

**R E P O R T**  
**OF THE**  
**METEOROLOGICAL COUNCIL,**  
**For the Year ending 31st of March, 1903,**  
**TO THE**  
**PRESIDENT AND COUNCIL**  
**OF THE**  
**ROYAL SOCIETY.**

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

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(REPORT OF METEOROLOGICAL COUNCIL 1902-1903)

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,

1902-1903.

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R E P O R T  
OF THE  
METEOROLOGICAL COUNCIL,

For the Year ending 31st of March, 1903,

TO THE  
PRESIDENT AND COUNCIL  
OF THE  
ROYAL SOCIETY.

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No change has taken place in the Council during the year.

Constitution  
of the  
Council.

At the request of Sir Herbert Maxwell, M.P., F.R.S., Chairman of the Committee appointed by the Lords Commissioners of His Majesty's Treasury to inquire and report as to the administration by the Meteorological Council of the Parliamentary Grant, &c., Sir R. Strachey, Chairman, and Mr. W. N. Shaw, Secretary, attended and gave evidence before the Committee. The Council submitted to the Committee a memorandum upon the organisation and work of the Office, with suggestions as to additional facilities required to increase the efficiency and utility of the Meteorological Service.

Treasury  
Inquiry.

As announced in last year's report, p. 8, it was arranged that a meeting of the International Meteorological Committee should be held at Southport during the meeting of the British Association in September, 1903. The Committee consists of seventeen members, representing the official meteorological organisations of Great Britain, France, Germany, Holland, Sweden, Norway, Denmark, Austria, Switzerland, Italy, Russia, Roumania, Portugal, The United States, The Argentine, India, and Australia. It is under the presidency of Professor E. Mascart of the Bureau Central Météorologique, Paris; the Secretary is Professor Hildebrandsson, of Upsala.

Internationa  
Meteoro-  
logical  
Committee.

The function of the Committee is to discuss and formulate recommendations upon subjects connected with meteorology and terrestrial magnetism, which are of international interest, and to make recommendations thereupon.

It is intended, in conjunction with the ensuing meeting, to hold also a meeting of the Sub-committee upon International Weather Telegraphy.

In view of these meetings, the Council have arranged for telegraphic reports of observations to be sent to Southport on each morning during the meeting of the British Association, and for weather charts to be prepared and a report with forecasts drawn up in illustration of the method adopted in this country for dealing with telegraphic weather intelligence.

They have also sanctioned the promotion of an exhibition of objects of meteorological interest at Southport during the meeting, in order to represent recent work in this country in connexion with meteorology and the allied sciences of terrestrial magnetism, seismology, and solar physics.

**International  
Co-operation.**

Various other international enterprises have occupied the attention of the Council during the year.

The arrangements for the exchange of daily telegraphic reports with the meteorological offices of the Continent of Europe have been continued. It has not yet been found possible to bring the morning observations for the Daily Weather Report into line with the observations in France and Germany by extending the system of observations at 7 a.m., but the special service of 7 a.m. observations for the German and Dutch offices has been continued. The daily telegraphic report to the United States Weather Bureau has also been continued.

The completion of the meteorological organisation of the Azores has enabled Major Chaves, the director of that organisation to offer to the Council a daily telegram from Horta of observations at 6 a.m., local time, in addition to the telegram from Ponta Delgada, which has been regularly received for many years. The Commercial Cable Company, which works the new direct cable from the Azores to Waterville very courteously undertook to forward the observations from Horta to the Office free of charge. The Eastern Telegraph Company in like manner forward the observations from Ponta Delgada. The Council desire to make special acknowledgment to Major Chaves and the Portuguese authorities and to the Cable Companies for their very valuable services in this connexion.

The arrangements for the supply of observations of ice to the Danish Office (Report 1900, p. 11), and of ten-day means for certain stations in the British Isles to the Deutsche Seewarte have been continued.

The Council have also received applications for co-operation in various other undertakings from the meteorological organisations of Foreign countries. These include observations of cirrus clouds in connexion with the Norwegian Polar expedition and observations of the motion of clouds in connexion with the international balloon ascents. They regard international co-operation as having special claims upon their consideration as meteorological problems are seldom of such a character as to be adequately dealt with by the organisation of a single country; they have accordingly taken steps to comply with these applications so far as the means at their disposal permit.

