	W.		Mallaranny	R.
	Recess	R.	Meath	—	—
	Spiddal	H.	Monaghan	—	—
Kerry	Killarney	F. G.	Queen's County	—	—
	Minard	W.	Roscommon	—	—
	Valencia	A. T. C.	Sligo	Markree Castle ..	D. F. S.
	Do. Glanleam ..	R.	Tipperary	Cahir	S.
	Do. Knightstown	H.	Tyrone	Lissan	E.
Kildare	—	—		Omagh	F.
Kilkenny	Kilkenny	C. F.	Waterford	Waterford	C.
King's Co. ..	Birr Castle	D. S. T.	Westmeath	—	—
Leitrim	Carrigallen	R.	Wexford	—	—
			Wicklow	Bray	H.
				Newcastle	D.

NOTE.—Light-vessels are not included in the above list.

LIST OF DOCUMENTS received from FOREIGN AND COLONIAL LAND STATIONS during the year ended March 31st, 1902.

Place.	Observer.	Nature of Observations.
Bahamas (Abaco)	R. A. A. Espie and T. A. Thompson, senr.	Lighthouse Register, 1901.
" (Cay Lobos)	Lightkeepers	" " 1900, July to December; 1901, January to June.
" (Cay Sal)	"	" " 1901.
" (Inagua)	"	" " Observations once daily. 1901, March to December; 1902, January and February.
" (Nassau)	R. W. D. Albury	Lighthouse Register, 1901.
" (Watling Island)	F. W. Lunn	Monthly Summary of Observations twice daily. 1901. March to December.
Barbados	J. R. Bovell	Observations twice daily, 1901, March to December; 1902, January.
Beyrout (Lee Observatory)	R. S. Dugan	Monthly values, 1900, December; 1901, January and February.
Brazil (Cuzaba)	E. G. Christian	Observations twice daily. 1900, October to December; 1901. 1902, January.
British Guiana (George Town)	"	Daily record of sunshine, 1901, March to December; 1902, January and February.
"	"	Meteorological observations, 1897, November and December; 1898 and 1899.
Central Africa, Nyassaland (Zomba)	J. McClounie	Temperature and Rainfall observations, 1901, February to December.
" Uganda (Eldoma Ravine).	"	1900, November.
" (Fort Berkeley).	F. Spire	" " 1901, September-November.
" (Fort Portal)	"	" " 1901, except August.
" (Gondokoro)	T. Spire, H. R. Maxstead	" " Rainfall (daily), 1899, March to December; 1900 and 1901.
" * (Kisumu)	Various Observers	" " 1898, December.
" † (Lubwas)	"	" " 1901, September-November.

* Also Port Florence, or Port Ugowe.

Land Stations
outside the
British Isles.

LIST OF DOCUMENTS received from FOREIGN AND COLONIAL LAND STATIONS during the year ended March 31st, 1902
—continued.

Place.	Observer.	Nature of Observations.
Central Africa, Uganda (Mbarara)	R. R. Racey, V. M. Mauara	Meteorological observations and Barometer Curves, 1901, April to December.
" " (Mumias)	—	Temperature and Rainfall observations, 1900, September to November; 1901, except February.
" " †(Entebbe)	F. Pordage and A. G. Boyle	Rainfall (daily), 1896, April to December; 1897, January to July; 1900. Meteorological observations, January-June, three observations of Temperature daily and Rainfall, July-December (Form 12), 1901. Observations twice daily, 1901.
Cyprus (Famagusta)	G. Eliades	" " " "
" (Kyrenia)	P. Michaelides	" " " "
" (Larnaca)	V. E. Feneck and P. Nicopoulou	" " " "
" (Limassol)	Luigi Béraud and M. Theodorides	" " " "
" (Nicosia)	P. Nicopoulou and V. E. Feneck	" " " "
" (Papho)	E. A. Malliotis and M. Enotiades	" " " "
East Africa (British)(Kibwezi)...	—	Meteorological observations, 1896, July to December; 1897, January to April, June to November; 1898, January; 1899, February to June. Temperature and Rainfall (daily), 1896-1898; 1899, January to September; 1900, January-June, September-December. Temperature and Rainfall observations, 1896-1900.
" " (Kikuyu)...	F. G. Hall	" " " "
" " (Kisimayu)	R. G. Farrant, W. Blake, and R. W. Humphrey.	1900, July, September to December. 1896-1900.
" " (Kitui)	S. L. Hinde	" " " "
" " (Lamu)	A. S. Rogers, W. Blake, and J. J. Anderson.	" " " "
" " (Machakos)	W. M. Wilson	1896, January to June, September and October; 1897-1899.
" " (Malindi)...	J. Weaver	1891, September and December; 1896, except October; 1897, January to June; 1898-1900.
" " (Mombasa)	J. W. Tritton	" " " "

"	"	(Nairobi) ...	W. D. Spiers, F. Gilkison, Louis S. —.	Rainfall observations, 1899, October to December; 1900, August to December.
"	"	"	Various Observers ...	Temperature and Rainfall observations, 1896, except March; 1897, January to June.
"	"	"	M. G. Carvalho, E. H. L. Murray, and E. H. Russell.	Meteorological observations, 1896, January, February, and April; 1897–1900.
"	"	"	C. F. Braganza and G. H. L. Murray.	Rainfall (daily), 1896, Complete; 1897, except February, November, and December; 1898, May to September, November and December; 1899, February to December; 1900.
"	"	Eastern Soudan (Wadelai)	Dr. S. Brunch ...	Meteorological observations and Nilometer readings, 1901, November.
"	"	Zanzibar (Iubweni)	—	Meteorological observations (monthly summaries), 1889, April to December. 1891, January to March. 1892, August to December. 1893, January to March.
Falkland Islands (Cape Pembroke)				
Gibraltar ...	"	"	G. K. Broom, Lightkeeper ...	Lighthouse Register, 1901.
Madagascar (Majunga) ...	"	"	Staff Sergeant W. Tuson, R.A.M.C.	Observations twice daily, 1901, March to December; 1902, January and February.
Mauritius (Royal Alfred Observatory.)	"	"	Stratton C. Knott ...	Observations twice daily, 1901, February to December.
"	"	"	T. F. Claxton ...	Results of observations, 1901.
Panama, Isthmus of (Colon) ...	"	"	Archdeacon S. P. Hendrick	Observations twice daily, 1901, February to June.
Perim, Island of ...	"	"	—	Meteorological observations, 1891, June to December; 1892–1898.
St. Helena ...	"	"	A. L. C. Hands ...	Observations once daily, 1900, November and December; 1901.
"	"	"	"	Continuous record of wind (direction and velocity), 1901, January to September.
"	"	"	J. Homagee ...	Daily rainfall, 1901, April to December.
Central (Oak Bank) ...	"	"	A. E. Broadway ...	" " " (except July); 1902, January.
" (James Town) ...	"	"	T. C. Barker ...	" " " 1900, August to December; 1901.
" (Mount Pleasant) ...	"	"	"	"

† Also Port Alice.

LIST OF DOCUMENTS received from FOREIGN AND COLONIAL LAND STATIONS during the year ended March 31st, 1902
—continued.

Place.	Observer.	Nature of Observations.
Sombrero	J. A. Richardson and A. L. Richardson.	Lighthouse Register, 1900, October to December; 1901, January to September.
South Pacific (Malden Island) ...	J. Rasmussen and J. G. Fingle ...	Observations, 1897, January to April; 1898, January to May; 1900 November and December; 1901, January to August, September to November.
Tangier (Cape Spartel)	E. C. Hathaway. Lloyd's Signalman.	Observations twice daily, 1901, March to December; 1902, January and February.
Teneriffe (Sitio del Pino)	A. F. Perry	" " and Barograms and Thermograms, 1901, February to November.
West Africa (Benin River)	—	Meteorological observations, 1891, November and December; 1892, January–March.
" " Gold Coast (Aburi)	Assistant Colonial Surgeons	Observations twice daily, 1901, February to August, October and November.
" " " (Accra)	" "	" " February to November.
" " " (Adda)	" "	" " September, November.
" " " (Axim)	" "	" " November.
" " " (Cape Coast Castle)	" "	" " December.
" " " (Gambaga)	" "	" " 1900, September, October, and December; 1901, January to September, November.
" " " (Kintampo)	" "	" " 1901, July, August, October, and November.
" " " (Kwitta)	" "	" " January to November.

"	"	(Lagos)	...	...	T. B. Wright...	...	...	"	"	"	February to May.
"	"	(Old Calabar)	...	...	Dr. E. G. Fenton and Dr. R. Bennett.	...	...	"	"	"	1898, February to April; July to December. 1899, 1900, 1901, January to June. (Three observations daily from September, 1899.)
"	"	(Sierra Leone)	...	...	Z. Grant	...	...	"	"	"	Observations twice daily, 1901, March to December; 1902, January.
"	"	(Warri)	...	...	Felix Roth, M.R.C.S., L.R.C.P., and others.	...	...	"	"	"	Temperature and Rainfall observations, 1893, June-December.

I—LIST OF PUBLICATIONS ISSUED UNDER THE AUTHORITY OF THE METEOROLOGICAL COUNCIL.*

The list is arranged under the following headings:—

1. Periodical Publications and Reports.
2. Occasional Publications.
3. Instructions in the use of Instruments.
4. Marine Meteorology.
5. Miscellaneous Publications.

1. Periodical Publications.

Daily Weather Report. Subscription, £1 per annum.

Weekly Weather Report. With Appendices and Monthly Supplements priced separately:—

†1888. Vol. V. (Official, No. 85.) 4*d.* per week. Annual subscription, including Supplements and Appendices, 21*s.* 2*d.*

1889-1902. Vols. VI.-XIX. (Official, Nos. 86, 87, 96, 100, 107, 111, 116, 121, 128, 133, 138, 144, 150, 155.) 6*d.* per week. Annual subscription, including Supplements and Appendices, 30*s.*

Monthly Pilot Charts of the North Atlantic and Mediterranean. See Marine Meteorology.

Monthly Weather Reports:—

1884 (Official, No. 62), Jan.-March, May Nov., 1*s.* 6*d.* each; April (with two Appendices), 2*s.* 6*d.*; Dec., 1*s.* 9*d.* 1885 (No. 65); 1886 (No. 68), Jan. to Dec., 1*s.* 6*d.* each. ‡1887 (No. 77), Jan. to April, 1*s.* 6*d.* each; May to Dec., in wrapper, 12*s.*

Quarterly Weather Reports:—

1869 (Official, No. 7), 1870 (No. 9), 1871 (No. 14), 1872 (No. 16), 1873 (No. 19), Parts I. to IV. of each year, 5*s.* each. 1874 (No. 25), Parts I., II., and IV., 5*s.* each; Part III., 5*s.* 9*d.* 1875 (No. 30), Parts I. to IV., 5*s.* each. 1876 (No. 33), Part I., 6*s.*; Parts II., III., and IV., 5*s.* each. 1877 (No. 52), Part I., 10*s.*; Part II., 5*s.*; Part III., 4*s.* 6*d.*; Part IV., 6*s.*; Appendices and Plates, 27*s.* 1878 (No. 55), Parts I. to IV., 6*s.* each; Appendices and Plates, 28*s.* 1879 (No. 49), Parts I. to III., 6*s.* each; Part IV., 5*s.* 6*d.*; Appendices and Plates, 27*s.* 1880 (No. 50), Parts I. and II., 6*s.* each; Part III., 4*s.*; Part IV., 6*s.*; Appendices and Plates, 28*s.*

ANNUAL Volumes:—

Reports of the Meteorological Committee:—

1867 (Official, No. 1), 1*s.* 1868 (No. 5), 5*d.* 1869 (No. 6), 10*d.* 1870 (No. 10), 10*d.* 1871 (No. 15), 10*d.* 1872 (No. 17), 1*s.* 1873 (No. 22), 4*d.* 1874 (No. 26), 6*d.* 1875 (No. 29), 4*d.* 1876-77 (No. 31), 3*s.* 5*d.*

* Sold by Messrs. Eyre and Spottiswoode and other agents for the sale of the publications of H.M. Stationery Office; Annual Reports by Parliamentary Booksellers; Pilot Charts and Charts published by the Admiralty, by Messrs. J. D. Potter & Co.

† The publication of the Weekly Weather Report began in February 1878. Annual subscription, including Supplements and Appendices, post paid, 1878-1883, 12*s.* 6*d.*; 1884-1887, 21*s.* 2*d.*

‡ The publication of the Monthly Weather Report was continued after this date as a Supplement to the Weekly Weather Report.

1. Periodical Publications—continued.

Reports of the Meteorological Council :—

1877-78 (Official, No. 35), 1*s.* 1878-79 (No. 38), 5*d.* 1879-80 (No. 41), 1*s.*
 1880-81 (No. 42), 1*s.* 2*d.* 1881-82 (No. 48), 1*s.* 1882-83 (No. 58), 10½*d.*
 1883-84 (No. 64), 1*s.* 2*d.* 1884-85 (No. 67), 4*s.* 4*d.* 1885-86 (No. 72), 8*d.*
 1886-87 (No. 75), 8*d.* 1887-88 (No. 79), 1*s.* 1888-89 (No. 84), 5½*d.*
 1889-90 (No. 91), 7½*d.* 1890-91 (No. 99), 5½*d.* 1891-92 (No. 104), 6*d.*
 1892-93 (No. 109), 8*d.* 1893-94 (No. 112), 7½*d.* 1894-95 (No. 119), 8½*d.*
 1895-96 (No. 122), 8½*d.* 1896-97 (No. 130), 8*d.* 1897-98 (No. 136), 11*d.*
 1898-99 (No. 140), 7½*d.* 1899-1900 (No. 147), 11½*d.* 1900-1901 (No. 153),
 1*s.* 1½*d.*

Observatories and Stations.

***Hourly Readings from the Self-Recording Instruments at the . . .
 Observatories under the Meteorological Council :—**

1881. (Official, No. 51.) Part I., 10*s.* 6*d.* ; Parts II., III., and IV., 21*s.* each.
 1882. (No. 54.) Parts I. and II., 20*s.* each ; III., 22*s.* 6*d.* ; IV., 26*s.*
 1883. (No. 63.) Parts I., II., and III., 21*s.* each ; IV., 30*s.*
 1884. (No. 70.) Part I., 12*s.* ; II., 10*s.* ; III., 10*s.* 6*d.* ; IV., 15*s.*
 1885. (No. 74.) Parts I. and II., 11*s.* each ; III., 10*s.* 6*d.* ; IV., 12*s.*
 1886. (No. 81.) Parts I., II., and III., 10*s.* 6*d.* each ; IV., 12*s.* 6*d.*

**Hourly Means of the Readings obtained from the Self-Recording Instruments
 at the . . . Observatories under the Meteorological Council :—**

1887 (Official, No. 94), 16*s.* 1888 (No. 97), 20*s.* 1889 (No. 103), 15*s.*
 1890 (No. 105), 20*s.* 1891 (No. 113), 32*s.* 6*d.* 1892 (No. 118), 21*s.*
 1893 (No. 126), 24*s.* 1894 (No. 131), 24*s.* 1895 (No. 135), 38*s.* 1896
 (No. 141), 37*s.* 6*d.* 1897 (No. 145), 37*s.* 6*d.* 1898 (No. 151), 37*s.* 6*d.*
 1899 (No. 157), (in the Press).

Meteorological Observations at Stations of the Second Order :—

†1876 (Official, No. 33*a.*), 1877 (No. 33*b.*), 1878 (No. 39), 20*s.* 1879
 (No. 45), 20*s.* 1880 (No. 57), 34*s.* 6*d.* 1881 (No. 66), 35*s.* 1882
 (No. 69), 35*s.* 1883 (No. 73), 30*s.* 1884 (No. 78), 32*s.* 1885 (No. 82),
 31*s.* 1886 (No. 88), 25*s.* 1887 (No. 95), 24*s.* 1888 (No. 101), 22*s.*
 1889 (No. 108), 34*s.* 1890 (No. 110), 34*s.* 1891 (No. 117), 30*s.* 1892
 (No. 120), 27*s.* 1893 (No. 125), 27*s.* 1894 (No. 129), 17*s.* 1895
 (No. 137), 22*s.* 6*d.* 1896 (No. 139), 21*s.* 1897 (No. 146), 22*s.* 1898
 (No. 152), 22*s.* 6*d.* 1899 (No. 156), (in the Press).

2. Occasional Publications and Reports.

ATLAS :—

Meteorological Atlas of the British Isles. (Official, No. 53. 1883.) 5*s.* 6*d.*

CONGRESSES, CONFERENCES, &c., Reports of Proceedings :—

Leipzig. 1872. (Non-Official, No. 6.) 1*s.*
 Vienna. 1873. (Official, No. 21.) 1*s.*
 Vienna and Utrecht. 1873 and 1874. (Non-Official, No. 9.) 1*s.* 6*d.*
 London. 1874. Maritime Meteorology. (Official, No. 23.) 2*s.*
 London. 1876. With Supplement. (Non-Official, No. 11.) 2*s.*
 Utrecht. 1878. (Non-Official, No. 13.) 6*d.*
 Rome. 1879. (Official, No. 36.) 1*s.* 6*d.*
 Berne. 1880. (Non-Official, No. 14.) 1*s.*
 Copenhagen. 1882. (Non-Official, No. 15.) 2*s.* 6*d.*

² For the years 1874-1880 the Hourly Readings were issued in lithographed form. Price 20*s.* per annum.

† The Observations at Stations of the Second Order for 1873-75 will be found in the Quarterly Weather Report for the respective years.

2. Occasional Publications and Reports—continued.**CONGRESSES, CONFERENCES, &c., Reports of Proceedings—continued.**

- Paris. 1885. (Non-Official, No. 16.) 1*s*.
 Zürich. 1888. (Non-Official, No. 17.) 4*d*.
 Munich. 1891. (Official, No. 102.) 1*s*. 6*d*.
 Upsala. 1891. (Official, No. 115.) 1*s*.
 Paris. 1896. (Official, No. 127.) 1*s*.
 St. Petersburg. 1899. (Official, No. 148.) 2*s*.
 Report on Weather Telegraphy and Storm Warnings. 1873. (Non-Official, No. 8.) 6*d*.
 Reports . . . on Atmospheric Electricity, Maritime Meteorology, and Weather Telegraphy. 1878. (Non-Official, No. 12.) 2*s*.

FOREIGN AND COLONIAL STATIONS :—

- Contribution to the Meteorology of Japan.—By Staff-Com. Thomas H. Tizard. H.M.S. "Challenger." (Official, No. 28. 1876.) [Out of Print.]
 Meteorological Observations at the Foreign and Colonial Stations of the Royal Engineers, and the Army Medical Department, 1852 - 1886. (Official, No. 83. 1890.) 23*s*.
 Meteorological Observations made at Sanchez, Samaná Bay, St. Domingo, 1886-1888.—By the late W. Reid, M.D. (Official, No. 89. 1890.) 8*s*. 6*d*.
 Report on the Meteorology of Kerguelen Island.—By Rev. S. J. Perry, S. J., F.R.S. (Official, No. 37. 1879.) 3*s*.

RAINFALL :—

- Diurnal Range of Rain at the Seven Observatories in connection with the Meteorological Office, 1871-1890. (Official, No. 143. 1900.) 2*s*. 6*d*.
 Rainfall Tables of the British Isles for 1866-80. Compiled by G. J. Symons, F.R.S. (Official, No. 47. 1883.) 7*s*. 6*d*.
 Rainfall Tables of the British Islands, 1866-90. (Official, No. 114. 1897.) 6*s*.

SUNSHINE :—

- Sunshine Records of the United Kingdom for 1881. (Official, No. 56. 1883.) 4*s*.
 Ten Years' Sunshine in the British Isles, 1881-90. (Official, No. 98. 1891.) 2*s*.

TEMPERATURE :—

- Temperature Tables for the British Islands. (Official, No. 154. 1902.) 10*s*. 6*d*. *Supplement* (in the Press).

3. Instructions in the use of Instruments, &c.

- Barometer Manual for the use of Seamen. With an Appendix on the Thermometer, Hygrometer, and Hydrometer. Fourth Edition, 1900. Extensively Revised. Reprinted, 1902. (Official, No. 61.) 3*d*.
 Fishery Barometer Manual. New Edition. 1887. (Official, No. 3.) 6*d*.
 Instructions for Meteorological Telegraphy. New Edition. 1891. (Official, No. 2.) Prepared for the use of observers exclusively.
 Instructions in the use of Meteorological Instruments. Reprinted 1892. (Official, No. 24.) 2*s*. 6*d*.