## *Report of the Meteorological Council.*

The nature of the cloud observations desired by the International Aeronautical Committee is indicated by the form of "Instructions" issued by the President of the Committee which is reprinted as Appendix I. to this report, p. 34.

They have received a representation from the German Embassy, forwarded by the Secretary of State for Foreign Affairs, suggesting that the tabulation of observations in terrestrial magnetism and meteorology collected from British sources in connexion with the Antarctic expeditions should be undertaken in this country, and they have referred the matter to the President and Council of the Royal Society.

The Council have also received from the German Ambassador in London, forwarded by the Secretary of State for Foreign Affairs, a representation from the International Committee for Scientific Aeronautics, which met in Berlin in May, 1902, pointing out the importance attached by the Committee to observations of the upper air by means of balloons and kites in the United Kingdom and in India. The importance of this investigation has also been represented to the Council in various other ways.

The Council concur in the opinion of the International Committee, and notwithstanding the exceptional difficulties attaching to such experiments in these islands, they consider it desirable, so far as the United Kingdom is concerned, that observations should be initiated in co-operation with the meteorological offices of the Continent. The established demands upon their funds are such that they cannot defray the special expenses of additional experiments. They have accordingly referred the matter to the President and Council of the Royal Society with a view to appropriate steps being taken to obtain the necessary funds, and they have received from the President and Council an assurance of their support.

In the meantime, so far as they have been able to do so, the Council have supported and assisted the experimental investigations by means of kites, initiated by the Royal Meteorological Society and carried out by Mr. W. H. Dines off the West Coast of Scotland. They lent the instruments required for a base station at Crinan Harbour, and defrayed the cost of maintaining the station. They also undertook the tabulation of the curves obtained during the experiments and the preparation of diagrams representing the results. These have been dealt with in a paper prepared by the Secretary in conjunction with Mr. Dines, which was read before the Royal Society in May, 1903, and will be published in the Philosophical Transactions.

Kite  
Experiments  
Royal  
Meteorological  
Society.

The Council are glad to learn from these experiments that effective observations can be obtained without difficulty, and without undue risk of loss, from aboard ship. From the point of view of meteorology the investigation of the upper air over the sea is more desirable than of that over the land, and although the consideration of expense makes it clearly improbable that a vessel could be specially retained for such experiments, yet in a maritime country various opportunities may arise which could be utilised to obtain the necessary observations.



Meteorological Reports for the Registrar-General of Births, Deaths, and Marriages.

The Meteorological Reports for the Registrar-General for England and Wales have been prepared in the Office since April 1st, 1902. The form to be adopted for the Monthly Summary of observations from the climatological stations for the purpose of this report, was the subject of a conference between representatives of the Council, the Royal Meteorological Society, and the Scottish Meteorological Society, with the assistance of Sir John W. Moore, M.D., who has a special knowledge of the meteorology and climatology of Ireland. The Council are glad to report that as the result of the conference a form was agreed upon, which has been adopted upon the recommendation of the Council by the Registrars-General for England and Wales and for Ireland, and with unimportant modifications preserving an established practice, by the Registrar-General for Scotland upon the recommendation of the Scottish Meteorological Society.

For the preparation of the reports the Council have incorporated the climatological stations comprised in the late Mr. Glaisher's organisation in the general climatological organisation of the Office, and have selected representative stations in each district of England and Wales from which to compile the returns for the Registrar-General.

The districts represented are the same as the forecast districts of the Office (*see* p. 39) with the exception that seven stations within the metropolitan area, viz., Greenwich, Kew, Barnet, Camden Square, Westminster, Brixton, and Norwood, have been grouped together as a separate district under the name of London. The district known as the Midland Counties for the purposes of the Weather Charts is called England Central for the Registrar-General's returns. In each of the non-metropolitan districts the selection of the stations has been made from among the whole number available to represent as concisely as possible climatic conditions which may be briefly summarised by the terms—Urban, Suburban, and Rural, High level and Low level, Coast and Inland. The different combinations of these several conditions are satisfactorily represented in the quarterly returns. For the weekly returns the information is confined to stations associated with large towns.

Earth Temperatures.