FORECASTING :—

- Aids to the Study and Forecast of Weather.—By W. Clement Ley, M.A. (Official, No. 40. 1889.) 1*s*.
 Principles of Forecasting by means of Weather Charts.—By the Hon. Ralph Abercromby, F.R.Met.Soc. Second Edition, Revised. 1885. (Official, No. 60.) [Out of print.]

4. Marine Meteorology.

CHARTS :—

Arabian Sea :—

Daily Weather Charts for the period of six weeks ending June 25, 1885, to illustrate the tracks of two cyclones in the Arabian Sea. (Official, No. 80. 1891.) 10s.

Atlantic :—

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. (Official, No. 27. 1876.) 24s.

Monthly Current Charts for the Atlantic Ocean. From information collated and prepared in the Meteorological Office. Published by the Admiralty. (Official, No. 132. 1897.) 7s.

Atlantic (North) :—

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. (Official, No. 20. 1874.) 20s.

Charts illustrating the Weather of the North Atlantic Ocean in the Winter of 1898–99. (Official, No. 142. 1901.) 6s. 6d.

Currents and Surface Temperature of the North Atlantic Ocean, from the Equator to Latitude 40° N., for each Month of the Year. With a General Current Chart. (Official, No. 12. 1872.) 2s. 6d.

Discussion of the Meteorology of that Part of the Atlantic lying North of 30° N., for the eleven days ending 8th February, 1870. With Charts. (Official, No. 13. 1872.) 5s.

Meteorology of the North Atlantic during August, 1873, with 31 Synoptic Charts. (Official, No. 32. 1878.) With Book of Charts. 15s.

Synchronous Weather Charts of the North Atlantic and the Adjacent Continents, 1st August, 1882, to 3rd September, 1883. Parts I. to IV. (33 sheets each). (Official, No. 71. 1886.) 17s. each part.

Atlantic (South) :—

Charts showing the Surface Temperature of the South Atlantic Ocean in each month of the Year. (Official, No. 4. 1869.) 2s. 6d.

Wind Charts for the Coastal Regions of South America, from information collated and prepared in the Meteorological Office. Published by the Admiralty. (Official, No. 159. 1902.) 7s.

Atlantic, Indian, and Pacific Oceans :—

Charts showing the Mean Barometric Pressure over the Atlantic, Indian, and Pacific Oceans. (Official, No. 76. 1887.) 10s. 6d. Supplementary Chart. 6d.

Charts showing the Surface Temperature of the Atlantic, Indian, and Pacific Oceans. (Official, No. 59. 1884.) 21s.

Atlantic and Mediterranean :—

Monthly Pilot Charts, commencing April, 1901. (Official, No. 149.) 6d. each. Subscription for one year, 5s. (exclusive of postage).

Indian Ocean :—

Monthly Current Charts for the Indian Ocean. From Information collated and prepared in the Meteorological Office. Published by the Admiralty. (Official, No. 124. 1896.) 7s.

Indian Ocean (North) :—

Meteorological Charts of the portion of the Indian Ocean adjacent to Cape Guardafui and Ras-Hafún. (Official, No. 92. 1891.) 6s.

4. Marine Meteorology—continued.**CHARTS—continued.***Indian Ocean (South) :—*

Cyclone Tracks in the South Indian Ocean. From information compiled by Dr. Meldrum, C.M.G., F.R.S. (Official, No. 90. 1891.) 7s.

Meteorological Charts for the Ocean District adjacent to the Cape of Good Hope, with accompanying Remarks. (Official, No. 43. 1882.) Charts, 25s.; Remarks, 7s.

Pacific Ocean :—

Quarterly Current Charts for the Pacific Ocean. From Information collated and prepared in the Meteorological Office. Published by the Admiralty. (Official, No. 134. 1897.) 5s.

Wind Charts for the Coastal Regions of South America, from information collated and prepared in the Meteorological Office. Published by the Admiralty. (Official, No. 159. 1902.) 7s.

Red Sea :—

Meteorological Charts of the Red Sea. (Official, No. 106. 1895.) 21s.

Southern Ocean :—

Meteorological Charts of the Southern Ocean between the Cape of Good Hope and New Zealand. (Official, No. 123. 1899.) 12s.

OTHER PUBLICATIONS ON MARINE METEOROLOGY :—

Contributions to our Knowledge of the Meteorology of the Antarctic Regions. (Official, No. 18. 1873.) 2s.

Contributions to our Knowledge of the Meteorology of the Arctic Regions. (Official, No. 34. 1885.) Vol. I.: Part I., 2s.; II., 10s.; III. and V., 6s. each; IV., 5s.

Contributions to our Knowledge of the Meteorology of Cape Horn and the West Coast of South America. (Official, No. 11. 1871.) 2s. 6d.

Notes on the Form of Cyclones in the Southern Indian Ocean.—By C. Meldrum, M.A., F.R.S. (Non-Official, No. 7. 1873.) [Out of print.]

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. H. Toynbee, F.R.A.S. (Non-Official, No. 10. 1876.) [Out of print.]

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. (Non-Official, No. 5. 1872.) 6d.

Report to the Committee of the Meteorological Office on the Meteorology of the North Atlantic.—By Capt. H. Toynbee, F.R.A.S. (Non-Official, No. 2. 1869.) 1s.

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. (Official, No. 44. 1882.) 7s. 6d.

Routes for Steamers from Aden to the Straits of Sunda and back. Translated from a Paper issued by the R. Meteor. Inst. of the Netherlands. (Non-Official, No. 4. 1872.) [Out of print.]

5. Miscellaneous Publications.

Harmonic Analysis of Hourly Observations of Air Temperature and of Pressure at British Observatories. (Official, No. 93. 1891.) 12s.

Report of an Inquiry into the Connexion between Strong Winds and Barometrical Differences.—By Robert H. Scott. (Non-Official, No. 1. 1868.) 6d.

Report on the Storm of October 13-14, 1881.—By Robert H. Scott, F.R.S. (Official, No. 46. 1882.) 1s. 6d.

Report to the Committee of the Meteorological Office on the use of Isobaric Curves.—By Capt. H. Toynbee, F.R.A.S. (Non-Official, No. 3. 1869.) [Out of print.]

APPENDIX III.

LIST of CAPTAINS and OFFICERS who have sent in Logs classed as "Excellent" during the year ending March 31, 1902. Figures are attached to the name of each observer to show the number of "Excellent" logs which he has supplied during the whole time of his co-operation with the Office.

Name of Captain or Officer.	Number of "Ex- cellent" Logs.	Ship.
Alford, F.	8	S.S. Monarch.
Alsop, J. J.	4	Hermione.
Andersen, O. E.	18	S.S. Elswick Grange.
Angus, T. S.	26	S.S. China.
Belding, R.	6	Harold.
Bolton, S. H.	25	S.S. Graphic.
Clarke, W. H.	7	S.S. Cevic and S.S. Tauric.
Clinock, T. C.	5	S.S. Harlech Castle and S.S. Lismore Castle.
Crewe, E.	10	S.S. Victoria.
Crowley, C.	11	Verajean.
Duguid, W.	6	S.S. Rangoon.
Dupen, P. P.	17	S.S. Jebba.
Glegg, R.	2	S.S. Macduff.
Hay, C. W.	1	S.S. Aorangi.
Holmes, W. B., R.N.R.	3	S.S. Matatua.
James, E. Gates, R.N.R.	4	Lynton.
Lyon, F. C. A., R.N.R.	1	S.S. Victoria.
McAllister, D.	4	S.S. Bhamo.
Martyr, J. W. C., F.R.A.S., F.R.Met.Soc.	4	S.S. Montrose.
Millican, J. W.	21	S.S. Loughrigg Holme.
Mullan, F. C., F.R.G.S.	8	S.S. Reynolds.
Murdoch, P.	20	Sierra Lucena.
Peebles, R.	26	S.S. Lincolnshire.
Phillips, J. D. S.	1	S.S. Warrimoo.
Robinson, E.	1	Sierra Lucena.
Scott, G. P., F.R.Met.Soc.	19	Buckingham.
Simpson, A.	33	S.S. Moravian.
Squares De Carteret, W. G.	12	S.S. Minia.
Turner, A. C., R.N.R.	6	S.S. Britannia.
Walker, H., R.N.R.	24	S.S. Campania.

Bolton, S. H.	...	S.S. Graphic	...	To Cape Town, Buenos Aires to U.K.	1900-1901	W. S. Stathers, Chief Officer.
"	...	"	...	To and from Odessa. To and from Lulea (Sweden) (2).	1901	W. S. Stathers & W. S. Ireland, Chief Officers.
Bowles, G. D., R.N.R.	...	S.S. Tartar	...	From Vancouver to and from Hong Kong and Yokohama (2).	1900-1901	J. A. McCulloch.
"	"	"	...	From Tacoma (U.S.A.), to and from Hong Kong, via Yokohama.	1901	— Gibbs, Chief Officer, — Dugdale, 2nd, and — Duncan, 3rd.
Burch, C. H.	...	S.S. Merionethshire	...	China and Japan, via Suez...	1901-1902	
Carrie, S. H.	...	Ardenraig	...	From Portland (Oregon) to U.K.	1901	
Chamberlin, W. C.	...	Don	...	To Adelaide	1900-1901	
"	...	"	...	From Adelaide to Valparaiso	1901	
"	...	"	...	From Chile to Rouen	1901-1902	
Clarke, W. H.	...	S.S. Cevic	...	New York (4)	1901	W. P. Sullivan, 3rd, E. Jones, 4th, J. G. Wood, R.N.R., 2nd, and W. Lightoller, R.N.R., 2nd.
"	"	S.S. Tauric	...	" (4)	1901	V. W. Hickson, R.N.R., 2nd, J. L. Jones, 3rd, and G. Houlgrave, 4th.
Clinock, T. C.	...	S.S. Harlech Castle	...	Sydney via Cape of Good Hope	1899-1901	H. Cracroft, A. Stanger, R.N.R., and H. Kershawe.
"	...	S.S. Lismore Castle	...	Durban	1901	E. Day, 1st, G. Gilbert, 2nd, W. Ulyet, 3rd, and T. Biryer, 4th.
Coad, A. J., R.N.R.	...	S.S. Ormuz	...	From Marseilles to Melbourne, via Suez...	1901	H. T. Jones, 1st, H. R. Leslie, 2nd, W. Bagham, 3rd, and A. V. Cowell, R.N.R., 4th.
Cole, Francis	...	S.S. Anstralia	...	Sydney, via Suez	1901	L. A. Davidson, 2nd, D. Scratton, Supnmy. 2nd, and H. M. Brandram, 3rd Officer.
"	...	"	...	"	1901-1902	L. A. Davidson, R.N.R., 2nd, D. Scratton, Supnmy. 2nd, and L. Bedwell, 3rd.
Combe, Commander J. W., R.N.	...	H.M.S. Penguin	...	To N. and W. Coasts of Australia...	1900-1901	R. J. Dailey, Boatswain.
Condorp, K.	...	City of Agra	...	From Sydney to U.K.	1901	W. W. Aldridge, 3rd.
Corrance, T.	...	Kilmory	...	Honolulu and Astoria	1900-1901	E. E. C. Roberts, R.N.R.; C. G. Smith, R.N.R.; W. F. Cossey, R.N.R.; H. H. Manning, R.N.R.; C. Swaley and D. Druce.
Crewe, E.	...	S.S. Victoria	...	Sydney, via Suez	1901	

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued*.

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Crewe, E.	S.S. Victoria ...	Sydney, via Suez ...	1901-1902	E. E. C. Roberts, R.N.R., Chief Officer, G. C. Holloway, R.N.R., 2nd, A. Bevan, Supmy. 2nd, H. H. Manning, R.N.R., 3rd, C. H. Druce, 4th, and C. P. Cotton-Stapleton, R.N.R., 5th.
Crowley, C.	Verajean ...	From Newcastle (N.S.W.), to Caleta Buena (Chile) and U.K.	1900-1901	B. Westray, 1st, and W. S. Ord, 2nd.
Dean, J. W.	Loch Finlas ...	New South Wales, via Cape Town, Chile, and New York.	1900-1901	Walter I. Menary.
Duguid, Wm.	S.S. Rangoon ...	Rangoon, via Suez ...	1901	— Weir, 1st, — Luttern, 2nd, and McLeish, 3rd.
"	"	"	1901-1902	
Dupen, P. P.	S.S. Jebba ...	West Coast of Africa	1901	L. C. Bakewell, 2nd.
Dyer, C. ...	S.S. Lucerna ...	Philadelphia (3)	1901	F. A. White.
Gates-James, E., R.N.R.	Lynton ...	Esquimalt ...	1900-1901	A. Donaldson, Chief Officer, and G. H. Goldsbrough.
Glegg, Robert	S.S. Macduff ..	China and Japan, via Suez, and in China Sea.	1900-1901	Wm. Tulloch, 2nd.
"	"	In China Sea...	1901	Wm. Tulloch, 2nd, assisted by Jas. Elliott, Chief Officer, and Wm. Pitcairn, 3rd.
"	"	From Hong Kong to Calcutta, La Pellice and the U.K., via Suez.	1901-1902	Wm. Tulloch, 2nd, Jas. Elliott, Chief Officer, and S. C. Foster, 3rd.
†Griffin, E. J., R.N.R. ...	S.S. Briton ...	Cape Town (2)	1901	F. G. Robinson, R.N.R., 3rd, G. Hamilton, R.N.R., 4th, and P. Durkin, 5th.
Hamon, J. J.	S.S. Waimate	New Zealand ...	1901-1902	A. M. P. Ford, R.N.R., 4th, H. Le Brocq, 2nd, and R. R. Neale, 3rd.
Hay, C. W.	S.S. Aorangi ...	From Brisbane to Victoria (B.C.), via Honolulu (3).	1900-1901	W. Ellis, 2nd, A. G. Bayne, 3rd, and — Booth, 4th.

Hayes, B. F., R.N.R. ...	S.S. Britannic ...	Cape Town and Durban (2) ...	1901-1902	T. E. Robinson, R.N.R., 3rd, S. S. Richardson, R.N.R., 4th, J. Roberts, R.N.R., 2nd, H. T. Mostyn Watkin, R.N.R., 3rd, and J. G. Wood, R.N.R., 2nd.
Holmes, W. B., R.N.R. ...	S.S. Matatua ...	Hobart, Wellington (N.Z.), Monte Video, returning to U.K.	1901	R. G. Cross, 2nd, and H. C. Allingham, R.N.R., 3rd.
" " " ...	" " " ...	New Zealand, via Cape of Good Hope, returning via Cape Horn.	1901-1902	R. G. Cross, 2nd, and R. Nillist, 3rd.
Hunter, W. M. ...	S.S. Chicago City ...	New York (4) ...	1901	J. J. Bailey, Chief Officer, and N. D. Kellock, 2nd.
Hurford, Richard ...	S.S. Reynolds ...	Baltimore ...	1901	A. French, T. Harrison and G. Warren.
" " " ...	S.S. Romney (Bolton S.S. Co.) ...	Rio de Janeiro and New York ...	1901-1902	W. Potts, B. Wilton and T. D. L. Hall.
Jackson, W. C. ...	Earl Derby ...	To Freemantle (W.A.) ...	1901-1902	J. Kane, 1st, and D. Macdonald, 2nd.
King, B. ...	S.S. Brooklyn City ...	New York (3) ...	1901	J. Sage, 1st, H. Barrow, 2nd.
" " " ...	" " " ...	" (2) ...	1901	J. Sage, 1st, and C. Davidson, 2nd.
Leukten. J. E. ...	S.S. Dahome ...	Halifax and St. John's (N.B.), (3½) ...	1901	A. W. Forworthy, 1st, J. R. Pepper, 2nd, and A. V. Tomlinson, 3rd.
Lobb, Commander F. J., R.N.	L.H. Tender Richmond ...	Bahamas ...	1899-1901	F. W. Holden, Chief Officer.
Lyon, F. C. A., R.N.R. ...	S.S. Victoria ...	Sydney, via Suez ...	1901	E. E. C. Roberts, R.N.R., Chief Officer, C. G. Smith, R.N.R., 2nd, A. Bevan, Supumy, 2nd, H. H. Manning, R.N.R., 3rd, C. H. Druce, 4th, and C. P. Cotton Stapleton, R.N.R., 5th.
McAllister, Duncan ...	S.S. Bhamo ...	Rangoon, via Suez ...	1900-1901	James Lyall, Chief Officer, L. McDonald, 2nd, and P. H. Davidson, 3rd.
" " " ...	" " " ...	" " " ...	1901	James Lyall, Chief Officer, L. McDonald, 2nd, and Wm. Cartanach, 3rd.
MacCormac, A. R. C. ...	Alcinous ...	San Francisco ...	1900-1901	D. MacDonald, Mate.

† Deceased.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—continued.

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Main, W. S. ... Marshall, O. P., R.N.R.	S.S. Numidian ... S.S. Empress of India ...	Montreal (4) From Hong Kong to Vancouver, via Yokohama (3).	1901 1900-1901	Vivian Coombe, 3rd. F. W. S. Peake, R.N.R., 2nd, H. L. Rader- macher, R.N.R., Ex. 2nd, and C. J. White, 3rd.
" " " "	" " " "	" " " " (3)	1901	F. W. Wilsden, 4th, W. Jones, 2nd, F. W. S. Peake, R.N.R., Ex. 2nd, and H. Davis, 3rd.
Martin, T. C. ...	Loch Tay ...	Adelaide, via Cape of Good Hope, return- ing via Cape Horn.	1900-1901	
Martyn, J. W., F.R.A.S., F.R. Met. Soc.	S.S. Montrose ...	Durban	1901	John N. Griffiths.
" " " "	" " " "	Cape Town and Bermuda	1901	Do. do.
" " " "	" " " "	Port Natal, St. Vincent and Bermuda ...	1901-1902	Do. do. 4th.
Miller, A. T., R.N.	Training Ship Conway	Off Birkenhead	1901	Cadets.
Millican, J. W., ...	S.S. Longhtrigg Holme	(Quebec to and from Tenerife London (2))	1900-1901	(— Beaton and — McInnes, Chief Officers,) and — Hodgson and — Kendall. 2nd.
" " " "	" " " "	From Kingston (Jamaica) to Havre, Leghorn and Montreal.	1901	
Mitchell, George ...	S.S. California ...	From Palermo to and from New York ...	1900-1901	John Samuel, 3rd.
" " " "	S.S. Persia ...	Calcutta, via Suez	1901	G. L. Wilson, 3rd.
" " " "	" " " "	Do. do.	1901-1902	Do.
Moseley, F. J., R.N.R., ...	S.S. Goorkha ...	Cape Town (2)	1900-1901	J. Atwood, R.N.R., H. P. B. Smith, R.N.R., and H. L. Scholefield.
" " " "	" " " "	" " " "	1901	A. Barron, R.N.R., H. B. Hughes, H. L. Scholefield.
Mullan, P. C., F.R.G.S.	S.S. Reynolds ...	China and Japan, via Suez	1900-1901	R. Hurford, T. Harrison and G. Warren.
Murdoch, Peter ...	Sicra Lucena ...	Mauritius, Newcastle (S.S.W.) and Iquique	1899-1900	E. R. Maycock and S. F. Meadows, 4th.
Nicholson, Colin, R.N.R.	S.S. Austral ...	Sydney, via Suez	1901	E. J. Taylor, 1st, E. A. Seager, 2nd, W. de M. Baynam, R.N.R., 3rd, and P. Flaggate, 4th.

Nunan, J. W. ...	S.S. Numidian ...	Montreal ...	1901	George Woodall, 2nd.
Nurton, James ...	S.S. Norwood ...	Monte Video (1½) ...	1901	
Pattman, R. ...	Loch Torridon ...	To Melbourne, via Cape of Good Hope, returning via Cape Horn.	1900-1901	John Davidson and Edward Smith, 1st, and John Vine, 2nd.
Peebles, R. ...	S.S. Lincolnshire ...	Zanzibar, Albany (W. Australia). Timaru (N.Z.). Timaru to Natal. Melbourne to Natal (1½).	1899-1900	A. Mell and I. McLean.
Phillips, J. D. S. ...	S.S. Warrimoo ...	From Victoria (B.C.) to Brisbane, via Honolulu (2½).	1900-1901	G. Hammon, F. J. Bayldon, S. Bayes-Davy and E. G. Mason.
Potter, R. H. ...	Alliance ...	To Melbourne, via Cape of Good Hope, returning via Cape Horn.	1900-1901	J. Patterson, 1st, and M. W. Hannah, 2nd.
Pybus, H., R.N.R. ...	S.S. Tartar ...	From Yokohama to Vancouver ...	1900	C. Harris Walker and J. A. McCulloch.
"	S.S. Empress of Japan ...	From Vancouver to Hong Kong (1½) ...	1901	
Ralph, W. S. ...	S.S. Falls of Keltic ...	From Iquique to New York, Chile and St. Lucia.	1901	A. T. Cadogan, 3rd, and P. J. Hennig.
Reeves, I. ...	S.S. Australia ...	Sydney, via Suez ...	1901	L. A. Davidson, R.N.R., 2nd, D. Scratton, Suppny, 2nd, and H. M. Brandram, 3rd.
Reynolds, R., R.N.R. ...	S.S. Norman ...	Cape Town (3) ...	1900-1901	C. D. Keene, 5th.
"	"	Algon Bay (3) ...	1901-1902	C. D. Keene, 5th.
Robinson, Ernest ...	Sierra Lucena ...	Mauritius, Newcastle (N.S.W.) and Iquique	1900-1901	S. F. Meadows, 4th.
Rudge, H. E. ...	S.S. Atrato ...	West Indies (2) ...	1901	G. S. Owen, R.N.R.
"	"	" (2) ...	1901	A. Cambell, 3rd, L. Lindsey, 4th, and J. Little 5th.
Rathven, J. F. ...	S.S. Omrah ...	Sydney, via Suez ...	1901	W. J. Cullimore, T. A. Dicker and W. T. Cox, R.N.R.
"	"	"	1901	H. G. Staunton, T. A. Dicker, and H. Shrubsole, R.N.R.
"	"	"	1901	H. G. Staunton, 2nd, F. C. B. Owen, 3rd, H. Shrubsole, R.N.R., 4th.
Schleman, H. A. ...	S.S. Sophocles ...	Melbourne, via Cape of Good Hope ...	1901	A. Thomson, 1st, H. Clark, 2nd, and R. R. Harrison, R.N.R., 3rd.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—continued.

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Schleman, H. A.	S.S. Sophocles	Melbourne, via Cape of Good Hope	1901	A. Thomson, 1st, H. Clark, 2nd, and R. R. Harrison, R.N.R., 3rd.
Scott, G. P., F.R. Met. Soc.	Buckingham	Cape Town, Port Phillip and Geelong	1900-1901	G. Gibbons, 2nd, and W. H. Wilson, 3rd.
Seymour, F. H.	S.S. Britannia, P. & O.	Sydney, via Suez	1901	R. Mallalue, Supmny. 2nd, H. D. Bennett, R.N.R., 3rd, M. C. Dean Morgan, 4th, and H. R. Rhodes, 5th.
"	"	"	1901	R. Mallalue, Supmny. 2nd, H. D. Bennett, R.N.R., 3rd, M. C. D. Morgan, 4th, and H. F. Colpoys, 5th.
"	"	"	1902	H. D. Bennett, Supmny. 2nd, S. E. Gardiner, 3rd, M. C. D. Morgan, 4th, and H. F. Colpoys, 5th.
Simpson, A.	S.S. Moravian	Melbourne via Suez, returning via Cape of Good Hope.	1901	G. Elrick, 1st, D. Ross, 2nd, and A. Smith, 3rd.
"	"	" via Cape of Good Hope	1901	G. Elrick, 1st, A. Smith, 2nd, and A. Corbett, 3rd.
Simpson, C. H., R.N.	H.M.S. Egeria	At Esquimalt	1900-1901	Sub-Lieut. J. S. Harris, R.N.
"	"	Esquimalt, &c.	1901	Do.
"	"	"	1901	Do.
Squires de Carteret, W. G.	S.S. Minnie	To Nova Scotia and off East Coast of North America.	1900-1901	James Adams, 1st, E. A. Hewardine, Navtg. Officer, J. E. Jeffery, 2nd, H. A. Lee, 3rd.
"	"	From Halifax (N.S.) to U.K.	1901	Do.
Symons, F. S.	S.S. Ormuz	Sydney, via Suez	1901	T. Taylor, 3rd, and R. G. Reeves, 4th.
"	"	"	1901-1902	T. Taylor, R. G. Reeves and J. Hills.
Tamplin, L. H.	S.S. El Dorado	In China Sea...	1900-1901	J. Smith, 1st, P. Callen and — Steele, 2nd
Title, F.	Falls of Afton	Rio Janeiro, Newcastle (N.S.W.), via Cape of Good Hope, Peru and Dunkirk.	1900-1901	D. Scott, 1st, and H. Steele, 2nd.

Trenaman, R. W.	...	S.S. Romney (L.B. and R.P. Steam Navtg. Co.)	...	Monte Video ...	...	...	1900-1901	C. Longbottom, 2nd.
"	...	"	...	Rio Janeiro ...	...	...	1901	Do.
"	...	"	...	Monte Video and New York.	...	New York	1901-1902	Do.
Turner, A.C., R.N.R.	...	S.S. Britannia (Anchor Line.)	...	to Monte Video, Bahia and Dunkirk.	...	...	1900-1901	T. A. Stirling, 2nd.
"	...	"	...	Bombay, via Suez, Naples, New York and Marseilles.	...	...	1901	Do.
"	...	"	...	From Marseilles to New York and Leghorn	...	...	1901	Do.
"	...	"	...	Bombay, via Suez	...	...	1901-1902	Do.
"	...	"	...	"	...	...	1901-1902	Do.
Walker, H., R.N.R.	...	S.S. Campania	...	New York (7½)	...	...	1900-1901	— Hankinson, 2nd, — Affolter, Ex. 2nd. — Hossack, 3rd. and — Leech, 4th.
Wilson, John, R.N.R.	...	S.S. Astoria	...	"	...	...	1900-1901	H. J. Smith, 3rd.
Wood, G. H. B.	...	"	...	"	...	...	1901	Do.
Woodfall, A.	...	Lutterworth	...	To New Zealand, via Cape of Good Hope, returning via Cape Horn.	...	...	1900-1901	— Reuton and — Coyte.
Worcester, W. D. G., R.N.R.	...	S.S. Amasis	...	East Mediterranean	...	...	1901-1902	C. H. Holland. W. P. Lukes and A. E. Wason.
"	...	S.S. India	...	Bombay, via Suez	...	...	1901	A. D. Williamson. Supnumy. 2nd, assisted by H. W. Pullan, 1st. S. P. Berridge, 2nd, L. R. Gardiner, 3rd. H. W. Harrison, 4th, and H. S. Smith, 5th.
"	...	"	...	Australia, via Suez	...	...	1901	A. D. Williamson. Supnumy. 2nd, H. W. Pullan, 1st, S. P. Berridge, 2nd, L. R. Gardiner, 3rd. P. L. Sandberg, 4th, and H. E. Smith, 5th.
"	...	"	...	Sydney, via Suez	...	...	1901	A. D. Williamson. Supnumy. 2nd, W. R. Le Mare, 1st, C. M. Redhead, 2nd, W. H. F. Warren, 3rd. P. L. Sandberg, 4th, and H. E. Smith, 5th.

In all cases, unless otherwise stated, the "Voyage" includes the Outward and Homeward passages.
The figures in () denote the number of "Voyages" made during which observations were taken.

APPENDIX V.

INSTRUMENTS supplied, &c., to the Royal Navy.

Per Account.	Baro- meters.	Ane- roids.	Thermometers.				Hydro- meters.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1901, afloat ...	261	747	1,463	448	443	262	57
Issued since	114	248	436	99	89	37	14
Returned since	375	995	1,899	547	532	299	71
	126	215	358	93	88	24	1
April 1st, 1902, afloat ...	249	780	1,541	454	444	275	70

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

April 1st, 1901, in use ...	75	84	259	33	56	10	14
Issued since	3	10	25	7	3	—	—
Returned since	78	91	284	40	59	10	14
	1	2	18	—	1	—	—
April 1st, 1902, in use ...	77	92	266	40	58	10	14

DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1902.

Afloat in Royal Navy ...	249	780	1,541	454	444	275	70
In use at stations	77	92	266	40	58	10	14
In store at M.O.	37	136	104	99	86	55	41
" Chatham	21	46	144	41	45	12	12
" Sheerness	1	16	30	11	12	8	6
" Portsmouth	26	53	160	54	56	16	4
" Devonport	20	46	139	53	45	22	2
" Queenstown	2	4	12	8	8	3	—
" Gibraltar	2	2	8	3	3	—	4
" Malta	15	16	53	12	10	2	6
" Bombay	4	1	—	3	3	2	4
" Halifax	3	1	19	1	1	2	7
" Bermuda	4	5	16	4	5	2	—
" Jamaica	3	4	10	—	1	1	3
" Cape of Good Hope ...	8	7	29	10	6	2	4
" Trincomalee	3	1	17	5	4	1	4
" Hong Kong	18	21	71	7	15	12	9
" Coquimbo	1	3	11	3	4	1	—
" Sydney	3	8	13	3	3	1	13
" Esquimalt	5	9	20	2	3	2	4
Total April 1st, 1902 ...	505	1,254	2,663	813	812	429	207
Lost, &c., since April 1st, 1901	—	—	166	19	11	—	—
Under repair, April 1st, 1902	14	21	17	—	—	—	—

APPENDIX VI.

INSTRUMENTS supplied, &c., to the Mercantile Marine.

Per Account.	Baro- meters.	Com- passes.	Thermometers.				Hydro- meters.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1901, afloat ...	104	—	670	—	—	106	379
Issued since ...	58	—	330	—	—	37	167
Returned since ...	162	—	1,000	—	—	143	546
	41	—	196	—	—	21	111
April 1st, 1902, afloat ...	121	—	804	—	—	122	435

INSTRUMENTS at Stations, viz., Telegraphic Reporting Stations, Observatories, Fishing Villages, &c.

April 1st, 1901, in use ...	316	1	321	63	71	57	7
Issued since ...	6	—	50	11	8	24	—
Returned since ...	322	1	371	74	79	81	7
	2	—	41	4	2	17	—
April 1st, 1902, in use ...	320*	1	330	70	77	64	7

DISPOSITION of INSTRUMENTS on April 1st, 1902.

In merchant ships ...	121	—	804	—	—	122	435
„ use at stations ...	320	1	330	70	77	64	7
„ store at M.O. ...	18	—	23	16	4	15	4
At Liverpool Agency ...	8	—	44	—	—	4	30
„ Glasgow „ ...	6	—	21	—	—	4	18
„ Dundee „ ...	8	—	23	—	—	3	20
„ Hull „ ...	4	—	21	—	—	4	14
„ Cardiff „ ...	11	—	41	—	—	1	22
„ Southampton „ ...	4	—	15	—	—	2	1
Total April 1st, 1902 ...	500	1	1,322	86	81	319	551
Lost &c., since April 1st, 1901	—	—	53	2	1	4	23
Under repair, April 1st, 1902	9	—	13	—	—	—	—

* Of these barometers, 228 are lent for use of seafaring communities at fishing villages and ports.

APPENDIX VII.

REPORT OF INSPECTIONS OF STATIONS IN CONNECTION WITH THE
OFFICE—1901.

As indicated in the last columns of the list of stations on pp. 58-63, the telegraphic reporting stations, with a few exceptions, a number of climatological stations, and the self-recording instruments at the observatories and other stations were inspected during the summer of 1901. Dr. Buchan undertook the Scottish stations, Captain Hepworth those in the North of Ireland and the North-West of England, Mr. Gaster those in the South-East of England, Mr. R. H. Curtis parts of Wales and Ireland and the North-West of England, Mr. J. A. Curtis the North-Eastern District, and Mr. Brodie part of the South-Western District, while the Secretary took charge of the inspection of the stations in the South of Ireland and the South-Western District of England.

The self-recording instruments at the various stations, except Holyhead, Scilly, Alnwick Castle, and North Shields, have been inspected by Mr. T. W. Baker and Mr. E. G. Constable, of Kew Observatory, who have also, in some cases, inspected the telegraphic-reporting instruments or climatological instruments at the stations they have visited.

The climatological stations in connection with the Royal Meteorological Society have been inspected by Mr. Marriott.

The following notes are taken from the reports of inspectors. As a rule, details are only quoted when a station has been inspected for the first time on behalf of the Council.

NOTES BY THE INSPECTORS.

TELEGRAPHIC REPORTING STATIONS.

Bath, September 6th.—I visited this station for the purpose of comparing the barometer with my standard and of personally inspecting the arrangements for the observations upon which the daily telegram is sent. In Dr. Symons' absence, Mr. Craven showed me the station. Everything is well arranged and in excellent order. It is unfortunate that the high building in course of erection to the west of the dome threatens the early morning sun for a certain period of the year, otherwise the exposure of all the instruments is admirable.

Holyhead, September 14th.—I still think the position of the rain gauge at this station is very unsatisfactory, the willows surrounding the hollow in which it is placed being eight to ten feet high. The observer told me he did not think the gauge would be interfered with if placed on the lawn, and I selected a site for it there to which the observer will remove it if instructed to do so.

Jersey (St. Aubin's), September 27th.—The dry bulb and spare thermometers each read about one degree too high; a new dry

bulb thermometer should be supplied. Some instructions were given respecting the extra remarks in the telegrams, those supplied at present being too long, and often very confused.

Portland Bill, September 30th.—A heavy dew had occurred on the night preceding my visit, and I found quite 0·01 inch of water in the rain gauge which had not been measured and reported to the office. I impressed upon each observer the importance of examining the gauge *daily*, even in dry weather.

Aberdeen, August 7th.—Mr. Joseph Scott, recently appointed assistant, was on duty. Mr. S. showed himself to be a remarkably good observer, was familiar with the instruments, and made the observations with expertness and accuracy.

Nairn, August 17th.—A new minimum thermometer was received on August 30th, 1900, which appears to be a good instrument. The new maximum thermometer is not a good one (*see* Notes of Inspection). The old one, which is not engraved on the stem, is used meantime till another is sent.

Sumburgh Head (Dunrossness), August 8th and 9th.—The thermometer screen is much out of order and a new one should be sent at once. The degrees are not etched on the stem of the maximum thermometer, the minimum is half a degree too low and the dry and wet bulbs are each half a degree too high. A complete set of thermometers is required for this important station.

Malin Head, July 23rd.—The rain gauge was not well fixed, the upper surface of a large stone, used as a prop for it, came within 3 or 4 inches of its rim. I left it level, firm, and in working order. This station appears to be a suitable one for an anemometer, and it would be in competent hands.

Pembroke (St. Ann's Head), September 3rd.—The thermometer screen is worn out and should be replaced by a new one. The opportunity might be used to change the position of the screen and rain gauge to one some 150 yards due south of the present one and by that much nearer the observers who live in the lower light house. Mr. Dunsford will watch the wet bulb coating carefully; it was dry at the time of my visit, and there had been no greater difference than 1° between the dry and wet for some weeks. A difference of 5° or more was exhibited upon my moistening the wet bulb in the fresh breeze of easterly wind. He will also level the rain gauge. A new thermometer is required to replace B.T. No. 1,308, which is not clearly graduated and has nearly all the figures on the porcelain scale obliterated. A spare thermometer is also required.

Roche's Point, August 29th.—The War Office shed, referred to in last year's report, has been removed, and an enclosure about 22 ft. × 13 ft. has been erected of wooden paling for the rain gauge and screen, close to the lifeboat house in the North Shore of the promontory of Roche's Point.

CLIMATOLOGICAL STATIONS.

NORMAL CLIMATOLOGICAL STATIONS.*—(Second Order Stations of the International Classification.)

ENGLAND AND WALES.

Ampleforth, September 10th.—The thermometer screen and the rain gauge have been placed in new positions since the last inspection. The exposure is still good, though that of the thermometers would be improved by raising the screen.

Aspatia, July 31st.—The position of this station is greatly in its favour and it promises to become a valuable one. Mr. Smith Hill is keenly interested in the work, and anxious to comply to the letter with all the requirements of the office. The thermometer screen is not well situated, being too near trees and shrubs. Mr. Hill has, however, decided to remove it to a more suitable position. There is an excellent site for an anemometer on the tower. The sunshine recorder is situated on a tower, and has an exceptionally good exposure. A plan of the station has already been sent to the office by the observer.

Buxton (M), July 29th.—The muslin on the wet-bulb thermometer was too thick and required changing. I recommended a re-arrangement of the thermometers in the screen in order to get better light on the scales of the dry and wet. The posts of the thermometer screen were rotten and required renewing. The screen also needed painting. The observer's measurement of snow was unsatisfactory. I urged him always to melt and measure what was actually in the gauge. The barometer seemed to be in good adjustment, but I recommended that it be removed to Mr. Pilkington's house. The sunshine recorder had been tampered with on the day of my visit. The index hand for latitude had been broken off, so I adjusted the instrument by my altazimuth to 53° . Trees on the south-west and west subtend an angle of 10° . The observations seemed to be taken under difficulties, as the observer lives a considerable distance from the instruments.

Canterbury, November 14th.—This is in many respects a very desirable station. The observer is sanguine and ingenious. The barometer is very good, and agreed exactly with the standard. The screen is a Stevenson—home-made. The thermometers are not the conventional pattern, but all agreed with standard very well. The anemometer and photographic sunshine recorder are, both of them, of private design and construction, but appear to work well. There were too many trees about, but these are being cut down. I think this may develop into a very good second-order and weekly-weather-report station.

* A normal climatological station is one at which readings are taken each day at 9 a.m. and at 9 p.m. local time, and which is provided with the following instruments, properly verified and exposed:—Barometer, dry-bulb, wet-bulb, maximum and minimum thermometers, and rain-gauge.

Llandudno (M), July 26th.—I removed the barometer from the porch at Warwick House to the Council Offices, the height of the cistern being 92 ft. 8 ins. above sea-level. The sunshine recorder is to be mounted on a new iron column.

Rousdon (M), August 28th.—On comparing the thermometers it was found that the dry-bulb and the 1 ft. earth had both gone up $0^{\circ}\cdot 1$. It is the intention of Lady Peek to continue the second order observations.

St. David's, September 4th.—I set the rain gauge level; being set in soft ground, it had become lower on the west side by a small amount. I was somewhat apprehensive of interference by the trees and shrubs to the south-east of the gauge; but I was assured by Dr. Probert that there had been no practical encroachment, since the readings of the gauge were found to agree with those of a gauge in the open field.

Scarborough (M), July 30th.—The muslin and cotton on the wet-bulb thermometer were dry at the time of my visit. I instructed the observer to use better muslin and cotton. The sunshine recorder was not quite level. I called on the Borough Surveyor, and also on Dr. Hudson, the Chairman of the Meteorological Sub-committee, and asked them to arrange for a thermometer screen to be put up in some other part of the town, in order to ascertain what difference exists between it and the present site. There is no doubt that the slope to the west of the present site becomes much heated by the afternoon sun, and so raises the evening temperatures.

Sheffield, Weston Park, September 7th.—This is an excellent station, well supplied with instruments, and very well managed by Mr. Howarth, F.R.A.S., the Curator of the Museum. The grass minimum was too high above the grass. I requested it might be lowered and slightly changed in position.

Wessington Court, October 4th.—All the instruments were in excellent order, but the thermometer screen is not of the recognised pattern. It is too shallow, and the interior air must be unduly heated, especially in the summer time.

York, September 6th.—The thermometer screen and rain gauge required some small repairs.

SCOTLAND.

Ben Nevis Observatory (§), August 21st and 23rd.—The instruments at Fort William were read correctly by the superintendent and the two assistants present, and the observations at the top have been made uninterruptedly. This station at the top was inspected by Mr. Andrew Watt, M.A., chief assistant in the office in Edinburgh, who went carefully into details as I had arranged, and he reported that, "Generally speaking, the work of the Observatory was in a very satisfactory state, that clerical work was up to date, and that there is an excellent and very neat compilation of mean values of all sorts from the opening of the

Observatory to the present time." The instruments were all separately read by Mr. W. and the three observers present, with satisfactory results. The barometers continued to be in good order; the very slight oxidation on the surface of the cistern in no way interfering with the correctness of the readings. A Stevenson screen will be sent to replace the old one, and an additional set of dry and wet bulbs are also to be sent.