The monthly tables give the means of comparison of stations and districts for a number of data which have not hitherto been brought together. The hours of observation are not uniform, and allowance has to be made in some cases on that account. Earth temperatures have been included, and it is hoped that the collection of the data on this subject will enable the Council to accumulate information as to the degree of accuracy of the observations made with the instruments under the ordinary conditions of installation. In this connexion the Council are glad to report that Dr. A. A. Rambaut, F.R.S., of the Radcliffe Observatory, Oxford, who has a very complete set of electrical resistance thermometers very carefully installed to measure temperatures at various depths underground, has expressed his willingness to compare the readings of these thermometers with a pair of the ordinary pattern installed in the ordinary manner at like depths in the immediate neighbourhood.

Attention has been given to the means of obtaining a more accurate table of equivalents of the numbers of the Beaufort Scale in terms of the velocity recorded by a properly exposed anemometer, as requested by the Mersey Docks and Harbour Board (Report, 1902, p. 7). An examination of the available data has shown that the agreement between the general averages of the estimates by regular observers at different stations with adequate exposure is satisfactorily close. At the same time a peculiar technical difficulty has arisen as to the use of a single series of equivalents for the conversion of scale numbers to velocities and *vice versa*. The difficulty arises partly from the fact that the Beaufort Scale estimates refer to the force of the wind at or about the time of observation, and are not necessarily directly represented by the average velocity recorded on the anemometer during an hour, with which they are compared; and partly from the relative infrequency of winds of high velocities as compared with those of more moderate velocities. Attention was originally drawn to this point some years ago by Professor W. Köppen, of the Deutsche Seewarte. The Council have now collected and arranged the data in such a way that they expect to be able to present the results in a satisfactory form within the coming year.

Wind  
Measure-  
ments.

The Council are called upon from time to time to render assistance in connexion with meteorological observations in the British Colonies and Dependencies. In the past year they have been in communication with the Foreign Office with regard to observations in Uganda and British East Africa, and at the request of the Secretary of State they have prepared a short book of hints for observers in Tropical Africa, which includes instructions for keeping a record of lake levels, supplied at the request of the Council by the Hydrographic Office. As regards meteorological instruments the book is a revised edition of one drawn up by a Committee of the British Association, of which Mr. Ravenstein was chairman, and the Council have had the advantage of the advice of Mr. Ravenstein as well as of Dr. H. R. Mill, the secretary of the Committee, in preparing the new edition.

Colonial  
Observations.

At the request of the Crown Agents for the Colonies the Council undertook the selection and purchase of instruments for the new meteorological organisation of the Transvaal, and they have been in correspondence with Mr. Innes, the director of the organisation, with regard to the selection of the instruments most suitable for the special circumstances of the Colony.

The Council have received from Mr. Bruce, leader of the Scottish Antarctic Expedition, a valuable report upon the meteorological station at Cape Pembroke, Falkland Isles, and at Mr. Bruce's suggestion they have put themselves in communication with the Governor, with a view to the permanent installation of a barograph, a sunshine recorder, and a rain gauge at that important station.

Information has been received from the Colonial Secretary, Port Moresby, as to the distribution of stations in New Guinea to which the six sets of instruments supplied by the Council are to be assigned.



The Council have taken steps to render the collection of printed meteorological reports relating to the Colonies and Dependencies as complete as possible, and desire to acknowledge the assistance received from the Colonial Office in that matter.

With regard to the returns received in manuscript from various Colonial stations, they have made arrangements for the issue of summaries from time to time, as Colonial Supplements to the regular quarto publications of the Office. The first issue will be a summary of observations in Tropical Africa, which has been prepared by Mr. Ravenstein, principally from observations collected by the Foreign Office.

**London Fog  
Inquiry.**

The report by Captain Carpenter, R.N., upon the observations made during the winter of 1901-2 of the occurrence and distribution of fogs in London, and the meteorological conditions associated therewith, has been printed as a separate publication.

After discussing the data accumulated, Captain Carpenter recommended that the observations should be continued during another winter, and that special observations of temperature should be taken in addition, at 5 a.m., in order to test the possibility of forecasting the persistence of fog during the day from the meteorological conditions in the early morning. He also called special attention to some remarkable observations in connexion with the temperature of the air over London during fogs and its difference from that recorded at the ground level, and advised the investigation of the subject.