Cargen (§), August 26th.—A new rain gauge was added in the spring of 1900.

Fort Augustus (§), August 19th.—A snow gauge and a Hick's rain gauge have recently been added to the instruments.

Fort William, August 21st and 23rd.—As a new house has been built interfering with the continuous record of the sunshine recorder, the position has been changed to a place higher up the grounds of the Observatory, where at all seasons the record will not be interfered with.

Pinmore (§), August 30th.—Mr. Donald, the old observer, died since last inspection. Mr. R. Torrance, who has recently been appointed gardener, had all the instruments in good order. He received some instruction as to the reading of the barometer, but all the instruments he read quite correctly.

Strathpeffer, August 16th.—A new rain gauge has been added, and both rain gauges will continue to be read for some time.

IRELAND.

Armagh, September 27th and 28th.—The corrections to the dry and wet thermometers have not been changed for many years past. I would suggest that Dr. Dreyer be asked to apply a correction of $-0^{\circ}4$ to both the dry and wet thermometers.

Phoenix Park, September 17th.—A lightning conductor on the anemometer stand, which at certain seasons interfered for a few minutes with the sunshine record, has been removed to the northern side of the stand, where it is out of the way. The wooden fastenings for the recorder had become decayed, and in consequence the base is liable to be moved.

OTHER CLIMATOLOGICAL STATIONS.

ENGLAND AND WALES.

Alnwick Castle, September 12th.—The wet-bulb was not properly mounted. The thermometer screen had bare earth beneath it. I requested that turf should be laid down under it.

Arlington Court, October 8th.—The observations here are taken, under Lady Bruce Chichester's superintendence, by the head gardener, Mr. Thomas Grant. He had not been long at the station, and was new to meteorological work. The rain-gauge measure had been broken about five weeks prior to my

visit, and the new one supplied was an 8-inch glass, which had been used in connexion with a 5-inch gauge. Observer was instructed to report the matter at once to Lady Chichester (who was away from home at the time), and in the meantime to make the best use he could of the stump of the old measure, which held rather more than 0·1 inch of water. The daily amounts for the interval have since been corrected on our returns, and a list of the revised values has been sent to the observer.

Bethesda (Penrhyn Quarries), September 9th.—This station had not previously been visited. The gauge was badly placed close to a high wall, but it was at once removed to a more open site, where the exposure is fairly good. The record of rain is most carefully kept, and Mr. H. P. Meares, Manager of the Quarries, will be glad to receive any suggestions for getting reliable rainfall statistics for the district, and especially for the Ogwen Valley.

Caistor, September 19th.—This is a new rainfall station, situate at the Manor Fishery. The position of the gauge is good, but the instrument itself is unsatisfactory. It is a 5-inch bottle gauge, and it is impossible to ensure that the rim shall remain level. The glass measure supplied with the instrument differed from that I had with me as standard by amounts varying from '005 inch to '030 inch. Mr. Ford, who is the proprietor of the Fishery, takes much interest in the work and makes an efficient observer.

Cirencester, October 2nd.—The instruments were generally in good condition, but the minimum thermometer had about 6° of spirit detached from the main column. The instrument was set right, and the observer instructed how to remedy such defects in future. The thermometer screen is an old one of a very small pattern. The adjustment of the sunshine recorder was not perfect, but was so nearly right that it seemed inadvisable to interfere with the instrument.

Hawarden Bridge, September.—This was the first inspection of this station. The rainfall returns are from a gauge which registers on a dial the amount of rain. The position of the gauge, if it could be moved to the field below the steep bank on which it now stands, would be improved.

Littlestone-on-Sea, September 20th.—The station was in abeyance. The barometer and sunshine recorder were in good order, and observer can read them both accurately. Returns will commence in October.

Llandovery, October 5th.—New maximum and minimum thermometers were procured through the office, and set up last December. There is a good Fortin barometer, by Negretti, at this station, and a set of dry and wet bulb thermometers, but the latter are not mounted in the screen.

Mareham-le-Fen, September 28th.—This is a new rainfall station. The gauge is 5 inches in diameter, by Negretti and Zambra, and it is placed on the lawn in a fairly large garden adjoining the house and the road. In its present position it is

sheltered to some extent by the hedges and trees, but I was unable to find a better site in any of the places shown to me as being available for the purpose.

Newcastle-on-Tyne, September 14th.—I found everything in very good order at this station, where the observations are conducted with great care by Mr. Robinson, the assistant in charge. There is, however, no prospect as regard the evening and Sunday observations under present conditions.

Newton Reigny, July 30th.—This station was inspected by the Secretary last year; no changes have occurred since then in the position or adjustment of the instruments. With the exception of the rain gauge measuring glass, all were clean and in perfect order.

Rauceby, September 6th.—This is a rainfall station, where observations have been recorded for many years past, but which has only recently sent returns to the office. The gauge was fixed over bare earth. I asked that it might be removed to a more open position about nine yards away and that turf might be laid down around it. At the request of Rev. V. F. Willson, of Fulbeck (through whom the observations reach us), I endeavoured to find a suitable position for a sunshine recorder, but the grounds are so well wooded that I failed to find any spot free from objection.

Sheffield, West Street, September 9th.—This is a station in the centre of the city, where a very complete outfit of excellent instruments has been fitted upon the roof of the Central Radical Club. These instruments are the property of Mr. Barker, who is a most careful and enthusiastic observer, and who contributes a weekly statement of results to the local press, a copy of which is regularly sent to the office. The roof is spacious, and the exposure of the instruments is, for such a position, exceedingly satisfactory, and the results will, in my opinion, well represent the conditions of that part of Sheffield.

SCOTLAND.

None.

IRELAND.

Ballyglass, July 19th.—I inspected a fishery barometer which has been here since November, 1879, and which looked almost new. A new sea surface thermometer was required at this station to replace one in an unsatisfactory condition.

Crosshaven, August 30th.—The fishery barometer is in excellent order, and is reading within '01 inch. The book of instructions is quite clean and more or less unused, dating from 1883. The instructions are not quite appropriate for the reading of the vernier on the instrument. The instrument is used by yachtsmen. There are no fishermen to use it, the only fishing boats being shrimpers.

Elly Bay, July 19th.—I visited the coast guard station at Elly Bay, where there is a fishery barometer, and found the instrument well cared for.

Killarney (M), August 28th, 1901.—The instruments are in a site selected by Archdeacon Wynne, the rain gauge about 20 yards and the screen about 30 yards from the projecting central portion of the south front of the asylum, a long range of buildings, the highest or central part being about 40 feet to the eaves, surmounted by two gables; the wings are somewhat further away and lower. The rain gauge is a few feet from the gravel path in front of the building, on grass ornamented with shrubs and low trees. From the front the ground slopes away to the level of the lake below, and forms part of a generally hilly and wooded country. The screen is not the standard pattern, and has a solid bottom. The exposure is somewhat restricted by the building on the north and by the trees. The instruments are good and well attended to.

Kingstown, July 17th.—I found the barometer, which is in Dr. Power's house, and the thermometer, and rain gauge situated in the park, all in good order and condition. Dr. Power hopes before long to be in a position to record 9 p.m. observations. The sunshine recorder is on the roof of the municipal buildings. It was out of adjustment for concentricity, and for level east and west I adjusted the instrument.

Knightstown, Valencia, August 28th.—The fishery barometer is well cared for. The diagram is not exhibited to the public, but made up from time to time in the coast guard station.

STATIONS WITH SELF-RECORDING INSTRUMENTS.

A.—OBSERVATORIES (First Order Stations of the International Classification).

Falmouth, October 7th to 9th.—As usual at this observatory the photography was very good, and all the instruments worked satisfactorily.

Oxford, Radcliffe Observatory, August 26th and 27th.—The self-recording meteorological instruments were in their usual first-class order, and all the curves, both photographic and otherwise, were very good.

Stonyhurst, September 25th and 26th.—At this observatory all the instruments were working satisfactorily and the photography was good.

The cups and arms of the anemograph were quite sound, but the direction fans are wearing away and one of the blades is badly corroded. New fans are much needed.

SCOTLAND.

Aberdeen, August 3rd to 6th.—The self-recording instruments at this observatory were on the whole in very good order.

The crutch of the thermograph clock was rusted; this was removed and the beat improved. The escape pallets are beginning to wear.

The "back-lash" in the worm on the direction fan spindle of the anemograph is becoming rather marked.

Fort William, August 13th and 14th.—The barograph and thermograph at this station appeared to be performing satisfactorily, but the clock escapements required attention.

I slightly lengthened the time-interval of the light-stop on the thermograph so as to widen the gap on the photographic curves and allow for full development of the traces. It was noticed on the 14th that the thermograph light-shutter lever grazed the side of the box at times, and stopped the clock, so the cover was shifted and a wedge fitted, and it is now acting well.

A measuring glass is wanted here for the check gauge.

Glasgow, August 16th to 19th.—There has been no change in any of the instruments since my visit in 1899, but a new brass supporting-tube has been fitted to the thermograph frame.

The thermograph clock required attention; it was taken down and well cleaned and oiled.

The barograph clock was cleaned, and I took down the temperature bar, as the knife edge was slightly rusty and the bearing dirty. This removal may, perhaps, slightly affect the value of the residual correction to the tabulated readings.

The Robinson anemograph was thoroughly overhauled.

IRELAND.

Valencia, October 1st to 3rd.—The instruments at this observatory were found carefully attended to and in good order.

The clocks of both the barograph and thermograph were taken to pieces and cleaned, and new lines attached to the weight and winder of the latter instrument.

I had the anemometer completely dismounted and cleaned all parts, the different bearings afterwards being replenished with fresh sperm oil. The fans were quite sound, but two of the cups were loose; these I had re-soldered and made fast before again erecting the instrument. The direction-shaft inside the observatory was found a little loose at one of the joints; this was tightened up and a new pin put in to make it secure. The recording parts received attention, and the orientation was examined and found correct.

Mr. Cullum called my attention to the anemometer sheets recently supplied by the office, which were not wide enough to be fastened by both clips to the cylinder, and in consequence one side had to be fastened down by adhesive paper.

The self-recording rain gauge was also in good order, with the exception of a defective pipe. The tube which conveys the rain from the funnel to the receiver was found cracked, and had been stopped up by putty. A new piece of piping was fitted and a new pen and ink supplied to the observatory.

B.—ANEMOGRAPH STATIONS.

ENGLAND AND WALES.

Alnwick Castle, September 12th.—I found this instrument to be in good order, and well oiled and cared for.

Fleetwood.—Not visited this year.

Holyhead (Cup Anemometer), September 14th.—The anemometer had not been cleaned for nearly two years, and those parts which are not easily accessible were badly in need of examination. It was taken entirely to pieces and thoroughly overhauled. The direction gear was found to be working stiffly, and the vane, in consequence, was sluggish in moving with light winds. The spindle carrying the cups had worked loose and did not rotate evenly, and it had become a good deal worn as a result. Some of the stays to the cups were loose. The velocity spindle had become loose at a point where its upper and lower lengths are joined, and the pin fastening them had made a large hole in the outer and lower rod. I re-bushed the fitting, soldered the old pin in its place, and drilled a second hole at right angles, a little lower down, and inserted a second pin there. The cap stays I fastened by soldering, the nuts having rusted too much to allow of their being easily removed.

The clock was also taken to pieces and cleaned.

I tested again the position relative to the wind at which the vane comes to rest, and, later on, a further trial was made in the same way by Mr. Davies in a stronger wind. The result confirms what I previously found, viz., that the vane points South when the wind is blowing from S.S.W., and similarly all round the compass. In orienting the instrument this error is allowed for.

To guard against any eddies affecting the experiments, I tested the vane when the cups were dismounted, and fastened to the top of the cup spindle, which is a continuation of the axis of the vane, a long thread (15 feet), at the end of which was a light piece of ribbon. This showed very well the line of the wind, and made it easy to determine the divergence of the vane from it.

I append Mr. Davies' note of the subsequent experiment he carried out in the same way with a much stronger wind than I had.

"The cups were taken down and a long rod fastened to the spindle. I then tied three pieces of thread, five yards long, one on top of the stick, the other in the middle, the other at the base. The three kept in line very satisfactorily, but with the vane as shown above. The direction of the wind was W.N.W.; the force on Dines' pressure-tube from 40 to 45 miles per hour; on plate, 5 lbs. per square foot."

(Signed) W. DAVIES."

Holyhead, September 17th, 1901.

N.B.—The rod was fastened to the spindle in order to get a streamer a good distance above the vane, to ensure that the vane was not influenced by an eddy caused by the stand.

R. H. C.

— (Pressure-plate Anemometer), September 14th.—This anemometer was in a very unsatisfactory state, partly due to corrosion of the vane causing too much friction to the rod attached to the plate, and partly, but to a lesser degree, to the stiffness of the wire connecting the plate with the spring.

The plate was dismounted and a friction roller on the rod removed; and the stiff brass wire was taken out and flexible copper wire cord, similar to that used for the bridled anemometer, was cut into short lengths and connected by swivels and substituted. The instrument then worked much better, and the pressures got in some strong winds experienced a few days later approximated very closely to the pressures indicated by the pressure-tube.

A substitute for the removed friction roller is necessary, and I have suggested one which, I think, will meet the needs of the case; and I would like to replace the wire cord now in use by a light chain of brass or steel, using the same swivels as now to prevent kinking. With this arrangement the lowest wind pressures would not be registered, since the pressure would have to be sufficient to lift the chain before it could affect the spring; but these smaller pressures are not needed so much, and I think we should certainly register anything from three pounds upwards.

It is due to Mr. Cotton and Mr. Davies to say that the anemometers at Holyhead are most carefully attended to, and Mr. Davies is very diligent and conscientious in changing the sheets and in making extra observations of the pressure-plate in strong winds.

— (Pressure-tube Anemometer), September 14th.—This instrument was opened and examined and the water found to be clean; but there was again a rather large amount of a pale-greenish deposit spread on the bottom of the container.

The sealing cover, up to the water line, was much corroded along the seam with a deposit which was, in one place, especially thick. The bottom of the container was found to leak slightly, and the leak was found and stopped.

As the vane had not been removed for three years, and as it appeared to move stiffly, I got it down and cleaned it. Dust, &c., had got into it, but in other respects it was in good order, and when placed it turned as freely as could be desired.

The clock was also opened and cleaned, and the instrument left in good working order.

— (Bridled Anemometer), September 14th.—This instrument was dismantled and cleaned in every part, including the clock, and left in good order.

The wheel pen in use shows signs of getting worn out, the little bucket carrying the ink being somewhat corroded. When a new one is required I think the present pen can be improved by using a shorter arm, and putting the wheel close to the rigid arm which is fixed to the cup spindle. By so doing the vibration, which is unavoidable with a long arm when it is moved rapidly by a gust of wind, will be prevented.

A supply of wire cord is needed for this instrument.

Mr. Davies told me that the ink in this pen, which is the usual anemometer ink fed to the wheel by a small wick, only needs renewal once in two months, and that it has gone so long as three months before being renewed. The reservoir is quite open to the air, and is not protected by a cover of any kind. The trace it makes is excellent.

Shields, North, September 16th.—I dismantled and thoroughly cleaned and oiled both the external parts and the recording apparatus. The exposed parts of the latter were very dirty, and coated with verdigris. The outside portions of the instrument were in good order and well oiled.

To minimise the difficulty caused by debris falling on the recording parts, Captain Robson has fitted up a canvas covering which serves its purpose very well.

The clock appeared to be in good order, and was going well. I therefore did not clean it or have it cleaned.

I tested the orientation and found it correct.

The approach to the anemometer is difficult and somewhat dangerous. I think an effort should be made to improve it.

Yarmouth, August 20th to 22nd.—When I visited this station last year the weather was very unfavourable for out-door examination, but this year it was fine and dry and I was able to give the anemometer thorough attention.

The instrument is apparently regularly lubricated, and the oil in the direction well was in a very satisfactory state, both as

regards colour and fluidity. There was, however, but very little oil in the cup on the velocity spindle, and the assistant stated that he had considerable difficulty in lubricating it, so I had a larger hole drilled, and the channels deepened out, to allow the oil to run more easily, and a longer screw was fitted, so as to bring the head well above the cup arm.

All parts were thoroughly cleaned.

The exterior portion is in good order, and is kept well painted. The orientation was satisfactory. On examining the defective leg of the stand, to which I have drawn attention in previous years, the rotting was found to have extended down nearly to the principal under the roof.

It was decided to cut away one side of the support down to the solid wood and bolt on a piece of $4\frac{1}{2} \times 2\frac{1}{2}$ inch pine plank.

This was done, and the plank fastened on with coach bolts and angle iron and made a good job of, and a sheet lead covering was fitted at the junction with the roof.

The interior parts of instrument, pencils, fusee clocks, &c., were cleaned, and the spring on the pricker put right. I also tried to improve the backward loop of the velocity curve between 45 and 50 miles, and it should be better now.

SCOTLAND.

Deerness (Orkney), August 8th to 9th.—The anemometer here, though well lubricated and apparently regularly looked after, certainly required cleaning, more especially the outer portion.

The oil for the direction bearings had become dirty and rather thick; it was all removed, bearings, &c., washed in paraffin, and fresh sperm used, and all left in good order.

The cups, arms, and stays were in good condition, but had become rusty, so I had the exterior parts well painted, as well as the upper portion of the velocity spindle.

The clock was cleaned, but did not require a new line this year.

I spent considerable time in endeavouring to remove the defect in the foot of the velocity trace, and I am hoping now that the curves will be much improved in this particular, but it is not an easy thing to make the traces quite symmetrical without trueing the helix in the lathe, but I did the best I could in the matter.

The orientation was tested and was satisfactory. I found that the stonework at the base of the hut had warped away from the woodwork, more especially on the southern side, so I got the local stonemason to clear away the old mortar, fill in the interstices all round with cement, and make a new fillet, and this should prevent water running down the sides and rotting the wood base.

The ridges on the hut roof were also painted, but the rest of the building, fences, &c., can be left till next year.

IRELAND.

Armagh, September 27th to 28th.—At the date of my visit to this observatory the weather was unfortunately wet and inclement, and in consequence I was unable to dismount the anemometer entirely. I found the instrument in good order, all parts were well oiled and carefully attended to. The cup shaft was taken down, and as far as I was able the bearings were lubricated with fresh sperm oil. The reducing gearing was seen to as well as the recording parts and clock, after which the orientation was tested and found correct.

The fans and cup stays were all quite sound.

Dublin, Phoenix Park, September 18th.—The anemometer required cleaning and it was entirely dismounted for this purpose. Some of the bevilled wheels geared too deeply owing to wear, and washers were put to remedy this. The vents in the brake box had been left full open at the last inspection, and to this the too great freedom of the vane was due; there was also an insufficient quantity of oil in the box, and the hole at the top of the box had not been closed, allowing dirt, &c., to get to the oil. These defects were made good. The clock was taken to pieces and cleaned. The orientation mark was examined and found good, and the instrument left in good order.

The stand on which the anemometer is placed is showing signs of decay at the ground level, and in a strong wind it vibrated a good deal. This I reported to Captain Rotherham, R.E., the officer in charge in Major Haines' absence.

Kingstown, September 20th.—This anemometer is erected upon a small house built for it near the Northern end of the Eastern breakwater of the harbour. The ridge of the roof of the house is 12 feet from the roadway, and the fans are raised 4 feet, and the cups 6 feet, above the ridge. On the Southern side a stone wall rises 7 to 8 feet above the road, and is brought close up to the house; on the Northern side the wall consists of huge blocks of stone placed side by side, and is only from 4 to 5 feet high. Outside, the breakwater runs down to the sea in a long "ramp"; but inside there is first a lower roadway below that on which the house stands, and then the quay wall and the water. The direct distance from the shore is considerable (about one-third of a mile), but the position is affected, as regards wind, by the hills to the Southward, and more immediately by the low elevation of the cups above the breakwater, and by the walls, &c., surrounding the house.

The instrument was in need of cleaning, and as the recording portion is quite unprotected by any casing it was full of dirt and grit. This portion was cleaned, as was also the exterior portion, the clock oiled, a defect in the gearing of the pencils remedied,

and the instrument left in good working order. I also explained to Constable William Foote, who attends to the instrument, how the papers should be changed, &c.

Mr. Robert D. Gray, C.E., Harbour Lodge, is the engineer to the harbour, and has immediate control of the anemometer as the representative of the Board of Works.

The lubricant in use is not very good, and I promised that a supply of our sperm oil should be sent.

A good orientation mark has been cut on the breakwater by Mr. Gray, and the instrument is now properly set by it. I thought the vane was pointing very well in the direction of the wind, but this I could not test with great accuracy, and it should be again seen to.

C.—SUNSHINE STATIONS.

ENGLAND AND WALES.

Bournemouth, October 1st.—Since last year a new sunshine recorder (Campbell-Stokes) has been mounted here on the summit of a water tower in Merrick Park. The recorder has been accurately adjusted, and its exposure is good, excepting that in summer time the sun's rays are cut off before 4 a.m. by a balustrade on the tower. I visited the old recorder which is still in use at the cemetery; the exposure is unsatisfactory owing to trees which, in winter time especially, must interfere with the working of the instrument. The observer sends us on his weekly return the records of each instrument, and we have been in the habit of publishing these taken at Merrick Park. I recommend that this practice be continued.

Colwyn Bay, September 7th.—Since this station was last inspected the recorder has been moved to a new and much better site upon the hill which rises behind the town. The horizon is nearly perfect and the record should be far more reliable than before.

Haverfordwest, September 2nd-4th.—The sunshine recorder has an admirable exposure on the cover of a waterworks reservoir, about 220 feet above the sea. It is a recorder of Swiss make with a ball, well ground and shaped, of 3.75 inch diameter. It is of the "Universal" pattern, and to prevent the ball working out of centre during adjustment, Mr. Phillips had inserted india-rubber pads under the clamping screw heads. He had also turned a wooden template of a half circle to enable him to make the adjustment for centring. The trace on the card when I saw the instrument was running high on the evening side. No sunshine was available. I took the bearings with a prismatic

compass, setting out the meridian line of the instrument by the boring of the latitude clamp, and found the deviation of the compass from this line about 22° instead of 19° . This instrument has an iron base plate which fits into a square ring supported by brackets from a $2\frac{1}{2}$ -inch iron supporting pipe. The iron base is clamped firmly to the iron ring by horizontal screws through the ring. Level adjustment has to be made by loosening the clamp-screws and tapping the base plate. This is difficult to carry out satisfactorily, and when the base plate is level the horns are not. The horns have been extended by Negretti & Zambra and no reliance can be placed on the levelling thereby. The time scale corresponds to that of $\frac{1}{1}$ of the M.O. card, *i.e.*, $5\frac{1}{2}$ M.O. "Hour lines" = 6 sunshine hours. I made the best adjustment I could for latitude, for centring, level and azimuth with the compass on September 2nd. The September 3rd card gave what was apparently a very satisfactory trace, but there was no time taken. A barely exposed sun image when I first arrived, before touching the instrument, gave correct time. After my adjustment the reading of a similarly unsatisfactory image was 4.40 image for 4.54, true local time, which is not very satisfactory. It is, however, to be left to see how the trace runs.

Hoylake, September 5th.—The position of the instrument here is excellent, and ensures for it an unobstructed horizon. At time of my visit I had an excellent opportunity of seeing how the record of this station is affected during easterly winds by the drifting smoke from the Liverpool and Birkenhead districts.

Newcastle-on-Tyne, September 14th.—The recorder was in excellent adjustment, and is very carefully attended to.

Plumstead.—The instrument at this station has been re-erected on a new site, which at present has an unobstructed horizon. The station is an important one for use in obtaining a summary of the sunshine conditions of the Metropolitan area, inasmuch as it is contiguous to what is probably its most smoky district. The recorder was readjusted and left in good order.

Scarborough (H), September 11th.—The recorder is placed outside the town, on the northern side. The exposure is not very satisfactory, for to the north-east and east there are houses about 300 yards away, while to the south-west and west there are trees and a hill, all of which will cut off some sun at times.

I think some sunshine will always be lost in the mornings and evenings, and I estimate that the loss in winter will amount to as much as $1\frac{1}{2}$ hours per day. In summer the loss will be less.

Sheffield (Attercliffe), September 7th.—The recorder is placed on the roof of the Public Baths in practically the centre of the manufacturing part of the city.

The exposure is very good, and in my opinion the instrument will record the possible bright sunshine at the station except for

fifteen minutes in the winter mornings, and for twenty minutes in the winter evenings. In all probability, however, no record will be lost, since when the sun is so low as to be cut off by obstructions it will seldom have power to burn through the smoky atmosphere.

Owing to the mode of access it is impossible to ensure that the cards shall be changed at any fixed hour.

The instrument was not cemented in its place, but it was promised this should be done.

York (Bootham), September 9th.—The recorder has been slightly changed in position since last inspection. It now stands on a wooden frame, where it is more easily accessible and less liable to accidental changes in adjustment. It was in very good adjustment on the day of my visit, and it appears to be very carefully attended to under the personal supervision of Mr. Richardson, M.A., the science master of the school.

NOTE by MR. CONSTABLE ON THE STATE OF THE SELF-RECORDING
METEOROLOGICAL INSTRUMENTS in operation at the KEW
OBSERVATORY OF THE NATIONAL PHYSICAL LABORATORY.

The instruments are in good order and there is nothing calling for special remark.

The oil in the anemometer direction-rollers trough was dirtier than usual; it was removed and bearings lubricated with fresh sperm.

All the self-recording instruments were dismounted and cleaned.

One of the spare thermograph tubes in stock was accidentally broken whilst being used in practising the method of obtaining "air-bubble" at different parts of the tube.

The Dines' pressure tube anemometer is in good working order and its performance has been generally satisfactory.

Trouble was experienced with the clock escapement in January, and again at the end of March, when another clock and cylinder had to be fitted up temporarily, but since April its action has been satisfactory.

(Signed) E. G. CONSTABLE.

28th September, 1901.

REMARKS by DR. CHREE, F.R.S., on the RECORDING of SUNSHINE and ATMOSPHERIC ELECTRICITY.

Records of Bright Sunshine.—The meteorological tables in our Annual Report to the Royal Society have for many years contained sunshine data as given by a Campbell-Stokes' recorder. In addition to the number of hours' sunshine recorded, the tables have given "the mean percentage of possible sunshine" for each month and for the year. A monthly "mean percentage" has meant the arithmetic mean of the 28 to 31 percentages for the individual days of the month, the duration of sunshine for each day being taken from Whitaker. The mean percentage given for the year has been the mean of the 12 monthly means. Though quite logical, this differs from the usual practice, which amounts to defining the mean percentage for any given period of n days as $100 \times (\text{total hours of sunshine in the } n \text{ days}) \div (\text{total possible hours in the } n \text{ days})$. So far as individual months are concerned, the results given by the two methods can hardly show differences of practical importance. It is quite otherwise, however, with the yearly percentages, as will appear from the following data. The figures in the first row were obtained by the method hitherto applied at Kew, those in the second row by the ordinary method as embodied in the definition given above. As the first row is based on monthly means going to only two significant figures, there may occasionally be an error of one or two units in the decimal.

	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	Mean.
Percentage, old method.	297	291	310	352	289	328	292	318	307	366	329	316
Percentage, new method.	315	307	340	377	303	357	322	354	326	396	356	341

The difference tends to be least in years such as 1894 when the amount of winter sunshine was relatively large.

The fact that the sun rarely, if ever, burns the Campbell-Stokes' card when within a few degrees of the horizon, has frequently been dwelt on in connection with the appropriateness of the phrase "total possible sunshine." The case against the phrase has certainly not been exaggerated. A slight error in the setting of the card may well have been responsible for several of the records in the times of late or early burning, and there is also the probability of not infrequent error in the time scale. In our experience of sunshine recorders, error to the extent of over a minute per hour at some season of the year is by no means uncommon.

It is also deserving of comment that sunrise and sunset as usually understood are the instants when the sun's *centre* as elevated by refraction is *seen* in the horizon. If the duration of the day, so far as bright sunshine is concerned, were defined

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—	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	Mean.
Percentage, old method.	29.7	29.1	31.0	35.2	28.9	32.8	29.2	31.8	30.7	36.6	32.9	31.6
Percentage, new method.	31.5	30.7	34.0	37.7	30.3	35.7	32.2	35.4	32.6	39.6	35.6	34.1

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It is also deserving of comment that sunrise and sunset as usually understood are the instants when the sun's centre as elevated by refraction is seen in the horizon. If the duration of the day, so far as bright sunshine is concerned, were defined

by reference to the times when the lower limb is really in the horizon it would appear a fairer definition. In high latitudes the question is of increased importance.

Defective Sunshine Lenses.—By the kindness of Mr. Marriott an opportunity was afforded of comparing the recorder recently discarded from use in Regent's Park with our own. The two recorders had as nearly as possible the same exposure, being situated a few feet apart on the parapet on the observatory roof.

The following is a summary of the results, the quantity tabulated being the mean percentage of the Kew record given by the Regent's Park recorder, *i.e.* :

$$100 \times \frac{\text{Hours sunshine by Regent's Park recorder.}}{\text{" " " Kew " "}}$$

Month	Number of Days of Comparison.	Percentage for all Hours of Day.	Percentage for Hours from 9 a.m. to 3 p.m.
1901.			
January	7	76	76
February	10	82	89
April	6	90	97
May	9	89	100
June	5	78	90
September	6	85	96
Arithmetic Mean of Monthly Percentages )	... ..	83	91

In January no sunshine was recorded before 9 a.m. or after 3 p.m. The days of observation in June were somewhat dull.

To supplement the above results, a comparison was made of the transparency of the Regent's Park and Kew spherical lenses, by means of the photometer used in ordinary lens testing. The mean of several pretty consistent observations with light from a paraffin lamp made the Regent's Park sphere transmit only 77 per cent. as much of the light as the Kew sphere. When, however, the light from the lamp passed through a screen of red paper before traversing the lenses, the Regent's Park sphere's transparency was 89 per cent. of that of the Kew sphere. One would naturally infer that the diathermancy of the Regent's Park sphere—on which its efficiency as a sunshine lens mainly depends—has suffered less than its translucency.

The comparison shows, what is, however, pretty obvious *a priori*, that a defective lens by causing most loss of record when sunshine is weakest, *i.e.*, in winter, or early and late in the day, is likely to introduce error into the laws of annual and

diurnal distribution of sunshine as well as into the total record for the year.

Atmospheric Electricity.—For some years observations have been carried out with the object of assisting in the interpretation of the electrograms from the Kelvin water-dropper. Each morning, after shutting off the water jet, the needle of the quadrant electrometer is charged to an approximately fixed potential, and the rate of leakage of charge is roughly noted. This gives a qualitative idea of the state of the general insulation.

Again, on most fair days, eye observations are taken with a Kelvin portable electrometer with burning fuse, the electrometer occupying a fixed position in the garden at a considerable distance from any building. The following table gives the mean value for each month of the following quantity—

$$100 \times \frac{\text{Potential from measurement of electrogram}}{\text{Potential given at same time by portable electrometer.}}$$

The early months of 1900 are grouped together, the number of observations being small. The greatest and least values recorded each month are given to show the extent of the variability. A few cases have been excluded, owing to the existence of negative and rapidly fluctuating potential, or to obviously defective action of the water-dropper.

$$100 \times \frac{\text{POTENTIAL FROM ELECTROGRAM}}{\text{POTENTIAL FROM PORTABLE ELECTROMETER.}}$$

Month.	1900.				1901.			
	Number of Com- parisons.	Mean Value.	Greatest Value.	Least Value.	Number of Com- parisons.	Mean Value.	Greatest Value.	Least Value.
January ..	7	89.6	101	81	22	84	120	56
February ..					22	87	102	59
March.. ..					18	82	130	48
April	31	92	117	71	19	93	117	63
May	39	108	142	71	30	87	116	50
June	23	95	164	75	19	85	118	50
July	28	103	120	65	19	90	125	40
August ..	20	93	117	77	25	95	116	69
September ..	22	87	117	62	19	95	113	55
October ..	26	87	130	50	17	80	123	60
November ..	22	84	104	50	19	98	114	70
December ..	14	75	100	43	17	66	88	48

The variability apparent in the table is due probably to a combination of causes. The portable electrometer is placed about 70 yards from the water jet and at a level, about 12 feet lower. Further, there is reason to believe that the results, from a fuse and from a water jet, even if they could be simultaneously used at one spot, would not always be equal or in a fixed proportion to one another. (R. S. Proc. Vol. 60, 1897, pp. 106-9.) Thus the ratio between the potentials recorded by the two instruments might be expected to show some slight variability, however satisfactory the arrangements.

The principal cause, however, of the variability is almost certainly want of uniformity in the insulation of the water-dropper and electrometer, especially the latter. When the ratio (water-dropper : portable) is conspicuously low, the effect of replacing the acid used to keep the air inside the electrometer dry is usually most marked. The insulation naturally suffers most in damp wintry weather.

The results arrived at point to some practical conclusions. It is clear that if the electrograms are tabulated in the usual way, on the assumption that a given length of ordinate answers to a given atmospheric potential, according to the scale got out by raising the electrometer needle to known potentials, the results obtained during damp weather and during the winter months, generally will be relatively too low. Even in the case of the same month, in two different years, differences in the insulation might answer for a good deal.

I would take this opportunity of mentioning some other points bearing on the question of tabulation. During rain, water is dripping from a length of some three feet of the water-dropper tube. In such a case, it is most improbable that the potential recorded depends solely on the small artificial jet at the end. It answers presumably to some point whose position along the tube fluctuates according to the amount of drip at intermediate points. Thus during rainfall it does not seem possible, in the absence of special experiments, to attach any definite numerical results to the measurements made. Again, during rain and at other times of rapid change of potential, the instrumental arrangements hardly admit of a satisfactory record. The changes are so big that the curve is apt to go off the sheet, unless the scale of potentials is so contracted as to be practically useless under ordinary conditions; also the movement is often too rapid to leave a satisfactory mark on the paper, while the time scale is too contracted to show details. There is the further consideration that during rapid changes of potential the nature of the record must depend largely on such wholly extraneous features as the capacity of the recording apparatus.

Taking all the facts into consideration, I think a good deal might be said for the policy of tabulating only a limited number of the curves on what, following the analogy of the magnetic tabulations, might be termed "*electrically quiet days.*"

These days should be selected from considerations as to the absence of negative potential, or of rapid and badly defined move-

ments, as well as with due regard to the apparent character of the insulation. The choice of days might be widely different at different seasons, so that it would probably be inexpedient to prescribe a definite number, the same for all months.

As in the case of terrestrial magnetism, it is not unlikely that the diurnal variation deduced from the selected "quiet" days might differ from that deduced from "all" or from "all fair" days, and quite possibly there might prove to be a "non-cyclic effect." These possible differences from "all day" curves ought not, however, to be regarded solely as defects, for if such differences exist their discovery would be important.

One of the principal advantages of the comparison of the electrogram measurements with the results from the portable electrometer is that it supplies a comparatively definite absolute value to the former data. The absence of definite information on this point has always been a notable source of uncertainty in comparing electrograph data at different stations, or even in comparing the results obtained at the same station during different months and years. So far as I am aware, it is absolutely unknown at the present day whether the phenomena of atmospheric potential—diurnal ranges, and so on—like those of terrestrial magnetism are subject to conspicuous alteration from year to year according to the position of the year in the sun-spot cycle. The importance of definite information on such a subject is sufficiently obvious.

CHARLES CUREE.

REPORT of WORK done at the BEN NEVIS OBSERVATORIES during
the year ending MARCH 31, 1902.

The health of the observers continued good, and the work of making and recording the continuous hourly observations at both observatories has been uninterruptedly carried on. An exception must be made as regards the superintendent, the state of whose health still necessitates the employment of an additional clerk at Fort William.

Mr. Omond's time has been much taken up in seeing through the press the observations which appear in the second volume of the Ben Nevis Observations, together with revising and otherwise preparing for the press the various Papers and Discussions which appear in the same volume, which was published in August last. The printing of Vol. III. is being proceeded with.

Mr. Omond's time has also been directed to the utilisation of the observations made at the High Level observatories of Europe viewed in connection with the Ben Nevis observations and their bearings on weather changes. In connection with this work the

observations at the following High Level observatories are being utilised :

In France.—Barcelonette, 3,714 feet; Servance, 3,990 feet; Gavarnie, 4,452 feet; Puy-de-Dôme, 4,813 feet; Aigoual, 5,099 feet; Mont Ventoux, 6,234 feet; and Pic de Midi, 9,380 feet. *In Germany.*—Brocken, 3,766 feet; and Schneekoppe, 5,259 feet. *In Austria.*—Semmering, 3,297 feet; Crkvice, 3,599 feet; St. Anton, 4,285 feet; Marienberg, 4,341 feet; Schneeberg, 4,810 feet; Schafberg, 5,827 feet; Rathhausberg, 6,283 feet; Schnittenhoe, 6,349 feet; Obirgipfel, 6,706 feet; and Sonnblick, 10,154 feet. *In Italy.*—Monte Cave, 3,166 feet; and Monteverdine, 4,518 feet. *In Switzerland.*—Chaumont, 3,701 feet; Rigi Kulm, 5,873 feet; Säntis, 8,094 feet; and Great St. Bernard, 8,130 feet. *In Algeria.*—Teniet-el-Haal, 3,738 feet; and Aflou, 4,679 feet. The constants of mean pressure, temperature and rainfall have been calculated for these High Level stations.

Along with these twenty-seven stations several Low Level stations are utilised in determining the vertical gradients of pressure, temperature and moisture. Particular attention is given to the different directions of the winds at different heights, differences which so often point clearly to very different distributions of barometric pressure at the higher levels of the atmosphere than what prevails at sea-levels at the same time. It is just these different distributions of pressure in the higher layers of the atmosphere from what prevails at sea-level at the same time, which is most likely to aid the forecaster of weather in seeing the most probable distribution of the sea-level pressure one day, two days, or even three days in advance.

It is evident that if the forecaster can guess what the distribution of the barometric pressure will be at some future time, he can state what the weather will be at that time. Hence the whole problem of forecasting resolves itself into foreseeing the arrangement of barometric pressure in the future. The distribution of pressure does not shift arbitrarily, but the areas of high and low pressure existing on any one day change into those of the next day by movement over the earth and by increase or diminution in intensity, in accordance with physical laws.

The scientific study of the causes of the movements of these areas of high and low pressures, called respectively anticyclones and cyclones, can only be said to be just beginning; and until this great inquiry has made some substantial progress we cannot have a science of forecasting, as we have now a science of climatological meteorology.

This is the inquiry which Mr. Omond, aided by the staff of the Scottish Meteorological Society, has entered on, and like the inquiry previously referred to will take from two to three years for the preparation of a report showing the general relations of the observations made at the two Ben Nevis observatories to the coming changes *in the immediate future* in the distribution of the sea-level pressures, which rule the weather one day, two days, or three days in advance.

It is evident that in carrying on these large works Dr. Buchan and Mr. Omond require the help of well qualified assistants, and your Committee have much pleasure in intimating that this has been provided. A generous donor in July, 1900, sent a donation of £300 to the Directors of the observatories to aid in carrying on this work, and another generous donor gave £500 in July, 1901, for the same object.

Dr. Buchan's time has been almost wholly occupied with a discussion of the hourly observations of pressure, temperature, humidity, sunshine and rainfall, with their inter-relations, of the two observatories from 1890 to 1902. So far as the inquiry has proceeded, one of the chief results is this: on the one hand, when the instances of the mean hourly temperature of the day happened to be $12^{\circ}0$, or lower, then the difference of the pressures at the two observatories reduced to sea-level is much less than the average deduced from the whole of the temperature observations; and, on the other hand, when the instances of the mean hourly temperature of the day happened to be $18^{\circ}0$, or greater, then the difference of the pressures at the two observatories similarly reduced is much greater than the average deduced from the whole of the temperature observations.

In the former class, when the temperature differences of the day did not exceed $12^{\circ}0$, the type of weather was strongly anti-cyclonic and humidity small, whereas in the latter class when the temperature difference exceeded $18^{\circ}0$, the type of weather was equally strongly cyclonic and humidity large.

It is scarcely necessary to remark that the result here empirically arrived at is in accordance with the principle laid down by Dalton: "Air charged with vapour, or vaporized air, is specifically lighter than when without the vapour; in other words, the more vapour any given quantity of atmospheric air has in it, the less is its specific gravity." (*Dalton's Meteorological Observations and Essays*. Second Edition. Manchester, 1834. Page 100.)

It follows that a nearer approximation may be made to the amount of vapour in the air in the stratum between the top and bottom of Ben Nevis, than can be approximated to from the readings of the dry and wet bulbs at Fort William and the top of the Ben. Vapour is a prime factor in weather changes.

ALEXANDER BUCHAN.

October 7th, 1902.

COMPARISON OF INSTRUMENTS.

The Barometers and Thermometers were compared at the stations visited. The following tables give the corrections required to be applied to the readings of the various Barometers to make them agree with the Inspector's standards :—

TELEGRAPHIC REPORTING STATIONS.

STATIONS.	Inspector's Standard Corrected.	Reporting Barometer	Check Barometer.	REMARKS.
ENGLAND AND WALES.	Inches.	Inches	Inches	
Bath	29.843	+ .014	—	
Dungeness	29.569	+ .010	+ .014	
Holyhead	30.031	+ .003	+ .005	
Jersey	30.417	+ .004	+ .013	
Loughborough .. .	29.950	— .005	—	
Newton Reigny .. .	—	—	—	
Oxford	—	—	—	
Pembroke (St. Ann's Head).	29.972	+ .014	+ .017	
Portland Bill	30.062	.000	+ .002	
Scilly	—	—	—	Not visited.
Shields	29.326	+ .012	+ .005	
Spurn Head	30.041	+ .000	+ .004	
Yarmouth.. .. .	—	—	—	
SCOTLAND.				
Aberdeen	29.723	+ .005	+ .004	
Leith	29.960	+ .002	+ .000	
Nairn	30.033	— .004	+ .002	
Stornoway	—	—	—	Not visited.
Sumburgh Head ..	29.710	— .004	— .008	
Wick	29.838	+ .003	+ .003	
IRELAND.				
Blackrod Point .. .	30.268	+ .005	+ .009	
Donaghadee	—	—	—	
Malin Head	29.552	+ .008	+ .021	
Parsonstown	29.658	+ .010	—	
Roche's Point	30.134	+ .009	+ .009	
Valencia	30.156	+ .006	—	

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Bath	29·843	+ '014	—	
Dungeness	29·569	+ '010	+ '014	
Holyhead	30·039	+ '003	+ '005	
Jersey	30·417	+ '004	+ '013	
Loughborough	29·970	— '007	—	
Newton Reigny	—	—	—	
Oxford	—	—	—	
Pembroke (St. Ann's Head).	29·972	+ '014	+ '017	
Portland Bill	30·062	'000	+ '002	
Scilly	—	—	—	Not visited.
Shields	29·326	+ '012	+ '005	
Spurn Head	30·044	+ '006	+ '004	
Yarmouth.. .. .	—	—	—	
SCOTLAND.				
Aberdeen	29·723	+ '005	+ '004	
Leith	29·960	+ '002	+ '006	
Nairn	30·033	— '001	+ '002	
Stornoway	—	—	—	Not visited.
Sumburgh Head	29·716	— '004	— '008	
Wick	29·888	+ '006	+ '003	
IRELAND.				
Blacksod Point	30·268	+ '005	+ '009	
Donaghadee	—	—	—	
Malin Head	29·552	+ '008	+ '021	
Parsonstown	29·658	+ '010	—	
Roche's Point	30·134	+ '009	+ '009	
Valencia	30·156	+ '006	—	

BAROMETERS.

NORMAL CLIMATOLOGICAL STATIONS (Second Order Station,
International Classification).

STATION.	Inspector's Standard Corrected.	Reporting Barometer.	Check Barometer.	REMARKS.
ENGLAND AND WALES.	Inches.	Inches.	Inches.	
Ampleforth	29.636	- .013	—	
Aspatia	—	—	—	
Buxton	—	—	—	
Canterbury	29.492	- .013	—	
Cheltenham	—	—	—	
Chester	29.863	+ .019	—	
Churchstoke	—	—	—	
Cockle Park, Morpeth..	29.748	- .002	—	
Cronkbourne	—	—	—	
Fulbeck	29.762	.000	—	
Liverpool (Bidston) ..	—	—	—	
Llandudno	—	—	—	
Rousdon	—	—	—	
St. David's.. ..	29.873	+ .008	—	
Scarborough	—	—	—	
Sheffield	29.544	- .008	—	
Stokesay	29.236	+ .011	—	
Stonyhurst	—	—	—	
Wessington Court ..	29.066	+ .001	—	
Whitchurch	—	—	—	
Woolacombe	—	—	—	
York	29.864	.000	—	
SCOTLAND.				
Ben Nevis	—	—	—	
Cargen	29.474	+ .012	—	
Dundee	29.610	.000	—	
Dunrobin	29.818	.000	—	
Fort Augustus	30.429	- .001	—	
Fort William	30.382	+ .006	—	
Glasgow	29.833	- .004	—	
Glennie	29.777	+ .004	—	
Lairg	29.350	+ .020	—	
Laudale	30.405	- .007	- .00	
Ochtertyre	29.496	+ .015	—	
Pinnmore	29.840	.000	—	
Strathpeffer	29.752	+ .001	—	

BAROMETERS—*continued.*NORMAL CLIMATOLOGICAL STATIONS (Second Order Station
International Classification)—*continued.*

STATION.	Inspector's Standard Corrected.	Reporting Barometer.	Check Barometer	REMARKS.
IRELAND.	Inches.	Inches.	Inches.	
Armagh	—	—	—	
Belfast	—	—	—	
Dublin (City)	30.220	+ .012	—	
Dublin (City)	29.609	+ .012	—	
Dublin (Phoenix Park)	29.814	- .002	—	
Glasnevin	29.496	- .015	—	
Kingstown	30.118	+ .001	—	
Markree Castle	29.849	+ .018	—	
Parsonstown	29.658	+ .010	—	

BAROMETERS.

OTHER CLIMATOLOGICAL STATIONS.

STATION.	Inspector's Standard Corrected.	Reporting Barometer.	Check Barometer.	REMARKS.
ENGLAND AND WALES.	Inches.	Inches.	Inches.	
Alnwick Castle	29.912	- .002	—	
Littlestone	29.663	+ .003	—	
Newcastle-on-Tyne ..	29.831	- .001	—	
SCOTLAND.				
None.				
IRELAND.				
Valencia (Knightstown)	30.022	+ .025	—	

BAROMETERS—*continued.*NORMAL CLIMATOLOGICAL STATIONS (Second Order Station
International Classification)—*continued.*

STATION.	Inspector's Standard Corrected.	Reporting Barometer.	Check Barometer	REMARKS.
IRELAND.	Inches.	Inches.	Inches.	
Armagh	—	—	—	
Belfast	—	—	—	
Dublin (City)	30.220	+ .012	—	
Dublin (City)	29.609	+ .012	—	
Dublin (Phoenix Park)	29.814	- .002	—	
Glasnevin	29.496	- .015	—	
Kingstown	30.118	+ .004	—	
Markree Castle	29.849	+ .018	—	
Parsonstown	29.658	+ .010	—	

BAROMETERS.

OTHER CLIMATOLOGICAL STATIONS.

STATION.	Inspector's Standard Corrected.	Reporting Barometer.	Check Barometer.	REMARKS.
ENGLAND AND WALES.	Inches.	Inches.	Inches.	
Alnwick Castle	29.912	- .002	—	
Littlestone	29.663	+ .003	—	
Newcastle-on-Tyne ..	29.834	- .001	—	
SCOTLAND.				
None.				
IRELAND.				
Valencia (Knightstown)	30.022	+ .025	—	

APPENDIX VIII.

STORM WARNING CHECKING.

COMPARISON between the WARNINGS and the subsequent WEATHER in 1901.

Coasts.	Total No. of Warnings.	Warnings justified by subsequent Gales. Force 8 and upwards.	Warnings justified by subsequent strong Winds, Forces 6 & 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.	Warnings issued in consequence of telegraphic errors.	Storms for which no Warning was issued.
Scotland, N.E. ...	41	31	5	5	—	—	—	Jan. 28-29, Jan. 30, Mar. 1, Dec. 12-13
„ E. ...	29	14	9	5	—	1	—	—
„ N.W. ...	44	28	9	3	—	4	—	Jan. 28-29
„ W. ...	41	13	22	6	—	—	—	—
Ireland, S.W. ...	42	26	11	3	1	1	—	—
„ N.W. ...	50	38	9	1	1	1	—	Jan. 30, Mar. 1, Oct. 8-9.
Irish Sea ...	48	36	6	2	2	2	—	Jan. 28-29, Mar. 19-20, Oct. 8-9.
St. George's Channel	34	18	13	2	1	—	—	—
Bristol Channel ...	34	23	9	—	—	2	—	—
England, S.W. ...	34	23	8	—	—	3	—	—
„ S. ...	27	16	9	2	—	—	—	—
„ S.E. ...	27	16	7	4	—	—	—	—
„ E. ...	22	13	6	2	—	1	—	—
„ N.E. ...	25	15	7	2	—	1	—	Jan. 28-29, Dec. 12-13.
Totals ...	498	310	130	37	5	16	—	
Percentages...	—	6.23	26.1	7.4	1.0	3.2	—	

GALES EXPERIENCED for which no WARNINGS were issued.
1901.

January 28th-29th.—A N.W. gale over all the Nn. parts of the Kingdom. No reports from Nn. stations were received for 2 p.m. and 6 p.m. on the 28th, a previous gale having destroyed electric communication with those regions.

January 30th.—A N. and N.Wly. gale in Scotland N.E., and in Ireland N.W., caused by a secondary disturbance, which on the night of the 29th came rapidly over the Nn. parts of the North Sea from the Nwd.

March 1st.—A S.Ely. gale in Scotland N.E., and Ireland N.W. The Wn. and Sn. coasts had been promptly warned on the night of February 28th, at which time the Nn. parts were not threatened. By 8 a.m. on March 1, however, the gale had extended to the Nn. coasts also.

March 19th-20th.—A N.Ely. gale in the Irish Sea. The S. and E. coasts had been warned, but the gale extended further to the Nwd. on our Western coasts than was anticipated.

October 8th-9th.—A N.Wly. gale over Ireland N.W. and the Irish Sea. The gale appeared in the rear of a depression moving rapidly from N.W. At 6 p.m. 8th, the appearance was not very threatening, but by 8 a.m., 9th, the centre was over Holstein.

December 12th-13th.—An Ely. and N.Ely. gale on the N.E. coasts of Scotland and England. The S.E. and E. coasts of England had been warned on morning of 12th, when the more Nn. coasts did not seem threatened. Later on telegraphic communication with the N. was interrupted.

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, 1901, to March, 1902. The results are for the United Kingdom as a whole.

The letters used have the following signification :—

a=complete success.

b=partial (more than half) success.

c= partial failure.

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 percentage of success in "Wind," the second in "Weather," and the third the average of the two.

The Summary for the various districts is given at page 18.

Months.		Percentages.			
		Wind.	Weather.	Average.	a + b.
April	a b c d	43 34 19 4	59 28 18 5	51 31 14 4	82
May	a b c d	68 19 10 3	69 20 10 1	69 19 10 2	88
June	a b c d	60 22 12 6	67 22 8 3	64 22 10 4	86
July	a b c d	57 19 16 8	61 23 9 7	59 21 13 7	80
August	a b c d	44 34 18 4	73 19 5 3	59 26 12 3	85
September	a b c d	61 25 8 6	60 28 5 7	61 26 7 6	87
October	a b c d	39 30 20 11	61 26 9 4	50 28 15 7	78
November	a b c d	51 32 12 5	70 25 5 0	61 28 9 2	89
December	a b c d	47 28 18 7	67 22 7 4	57 25 13 5	82
January	a b c d	49 29 16 6	68 26 5 1	59 27 11 3	86
February	a b c d	51 32 12 5	61 31 6 2	56 32 9 3	88
March	a b c d	39 35 21 5	57 27 15 1	48 31 18 3	79
The entire year	a b c d	51 28 15 6	64 25 8 3	58 26 12 4	84

APPENDIX X.

CONSPICUOUS METEOROLOGICAL OCCURRENCES IN 1901.

The following were the more striking features in the weather of 1901, noticed in connexion with the issue of daily and weekly reports.*

1. *Gales*.—These were less numerous than in many recent years, and were rarely of any general or striking severity. The three most important storms occurred :—

(a.) On January 27th, when a strong gale from the Westward and North-Westward prevailed on all coasts. The gale was very severe over Ireland and England.

(b.) On November 12th and 13th, when a severe gale from the Eastward and North-Eastward was experienced on all our Eastern and Western coasts. At Alnwick Castle the anemometer broke down during the prevalence of the gale, the highest actual velocity registered being 43 miles at 5 p.m., 12th. A gale from the South-Westward was experienced at the same time on our Southern coasts, but was not severe.

(c.) On December 12th and 13th. This gale was again from the Eastward or North-Eastward, and was again severe on many parts of our Eastern and Western coasts. (The anemometer at Fleetwood was dismounted on November 26th, and had not been replaced by the end of the year.)

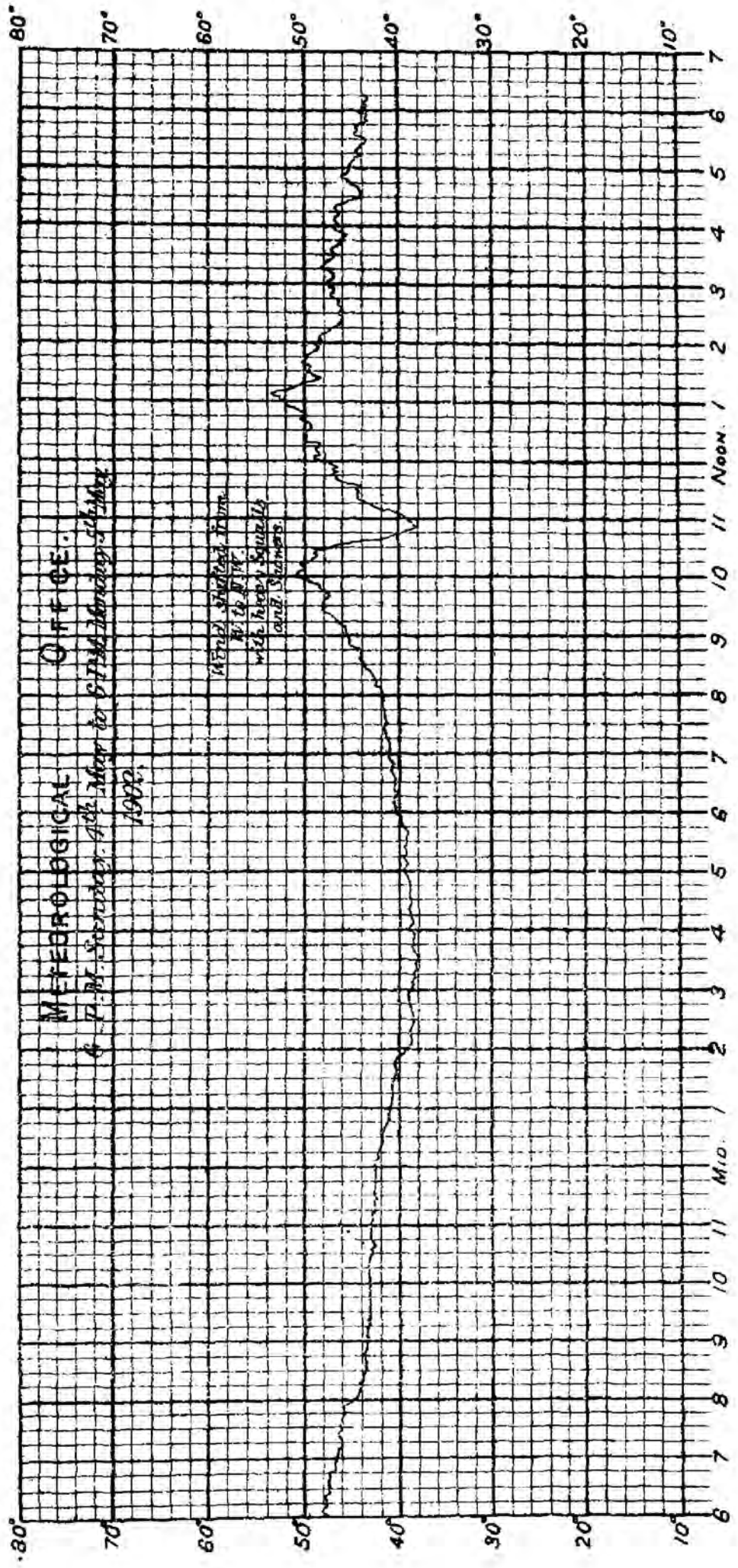
Owing to the direction of the wind the two gales last mentioned resulted in a large number of maritime casualties, especially along our East coasts, where the storm was in each case rather protracted.

On March 5th a general gale from South-West and West blew with considerable severity on the Irish coast; while on March 30th a violent gale from East and South-East was experienced in the North of Scotland.

The annexed table of notes on the readings of anemometers showing a greater velocity than 44 miles per hour (actual) gives particulars of the gales referred to above :—

* Since November an electrical thermometer has been in operation at the Office, giving a continuous record of the temperature in a screen fixed in the roof. The more transient changes which such an instrument records are not represented in the reports. An example is shown in the sudden fall and recovery of temperature on May 5, which is illustrated by the reproduction of the thermometer chart for that day.

COPY OF RECORD FROM CALLENDAR'S SELF RECORDING ELECTRICAL THERMOMETER
SHEWING SUDDEN CHANGES OF TEMPERATURE IN LONDON ON MAY 5 1902.



NOTES ON READINGS OF ANEMOMETERS EXCEEDING AN ESTIMATED VELOCITY OF 44 MILES (Actual) per hour.

Date.	Station.	Duration of Severe Gale, 44 miles per hour, or above.	Wind Direction.	Maximum.		Remarks.
				Hourly Velocity (Actual).	Rate in a gust.	
Jan. 1	Deerness...	1.30 a.m. to 3.30 a.m. ...	S.S.E.	45	—	The track of the depression which caused this gale lay well to the northward of the British Isles. A well-marked depression, the centre of which passed close to Scilly, and thence across the centre of England to the North Sea. On the morning of the 27th the centre of a deep depression lay to the North-East of Scotland, and caused steep barometric gradients all over the United Kingdom. As it passed away to the eastward it was succeeded by several subsidiary centres, which brought a continuance of strong winds and gales for some days. This was due to a small secondary depression which passed across Wales and England during the evening of the 4th and morning of the 5th. At Scilly the wind force averaged 42 miles for nearly an hour at about 7 p.m., 4th.
" 19	Scilly ...	1 a.m. to 5 a.m., and 8.30 a.m. to 4.30 p.m.	S.S.E. to W.S.W. & N.W.	52	72	
" 25, 29	Scilly ...	11 p.m., 25th, to 6 a.m., 26th; 2.30 p.m., 26th, to 7 p.m., 28th.	W.	55	73	
	Fleetwood	0.30 a.m. to 2.30 a.m., 26th; 1.30 p.m., 27th, to 5.30 a.m., 28th; 2.30 a.m. to 5.30 a.m., 29th.	W.N.W.	62	—	
	Holyhead	2.30 p.m., 27th, to 10 a.m., 28th.	W.N.W.	54	70	
	Valencia...	1.30 p.m. to 3.30 p.m., 27th ...	W.N.W.	45	—	
	Kingstown	3.30 p.m. to 4.30 p.m., 26th; 3.30 a.m. to 5.30 a.m., and 2.30 p.m. to 4.30 p.m., 27th.	W.N.W.	48	—	
Feb. 4	Holyhead	5.30 p.m. to 8 p.m. ...	N.	55	68	

NOTES ON READINGS OF ANEMOMETERS exceeding an ESTIMATED VELOCITY of 44 MILES (Actual) per hour.

Date.	Station.	Duration of Severe Gale, 44 miles per hour, or above.	Wind Direction.	Maximum.		Remarks.
				Hourly Velocity (Actual).	Rate in a gust.	
Jan. 1	Deerness ...	1.30 a.m. to 3.30 a.m. ...	S.S.E.	45	—	The track of the depression which caused this gale lay well to the northward of the British Isles. A well-marked depression, the centre of which passed close to Scilly, and thence across the centre of England to the North Sea. On the morning of the 27th the centre of a deep depression lay to the North-East of Scotland, and caused steep barometric gradients all over the United Kingdom. As it passed away to the eastward it was succeeded by several subsidiary centres, which brought a continuance of strong winds and gales for some days. This was due to a small secondary depression which passed across Wales and England during the evening of the 4th and morning of the 5th. At Scilly the wind force averaged 42 miles for nearly an hour at about 7 p.m., 4th.
" 19	Scilly ...	1 a.m. to 5 a.m., and 8.30 a.m. to 4.30 p.m.	S.S.E. to W.S.W. & N.W.	52	72	
" 25, 29	Scilly ...	11 p.m., 25th, to 6 a.m., 26th ; 2.30 p.m., 26th, to 7 p.m., 28th.	W.	55	73	
	Fleetwood	0.30 a.m. to 2.30 a.m., 26th ; 1.30 p.m., 27th, to 5.30 a.m., 28th ; 2.30 a.m. to 5.30 a.m., 29th.	W.N.W.	62	—	
	Holyhead	2.30 p.m., 27th, to 10 a.m., 28th...	W.N.W.	54	70	
	Valencia ...	1.30 p.m. to 3.30 p.m., 27th ...	W.N.W.	45	—	
	Kingstown	3.30 p.m. to 4.30 p.m., 26th ; 3.30 a.m. to 5.30 a.m., and 2.30 p.m. to 4.30 p.m., 27th.	W.N.W.	48	—	
Feb. 4	Holyhead	5.30 p.m. to 8 p.m. ...	N.	55	68	

NOTES ON READINGS OF ANEMOMETERS EXCEEDING AN ESTIMATED VELOCITY OF 44 MILES (Actual) per hour—*continued*.

Date.	Station.	Duration of Severe Gale, 44 miles per hour, or above.	Wind Direction.	Maximum.		Remarks.
				Hourly Velocity (Actual).	Rate in a gust.	
Mar. 1, 2	Deerness ... Scilly ...	11.30 a.m. to 0.30 p.m., 1st ... 5 a.m. to 8.30 a.m., 2nd ...	E.S.E. S.S.E. to W.	44 50	— 70	A deep low-pressure centre reached the Irish coast on the 1st, and did not become dispersed until the 3rd. At Scilly the wind was very squally throughout.
" 5, 8	Scilly ...	10.30 a.m. to 4.30 p.m., 5th ; 6.30 a.m. to 10.30 p.m., 6th, and intermittently up to 11.30 a.m., 8th.	W'ly. veering to N.	58	74	
" 30	Kingstown Deerness ...	9.30 a.m., to 10.30 a.m., 7th ... 2.30 p.m. to 5.30 p.m. ...	N.W. E.N.E.	47 45	— —	A deep depression which, after remaining for several hours to the North-West of Scotland, travelled southwards across Great Britain to France.
Apr. 4	Deerness ...	11.30 a.m. to 5.30 p.m. ...	N.W.	46	—	This depression travelled north-eastwards across Ireland and Scotland, the gradients on its advancing side becoming steeper as it left our coasts.
" 8	Alnwick ...	0.30 p.m. to 4.30 p.m. ...	W.	51	—	This gale was due to a large depression, the centre of which was a good way north of the British Isles.
						The gradients in this depression were not particularly steep; its centre travelled in a northerly direction over Scotland.

Aug. 26, 27	Fleetwood Holyhead	4.30 p.m., 26th, to 3.30 a.m., 27th 10.30 a.m. to 0.30 p.m., 26th ...	N.W. N.W.	48 46	— 61	<p>A somewhat shallow depression which moved eastward to the North Sea, the gradients becoming rather steeper in its rear, and causing strong winds and gales.</p> <p>This gale was due to a secondary depression which travelled in an easterly direction across England, and developed considerably in intensity during its passage.</p> <p>The wind was blowing with an average force of about 30 miles per hour, owing to a deep depression whose centre lay outside the Western coast of Ireland. At 2.45 a.m. the force suddenly dropped to about 18 miles per hour, and 15 minutes later a strong squall burst out with great suddenness, in which the wind attained a rate of 76 miles per hour. By 3.10 a.m. the force had again fallen to an average of about 32 miles per hour. The squall was accompanied by an abrupt fall of the barometer, amounting to nearly a tenth of an inch, and was succeeded by a gradual rise which lasted for some hours. At Falmouth there was no similar fall in pressure, but after 5 a.m. the barometer showed some small oscillations.</p> <p>In both these instances the gale was caused by a well-marked subsidiary depression which passed in a southerly direction across our Islands, the main disturbance lying over Scandinavia.</p>
Sept. 17	Fleetwood	7.30 p.m. to 11.30 p.m. ...	N.W.	46	—	
" 20	Scilly ...	3 a.m. ...	S.S.E. to S.W.	32	76	
Oct. 6	Fleetwood Holyhead	0.30 p.m. to 6.30 p.m. 1 p.m. to 3.30 p.m. ...	N.N.W. W.N.W.	51 45	— 63	
" 9	Fleetwood	0.30 a.m. to 6.30 a.m. ...	W.N.W.	54	—	

NOTES ON READINGS OF ANEMOMETERS EXCEEDING AN ESTIMATED VELOCITY OF 44 MILES (Actual) per hour—*continued*.

Date.	Station.	Duration of Severe Gale, 44 miles per hour, or above.	Wind Direction.	Maximum.		Remarks.
				Hourly Velocity (Actual).	Rate in a gust.	
Nov. 12, 13	Shields ...	10.30 a.m. to 7.30 p.m., 12th ...	E.N.E.	47	—	The centre of a deep cyclonic system traversed the British Isles from the South of Ireland to the Norfolk coast, causing strong easterly and northerly gales over the northern half of the Kingdom, and westerly gales along the Channel coasts.* Gradients for strong westerly winds were caused by the co-existence of an area of high pressure over the Peninsula and an extensive depression which extended from the neighbourhood of the Shetlands to the Baltic. The well-defined centre of this depression passed slowly up the English Channel during the 12th and 13th, and on the morning of the 14th lay over North-Eastern France.
	Fleetwood ...	0.30 a.m. to 7.30 a.m., 12th ...	N.N.E.	56	—	
	Holyhead ...	10.30 p.m., 12th, to 10.30 a.m., 13th ...	N.N.E.	48	66	
	Kingstown ...	3.30 p.m., 12th, to 8.30 a.m., 13th ...	N.N.E.	59	—	
	Scilly ...	1 p.m. to 2 p.m., 12th ...	W.	44	58	
Dec. 9, 10	Holyhead ...	9 a.m. to noon, 9th ...	W.	44	63	
	Scilly ...	1.30 a.m. to 2.30 a.m., 9th, and 11.15 p.m., 9th, to 4 a.m., 10th ...	W. & W.N.W.	46	71	
" 12, 14	Holyhead ...	3.30 p.m., 12th, to 2.30 a.m., 14th ...	N.N.E.	50	65	
	Kingstown ...	10.30 p.m., 12th, to 6.30 p.m., 13th ...	N.N.E.	51	—	
	Scilly ...	2.30 p.m., 12th, to 2 p.m., 13th ...	N.N.W.	51	85	

No gales showing a mean velocity of 44 miles or more per hour have been recorded during the year by the anemometers at Armagh, Phoenix Park (Dublin), Yarmouth, Kew, or Falmouth.

* See Plate II, p. 122.

2. *Heavy Rains.*—The frequent thunderstorms of the summer months were accompanied in numerous instances by heavy falls of rain or hail, very few districts escaping without at least one downpour of almost tropical severity. The principal cases were observed—

- (a.) On June 30th when more than an inch fell in several parts of England.
- (b.) Between July 24th and 26th, and over nearly the whole of England. On the 24th and 25th more than an inch was recorded at many of the inland Stations; at Oxford 1·6 in. fell on the former day, and 1·5 in. on the latter, the total for the 48 hours ending with 8 a.m. on the 26th being therefore as much as 3·1 ins. An exceedingly heavy fall occurred also on July 25th over the central parts of London during the prevalence of a severe and prolonged thunderstorm; at Westminster the amount in a little more than four hours was as much as 1·98 in., while at Camden Town in the same time it was as much as 2·85 ins.
- (c.) On August 9th and 10th in Scotland and the North of Ireland. On the latter day the fall amounted to 1·8 in. at Leith, and to 1·5 in. at Aberdeen.

Apart from the summer months the heaviest rainfalls of the year occurred—

- (a.) Between March 4th and 6th and in the West of Scotland, the total for the three days exceeding three inches in several places, and amounting to 4·3 ins. at Laudale (Loch Sunart).
- (b.) On March 29th, in the North-West of England, more than an inch being recorded at several Stations, and 1·7 in. at Blackpool.
- (c.) On April 2nd, and in many parts of Ireland and Scotland, the fall amounting to as much as 2·5 ins. at Glenlee and 2·0 ins. at Ochtertyre.
- (d.) On May 26th in the North of England, the largest amount reported being 2·2 ins. at Alnwick Castle.
- (e.) On November 11th and 12th over Ireland and the Northern parts of Wales and England. These falls were exceedingly heavy. On November 11th more than two inches was registered in a broad band extending Eastwards from the Atlantic over all the more central parts of Ireland to Carnarvonshire, the largest amounts reported to the Office being 3·3 ins. at Mount Callan, and 3·0 ins. at Roslevan (both in co. Clare), 2·9 ins. at Recess (co. Galway), and 2·7 ins. at Parsons-town and Holyhead. On November 12th more than two inches fell over the greater part of Northumberland, Durham and Yorkshire, the largest amounts reported being 2·9 ins. at Durham, 2·7 ins. at Newton Hall (Northumberland), and 2·5 ins. at Aysgarth (Yorks).

- (*f.*) On December 11th in the South of Ireland, and on December 12th over the Southern half of England. On the latter day between an inch and three quarters and two inches was registered in many places, the largest amount reported being 2·5 ins. at Yarmouth.

The heavy rains mentioned in Sections *e.* and *f.* occurred in each case with Easterly winds, and immediately to the Northward of storm centres which travelled Eastward across our Islands. In the earlier instance (on November 11th and 12th) when the centre passed across the South of Ireland and over Central England the heaviest falls were experienced either in the Northern or Central parts of those countries. In the second case the storm centre pursued a more Southerly track along the Channel coasts, and the heaviest falls were reported over our more Southern districts. The accompanying diagram gives maps showing the amounts of rainfall measured respectively on the mornings of November 12 and 13, with the total for the four days 10-13; and also a map showing the distribution of barometrical pressure at 6 p.m., November 12.

3.—*Snowstorms*.—Snow was frequent in each of the winter months, January, February, and December, and also in March, but with a few exceptions the falls were individually of no great weight. The principal storms occurred on February 4th and 11th, March 19th and 28th, and at various times in December, the falls in the closing month being confined mainly to the Northern parts of the United Kingdom. On April 5th (Good Friday) a rather heavy fall of snow was experienced in the West and South-West of England.

4. *Thunderstorms*.—These were unusually frequent, especially in July, when scarcely a day elapsed without a record of the phenomena in some portion of the United Kingdom. The heaviest and most general storms occurred—

- (*a.*) Between July 21st and 28th, and more especially over England. The storms of the 24th and 25th were, perhaps, the most severe, and were accompanied, as we have already seen, by exceedingly heavy falls of rain.

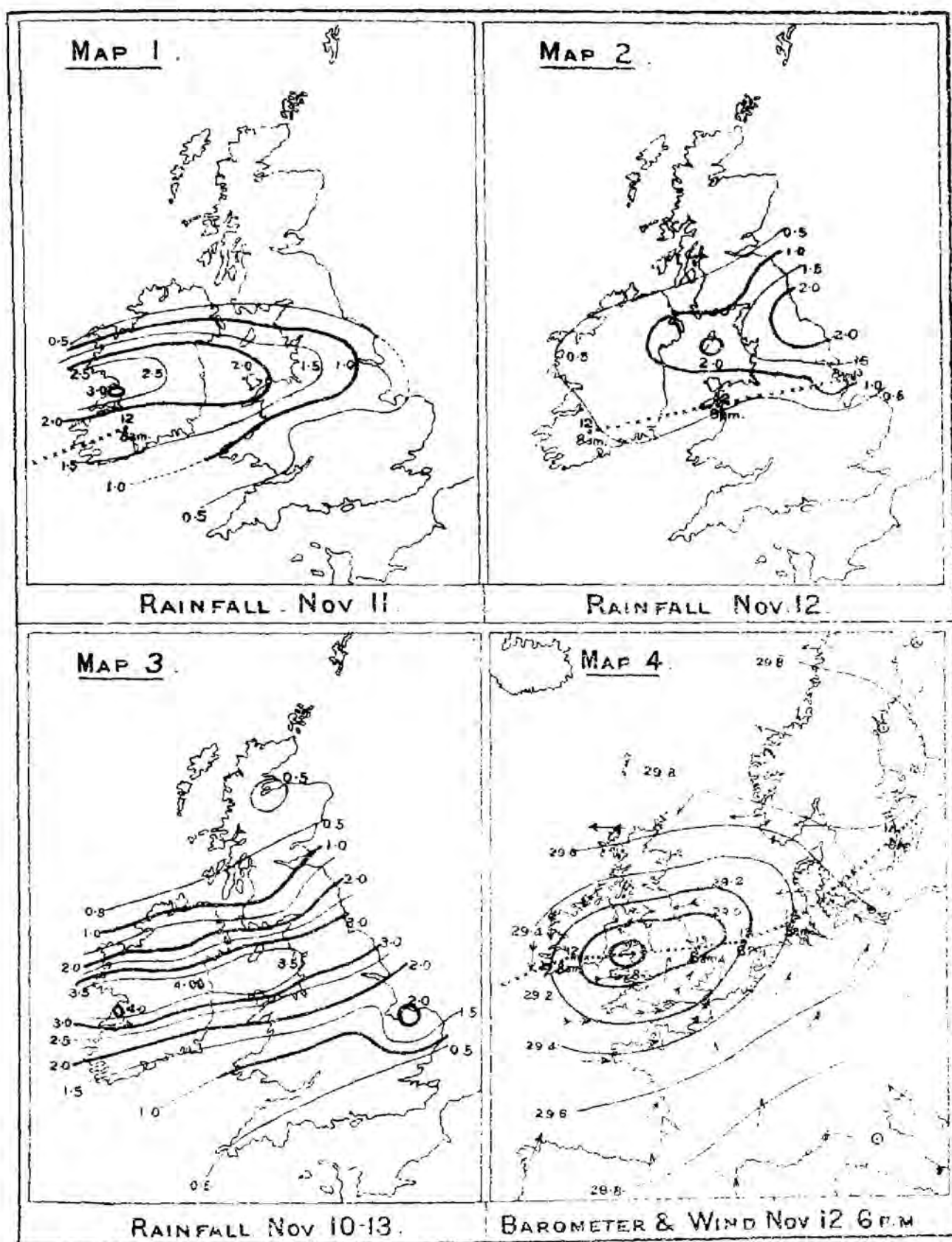
- (*b.*) On August 10th and 11th, the attendant rainfall being very heavy in Scotland and the North of Ireland.

An unusual feature was observed on May 2nd and 3rd, when, in spite of a large anticyclone which hung over the districts affected, thunderstorms, or thunder only, occurred in many parts of Scotland and the North-West of England.

5. *Droughts*.—Absolute droughts of rather more than a fortnight's duration occurred over our Eastern, Midland and Southern counties during the latter half of April, and over the United Kingdom generally during the third and fourth weeks of May.

The dry weather which prevailed for the most part through the summer time was frequently interrupted by heavy thunder showers, the only drought in this season occurring round the middle of July, when an absence of rain lasting for about a fortnight was reported in many parts of the English Midland, Southern, and South-Western counties.

MAPS SHOWING THE HEAVY RAINFALL OF NOVEMBER 10-13, 1901.



Explanation. In Maps 1, 2, and 3 the distribution of Rainfall over the United Kingdom is represented by Isohyets drawn for each half inch that fell. Maps 1 and 2 show the amount collected during the 24 hrs. ending respectively with the mornings of Nov 12 and 13, the progress attained by the centre of the Cyclonic disturbance in the same period being depicted by lines of crosses. Map 3 shows the aggregate amount collected during the 96 hrs. ending with the morning of Nov 14. Map 4 gives the distribution of Barometrical Pressure and the Prevailing Winds at 6 p.m. on Nov 12, when the centre of the Cyclonic System was situated over the northern part of Cardigan Bay. The previous and subsequent paths of the storm centre across Western Europe are shown by a line of crosses, the positions occupied at the various hours of observation being marked by dots, with accompanying dates.

6. *Temperature.*—The *highest* temperatures of the year occurred in July. Over the greater part of Scotland they were registered on the 3rd or 4th, when the thermometer rose to 80° or slightly above it in many places; the highest Scotch readings of all occurred, however, on the 8th, when a maximum of 87° was recorded at Lairg, and 85° at Nairn. Over Ireland, England, and some neighbouring portions of Scotland the highest temperatures were observed between the 17th and 20th. In Ireland the thermometer rose very little above 80° , but at a large majority of the English stations it exceeded 85° , while at many places it touched or slightly exceeded 90° , the highest reading reported being 92° at Newton Reigny (Penrith), Bawtry, and Colly Weston, near Stamford. During the latter part of July and the early part of August the thermometer again exceeded 85° in several parts of England, and on August 10th it rose to 91° degrees at Hillington.

The summer of 1901 was the third in succession, and the fourth out of five, in which shade temperatures of 90° or more were registered over England, the sequence of warmth being in this respect without parallel in the course of the last 30 years.

The *lowest* temperatures of the year occurred at varying times in the different districts, touches of severe frost being experienced in each of the first three months, and also in November and December.

Over the greater part of England the lowest temperatures occurred between December 20th and 23rd, when the sheltered thermometer fell below 15° at several of the northern and central stations, and reached a minimum of 4° at Newton Reigny and 12° at Loughborough. In some portions of our Southern counties, however, the lowest readings were observed on January 9th, when the thermometer fell to 13° at Southampton and to 2° below zero at Swarraton.

In Scotland the lowest temperatures occurred on or about March 29th, when the thermometer fell to 1° at Braemar, to 7° at Lairg, and to 12° at Glencarron; at Braemar a reading as low as 1° was recorded also on February 14th.

Over the greater part of Ireland the lowest readings were observed between March 26th and 29th, the thermometer on the 26th falling to 19° at Markree Castle and to 20° at Parsons-town. A reading of 19° was again recorded at Markree Castle on November 16th, the thermometer at Kilkenny Castle falling on the same day to 18° .

7. *Fog.*—In the autumn months the prevalence of fog over England was greater than for some years past, and in many cases the visitation was dense and protracted. In London fog was recorded in November on 14 days, being six in excess of the average for the 30 years 1871–1900, and appreciably in excess of the number recorded in any November since that of 1892.

8. *Earthquake Shock.*—Early on the morning of September 18th a smart shock of earthquake was experienced in the Northern and Central parts of Scotland, and in some places a considerable amount of structural damage was reported.

APPENDIX XI.

ADDITIONS TO THE LIBRARY DURING THE YEAR ENDING
31ST MARCH, 1902.

Aachen, Meteorologische Centralstation.—Uebersicht der Witterung. 1901, Jan.—Dec. Slips.

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[— — —] Rainfall in South Australia and the northern territory, during 1898, with weather characteristics of each month. By Sir C. Todd. f°. Adelaide, 1901.

|| **Aitken, John.**—Notes on the dynamics of cyclones and anticyclones. a. 4°. Edinburgh, 1901. (*Trans. R. Soc. Edinb.*, 40, Part 1, p. 131.)

|| **Alberti, Vittorio.**—Sul clima di Napoli. Riassunto generale delle osservazioni meteorologiche fatte nella R. Specula di Capodimonte dal 1866 al 1900. sm. f°. Napoli, 1901. (*Atti R. Ist. Incoraggiamento Napoli*, 3, ser. 5, N. 4.)

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[**Allahabad, Meteorological Office.**]—Administration report of the Meteorological Reporter to Government, North-Western Provinces and Oudh, for the year 1900-1901. sm. f°. Allahabad, 1901.

— — — Annual statement of rainfall in the North-Western Provinces and Oudh. for the year 1900. sm. f°. s.l.e.a.

— — — Brief sketch of the meteorology of the North-Western Provinces and Oudh, and adjacent parts of Rajputana and the Panjab, for the year 1900. sm. f°. Allahabad, 1901.

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Antigua, Government Laboratory.—Meteorological register kept at the Government Laboratory, St. John's, Antigua. 1901, Jan. 1-Dec. 30. sm. f°. Sheets.

Araujo, J. M.—Ideas médicas acerca de la atmósfera de Sucre—su clima. la 8°. Sucre, 1901.

* **Arctowski, H.**—Aurores Australes. Résultats du voyage du S. Y. Belgica en 1897-1898-1899. la. 4°. Anvers, 1901.

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

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

Athens, Observatoire National.—Annales . . . publiées par D. Eginitis. Tome 3. la. 4°. Athènes, 1901.

Azambuja, G. A. de.—Anuario do Estado do Rio Grande do Sul. 1902 Anno 18. sm. 8°. Porto Alegre, 1901.

|| **Baldwin, E. B.**—Auroral observations on the second Wellman expedition, made in the neighbourhood of Franz Joseph Land. la. 4°. (*Monthly Weather Rev.*, 1901, *Mch.*)

——— Meteorological observations of the second Wellman expedition. la. 4°. Washington, 1901. (*Rep. Chief of Weather Bureau, Washington, 1899-1900, Part 7, p. 349.*)

[**Bangalore, Mysore Government Meteorological Department.**]—Meteorology in Mysore, for 1900, being the results of observations at Bangalore, Mysore, Hassan and Chitaldrug. 8th Annual Report by John Cook. la. 4°. Bangalore, 1901.

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Bath, Medical Officer of Health.—Annual report to the Bath Urban Sanitary Authority, by the Medical Officer of Health. 35th, 1900. la. 8°. Bath, 1901.

Bathurst, Gambia.—Comparative rainfall, colony of the Gambia, 1896-1900, and meteorological observations, 1900. sm. f°. Sheet.

Belize, Public Hospital.—Meteorological observations, 1900-1901, Jan.-Dec. sm. f°. Sheets.

Bell, Arthur H.—The alchemy of hoar-frost. la. 4°. (*Knowledge*, 24, 1901, *Nov.*, p. 258.)

——— Animals as weather prophets. la. 8°. (*Science Gossip*, 7, 1900, *June.*)

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|| **Black, W. G.**—Ocean rainfall by rain-gauge observations at sea. General and special Oceans. 1864-75-81. Addressed to the Soc., Oct. 20, 1897. la. 8°. Edinburgh, s.a. (*Journ. Manch. Geogr. Soc.*)

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—— Annual report and results of the observations made during the year 1900, at the Bognor Climatological Station. 8°. Bognor, s.a.

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—— Report on the condition and proceedings of the Government Observatory, Colába, for the year which ended with the 31st March, 1901. f°. s.l.e.a.

[**Bombay, Meteorological Office.**]—Brief sketch of the meteorology of the Bombay Presidency for 1900-1901. f°. s.l.e.a.

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|| **Buchanan, J. Y.**—Chemical and physical notes. 8°. London, 1901. (*Antarctic Manual*, 1901, p. 71.)

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Budapest, K. Ung. Reichsanstalt für Meteorologie u. Erdmagnetismus.—Bericht über die Thätigkeit der Kgl. Ung. Reichsanstalt für Meteorologie u. Erdmagnetismus und des Central-Observatoriums in Ó-Gyalla im Jahre 1900. 1a. 8°. Budapest, 1901.

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Cairo, Public Works Department, Survey Department.—Meteorological observations at Abbassia, Jan. 1900 to Dec. 1901; Assiut, May 1900 to Dec. 1901; Port Said, June 1900 to Dec. 1901; Omdurman, July 1900 to Dec. 1901; Alexandria, Jan. to Dec. 1901; Assuan, Jan. to Dec. 1901. oblong 1a. 8°. Sheets.

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————— Meteorological summary for the monsoon period of 1901. sm. f°. s.l.e.a.

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[————— **Surveyor General of India.**]—General report on the operations of the Survey of India Department . . . during 1899-1900. sm. f°. Calcutta, 1901.

Calderwood, W. L.—Water temperature in relation to the early annual migration of salmon from the sea to rivers in Scotland. la. 8°. (*Ann. Rep. Fishery Board for Scotland*, 19, 1900, p. 57.)

Cambridge, Scientific Instrument Co., Ltd.—Physical and electrical instruments manufactured by the Cambridge Scientific Instrument Company Ltd. la. 8°. Cambridge, 1902.

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Charts previous to Feb. 19 cannot be supplied.

——— **Regia Societas Scientiarum Danica.**—Tychonis Brahe Dani . . . operum primitias de nova stella summi civis memor denuo edidit Regia Societas Scientiarum Danica. la. 8°. Hauniæ, 1901.

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—— Rainfall, 1900-01, British Central Africa Protectorate, showing amount for the year 1900, and up to 31st March, 1901. oblong 8°. Sheet.

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APPENDIX XII.

LIST OF THE PRINCIPAL PAPERS PRINTED IN VARIOUS REPORTS
ISSUED BY THE OFFICE FROM THE YEAR 1866.

I.—DAILY WEATHER REPORT.

Year.	Page.	
1896 (July to Dec.).	1	Mean Values of Barometric Pressure for each Month and for the Whole Year, derived from Observations made at 8 a.m. daily during the 25 Years 1871-95.
1896	2 and 3	Mean Values of the Dry Bulb and Wet Bulb Temperatures for ditto, ditto.
"	4 and 5	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for the 25 Years 1871-95.
"	6 and 7	Extremes of the Daily Maximum and Minimum Temperatures for ditto, ditto.
"	8	Mean Rainfall for each Month and for the Whole Year—derived from Observations extending over the 30 Years 1866-95.
"	9	Mean Numbers of Hours of Bright Sunshine, with the Percentages of Possible Duration, derived from Observations extending over the 15 Years 1881-95.
Supplement.	—	Values for Pressure (1871-1900), Temperature (1871-1900), Rainfall (1866-1900), and Bright Sunshine (1881-1900), for each month.

II.—WEEKLY WEATHER REPORT.

Year.	Page.	
1884	V.	Table A.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Month of the Four Quarters of the Year.
"	VI.	Table B.—Showing similar information for each Week of the Year.
1895	VI.-VII.	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for each Month and for the Whole Year, derived from Observations extending over the 25 Years 1871-95.
"	VIII.	Mean Rainfall for each Month and for the Whole Year, derived from Observations extending over the 30 Years 1866-95,

Year.	Page.	—
1895	IX.	Mean Numbers of Hours of Bright Sunshine, together with the Per-centages of the Possible Duration, for each Month and the Whole Year, derived from Records extending over the 15 Years 1881-95.
1900	[17]	Table I.—Showing for each District, during the Lustrum 1896-1900, and the whole Period comprehended in the 20 Years 1881-1900, the Mean Aggregate numbers of rainy days from the beginning of the Year to the end of each week in the Year.
"	[21]	Table II.—Showing in the same detail the Mean Aggregate Amounts of Rainfall.
"	[25]	Table III.—Showing in the same detail the Mean Aggregate Values for Accumulated Heat above 42° F.
"	[29]	Table IV.—Showing in the same detail the Mean Aggregate Values for Accumulated Heat below 42° F.
"	[33]	Table V.—Showing in the same detail the Mean Aggregate Numbers of Hours of Bright Sunshine.
"	[37]	Table VI.—Showing in the same detail the Mean Per-centages of the possible amount of Bright Sunshine.
"	[41]	Table showing in the same detail the Mean Temperature of the Air.
1901	[1-9]	Summaries of Rainfall and Mean Temperature for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the 36 Years 1866-1901. [The separate Yearly Values for 1866-90 are contained in the Reports for 1890, and previous Years.]

III.—MONTHLY WEATHER REPORT.

Year.	Page.	—
1884	[i.]	On London Rain. By W. J. Russell, Ph.D., F.R.S.
"	[ii.]	On the Amount of Carbonic Acid in London Air. By W. J. Russell, Ph.D., F.R.S.
"	[iii.]	Table showing for each Month and for each Degree of Latitude from 18° N. to 49° N. the Total Number of Hours during which the Sun is above the Horizon.
1885	[i.]	On the Impurities in London Air. By W. J. Russell, Ph.D., F.R.S.
"	[ii.]	Table showing the Mean Monthly and Annual Rainfall at the Weekly and Monthly Weather Report Stations for the 20 Years 1866 to 1885.

IV.—QUARTERLY WEATHER REPORT.

Year.	Page.	
1869	43	Factors for Calculation of Gradients.
"	[1]	Notes on Easterly Gales, by R. H. Scott.
1870	iii.	Description of Observatories, with illustrations of thermometer screens.
"	[23]	Bessel's Paper on the Determination of the Law of a Periodical Phenomenon. Translated from the <i>Astronomische Nachrichten</i> , 136, for May, 1828.
1871	[7]	Discussion of Anemometrical Results for Orkney, 1863-68.
"	[59]	Constants for the Determination of the Monthly March of Atmospheric Pressure, &c. at the Seven Observatories for 1869-70.
1872	[13]	Discussion of the Anemometrical Results at Bermuda from 1st April 1859 to 31st March 1863.
1873	[13]	Rainfall of the London District for Sixty Years, 1813-72. By G. Dines, F.M.S. [with diagram].
1874	[26]	On the Winds at Liverpool. By W. W. Rundell.
1875	[1]	Observations taken at Nine Stations of the Second Order [1875].
"	[89]	Mean Monthly Results for the Seven Observatories for the Lustrum, 1871-75.
1876	[13]	Report on the Reduction of Greenwich Curves for 1875 to a Common Standard with those of Kew [with 25 plates].
"	[20]	Results of Observations made at the Pagoda, Kew Gardens, to Determine the Influence of Height on Temperature, &c. By R. H. Scott, F.R.S. [4 plates.]
"	[39]	Comparison of Results obtained by means of the Harmonic Analyser, with similar Results got from Measurement and Numerical Calculation for the Seven Observatories.
1877	[13]	On the Diurnal Range of Rainfall at the Seven Observatories in connexion with the Meteorological Office, 1871-80. By R. H. Scott, F.R.S. [5 plates.]
"	[35]	Report on Evaporimeters. By W. N. Shaw, M.A. [2 plates.]
1878	[13]	On the Computation of the Quantity of Heat in excess of any Fixed Base Temperature, received at any place during the course of the Year, &c. By Lieut.-Gen. Strachey, R.E., F.R.S.
1879	[13]	Report on Experiments made at Strathfield Turgiss in 1869 with Thermometer Stands or Screens of various patterns, &c. By F. Gaster.
"	[41]	Report on Hygrometric Methods, &c. Part I. By W. N. Shaw, M.A.
1880	[13]	Report on Experiments made at the Kew Observatory with Thermometer Screens of different patterns during 1879, 1880 and 1881. By G. M. Whipple, Superintendent.
"	[19]	Tables and Diagrams illustrating the Diurnal Range of Barometric Pressure in the British Isles during the Years 1876-80. By F. C. Bayard, LL.M., F.R. Met. Soc. [5 plates.]

V.—REPORT of the METEOROLOGICAL COMMITTEE of the
ROYAL SOCIETY.

Year.	Page.	—
1867	27	A Description of the Self-recording Instruments recently erected by the Meteorological Committee of the Royal Society in various parts of the United Kingdom. [With plates.]
1869	25	Note upon a Self-registering Thermometer adapted to Deep-Sea Soundings, by W. A. Miller, M.D., Treasurer and V.P.R.S., extracted from Proceedings of Royal Society, vol. XVII., p. 482.
"	36	Description of a Self-recording Rain-gauge, invented by Robert Beckley, of the Kew Observatory; made by James Hicks, London.
1870	25	Description of the Process by which the Traces of the Self-registering Instruments are reduced suitably for publication.
1872	27	A Summary of the Results obtained from the Discussion of the Information for Square 3, being the Region of the Doldrums in the Atlantic. By Capt. H. Toynbee, Marine Superintendent.
1874	33	The International Maritime Conference.

VA.—REPORT of the METEOROLOGICAL COUNCIL.

Year.	Page.	—
1877-78	21	Account of the Experiments on Atmospheric Electricity conducted at Kew Observatory. By Prof. J. D. Everett.
1879-80	28	On the Effect of Sluggishness on the Readings of Marine Barometers on Shore, by Prof. Stokes.
"	43	On the Methods available for the Determination of the Humidity of the Atmosphere, by W. N. Shaw.
"	46	Memorandum as to the Employment of the Harmonic Analyser in the Meteorological Office, by Prof. Stokes.
1880-81	25	On the Working of the Harmonic Analyser. [Prof. Stokes.]
"	27	Report on Fogs. [W. J. Russell.]
"	28	" " Hygrometers and Evaporimeters, presented to the Meteorological Council, May 10, 1881. [W. N. Shaw.]
1881-82	25	On fogs. [W. J. Russell.]
"	29	Report on the Results of a Tentative Reduction of a Year's Electrograms at the Kew Observatory. [G. M. Whipple.]
1882-83	27	On the Results obtained by the use of the Harmonic Analyser.
1884-85	22	Note on Work done with the Harmonic Analyser.

Year.	Page.	
1885-86	22	Memorandum on Cloud Photography, by Prof. Stokes, F.R.S.
1886-87	21	On the Distribution of Gales round the Coasts of the British Isles [for the 15 years, 1871-85].
1887-88	22	On the History of the Severe Storms which visited the British Isles between August 1, 1882, and September 3, 1883, as traceable from the Atlantic Charts published by the Office. By Robert H. Scott, F.R.S., Secretary.
"	30	Abstract of Report on Hygrometric Methods, by W. N. Shaw, M.A., reprinted from the "Proceedings of the Royal Society," No. 262.
1888-89	22	Notes of some Results of an Examination of Atlantic Charts published by the Office, by R. H. Scott, F.R.S., Secretary.
"	27	Memorandum on the Measurement of Squalls shown on the Traces yielded by Robinson Anemometers of the "Standard" Pattern, by R. H. Curtis.
1889-90	24	Code of Regulations, &c. for conducting the work at the First Class Observatories, and the Examination thereof. [See also Report, 1868.]
"	36	Note on Experiments on Pressure of Wind made by W. H. Dines.
"	46	Experiments with Violle's Actinometer Apparatus.
"	47	On the Work done with the Harmonic Analyser at the Meteorological Office.
1890-91	22	On Mr. Dines' Anemometer Experiments.
1891-92	23	On Anemometer Comparisons carried out by the aid of a Grant from the Meteorological Council, by W. H. Dines, B.A.
1892-93	21	On the Construction of the Anemometer recently erected for trial on the roof of the Meteorological Office, by W. H. Dines, B.A.
"	27	On the Harmonic Analysis of Hourly Observations of Air Temperatures at British Observatories, by Lieut.-Gen. R. Strachey, F.R.S.
1894-95	22	Report on Weather Forecasts during the Hay Harvest of 1894 by H. N. Dickson.
"	27	Report on the Comparisons made between two Pressure Tube Anemometers on the roof of the Meteorological Office, by R. H. Curtis.
"	29	Note on the Exposure of the Robinson Anemometer at Holyhead, by R. H. Curtis.
1895-96	24	Note on Anemometer Experiments, by R. H. Curtis.
1897-98	21	Report upon Anemometer Experiments at Holyhead, by R. H. Curtis.
"	28	Description of the Bridled Anemometer designed by Sir G. G. Stokes, Bart., F.R.S., by R. H. Curtis.

Year.	Page.	—
1899-1900.	104	Report upon Anemometer Experiments at Holyhead by R. H. Curtis.
"	108	Researches on Atmospheric Electricity, with Reports, by C. T. R. Wilson.
1900-01.	114	Report on Investigations in Atmospheric Electricity, by C. T. R. Wilson.

VI.—HOURLY READINGS of the SELF-RECORDING INSTRUMENTS of the OBSERVATORIES in connexion with the METEOROLOGICAL OFFICE.

Year.	Page.	—
1883	[1]	Constants of formulæ expressing the mean daily range of temperature obtained by the use of the Harmonic Analyser.
1884	[1]	Tables and formulæ to facilitate the computation of harmonic coefficients. By Lieut.-General Strachey, R.E.

VII.—HOURLY MEANS of the READINGS obtained from the SELF-RECORDING INSTRUMENTS at the FIVE OBSERVATORIES under the METEOROLOGICAL COUNCIL.

Year.	Page.	—
1891	[1]	Tables of Hourly Sunshine Values, with Plates, for the Ten Years 1881-90, for Seven Observatories.
1895	[6-80]	Mean Hourly and Extreme Values of Pressure and Temperature, and Amount and Frequency of Rainfall, for each month of the 25 years, 1871-95; also Amount and Frequency of Sunshine for each month of the 15 years, 1881-95.

VIII.—METEOROLOGICAL OBSERVATIONS at STATIONS of the SECOND ORDER.

Year.	Page.	—
1891	[186]	Results of Observations at Stations of the Second Order for the Fifteen years, 1876-90.

APPENDIX XIII.

ACCOUNT of RECEIPTS and PAYMENTS for the year ending 31st March, 1902:—

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
Balance from year 1900-1901	—	3,122 9 1	ADMINISTRATION:		
Parliamentary vote	—	15,300 0 0	Council	845 12 6	
Repayment of expenses charged under—			Secretary	825 0 0	
(1.) Incidental expenses	21 6 1		Salaries and wages	967 1 2	
(2.) Observatories	28 0 5	49 8 6	Rent, fuel, and lighting	725 10 2	
			Incidental and contingent expenses	255 14 7	
			Furniture and fittings	21 19 8	3,440 18 1
SUPPLY OF INFORMATION:			SPECIAL RESEARCHES:		
Daily Weather Charts and Forecasts	293 15 8		Salaries and other charges	—	808 19 8
6 p.m. Charts	25 0 0		LAND METEOROLOGY:		
Reports for Press Agencies, &c.	271 5 1		Observatories and stations, including remuneration of observers.. .. .	2,228 10 2	
Telegrams sent abroad	322 12 9	912 13 6	Salaries:— Discussion and reduction of observations, &c.	1,325 2 5	3,553 12 7
SALE OF INSTRUMENTS, &c.:			WEATHER INFORMATION AND FORECASTS:		
Mercantile Marine account	37 5 10		Telegraphic reports and storm warnings, remuneration of observers, &c.	2,577 2 6	
"M.O." (Stations) account	53 6 0	90 11 10	Salaries:— Preparation and issue of reports and forecasts	1,732 1 8	4,300 4 2
Repayment of Miscellaneous commissions executed for Colonial and Foreign Institutions, &c... .. .	—	403 15 4	INSPECTIONS:		
Commission charged on work done for Colonies, &c.	—	9 19 4	Salaries and travelling expenses	—	404 4 10
SUPERANNUATION ACCOUNT	—	169 8 3	OCEAN METEOROLOGY:		
			Salaries:— Discussion and reduction of observations	1,352 14 5	
			Expenses incidental to the supply of instruments:—		
			Proportion for care and issue of instruments	130 0 0	
			Royal Navy	849 9 1	
			Mercantile Marine.. .. .	195 14 11	2,527 18 5
			Miscellaneous commissions executed for Colonial and Foreign Institutions, &c.	—	362 15 3
			SUPERANNUATION ACCOUNT:		
			Pensions and Allowances	685 11 3	
			Provision for Annuities	1,500 0 0	2,185 11 3
			BALANCE:		
			Cash at Bank	2,418 2 5	
			" at Office	46 17 2	2,464 19 7
		£20,148 3 10			£20,148 3 10

NOTE.—On March 31st the amount of $2\frac{1}{2}$ per cent. Consols held by the Council for the provision of Superannuation Annuities was £1,576 16s. 4d.
In the year 1901-2 the sum of £1,490 13s. 8d. was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

I N D E X.

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