The report and diagrams illustrating it were not ready for the press until after the vacation, and the Council decided to follow its recommendations and re-open the inquiry for the winter of 1902-3 with the additional observations suggested. Captain Carpenter was unable to continue the investigation himself, as the atmosphere of London during foggy weather proved to have an injurious effect upon his health. The further conduct of the inquiry was therefore placed in charge of Mr. R. G. K. Lempfert, who had been recently appointed Special Assistant to the Secretary, and observations were recommenced on September 1st, 1902.

Of the sum voted by the London County Council for the special expenses of the inquiry, a balance of £15 remained. As this was not sufficient to provide for the special expenses of the inquiry during the winter, the Council applied in October, 1902, to the London County Council for an addition to the sum voted. On February 20th, 1903, the Council were informed that the General Purposes Committee had decided to recommend the County Council not to make any further grant towards the expenses of the continuance of the inquiry, and the report of the General Purposes Committee was duly confirmed.

The Council can only express their regret at the termination of the co-operation with the County Council in this matter and of the inquiry which was set on foot by its means, and at the dispersion of the organisation by which the inquiry was conducted.

Captain Carpenter's report calls attention again to the gravity and difficulty of the various problems associated with the atmosphere of London, and the extent to which they are aggravated by the common practice of the inhabitants as regards the production of smoke. The treatment of such problems requires common action guided by patient and persistent inquiry into the extent, the distribution, and the causes of the unsatisfactory conditions themselves, into the extent to which the obnoxious products are dispersed by natural processes and the circumstances under which those natural processes fail.

The observations in connexion with the inquiry were continued until 28th of March, when the apparatus was withdrawn. As the past winter was singularly free from fog, the additions to the data concerning its occurrence and distribution are not very large, but a report on the supplementary observations, with a summary of the results of the whole inquiry, will be drawn up in due course.

In connexion with the special investigation of the peculiar distribution of temperatures at a small height above the ground during fogs, the Council have pleasure in recording the offer by Mr. P. Y. Alexander, of Bath, of the loan of a signal balloon, of 3,500 cubic feet capacity, and recording instruments, in order to make a trial of the use of a captive balloon for obtaining records of the temperature of the air up to 1,000 feet or more on calm days. The offer was accepted, and through the courtesy of Mr. R. T. Glazebrook, F.R.S., Director of the National Physical Laboratory, it was arranged that trial ascents should be made at Bushy House.

The weather of the early part of the year was unusually windy and unsuitable for the experiments, and an attempt to utilise the first approximately calm day resulted in the balloon breaking free from its moorings and carrying away the instruments. It was subsequently brought back in a somewhat damaged condition by Mr. Pigeon, master of the coasting schooner "Eagle," of London, from the North Coast of France, and showed a remarkable record of its journey.

The Council desire to place on record their obligations to Captain Wells and the staff of the Metropolitan Fire Brigade, the Metropolitan Police, the Superintendent of Battersea Park, the Royal Botanical Society, Regent's Park, for their assistance in the inquiry during the two years, especially to those who observed at 5 a.m.; also to the Lord Chamberlain, the Office of Works, the Dean of St. Paul's, the Rector of St. Margaret's and the Vicar of Christ Church, Westminster, for permission to place instruments in suitable positions.

The Council have been in correspondence with Lloyd's respecting proposals for an arrangement, by which outgoing and incoming Atlantic liners should report readings of barometric pressure and wind to Lloyd's stations in the South and North of Ireland, from points in the Atlantic within range of the signalling apparatus by wireless telegraphy, but they regret that up to the present it has not been found possible to conclude any arrangements.

Wireless  
Telegraphy.

**"Red Rain."** In February last some remarkable falls of red dust, with or without rain, occurred in various parts of the country, and a number of correspondents kindly forwarded specimens of the dust to the Office. Other specimens had been received by the Royal Meteorological Society or by Dr. H. R. Mill, of the British Rainfall Organisation, and it was arranged that a careful investigation of the meteorological conditions under which the falls took place should be made by the Office, in conjunction with Dr. Mill, with a view to ascertaining the source from which the dust was derived and the method by which it was carried. The investigation is in progress, and the Council have to acknowledge their indebtedness to Dr. Flett, of the Geological Survey, for a microscopical and chemical analysis of a large number of samples of the dust.

**Antarctic Exploration.** At the request of the Admiralty, the s.s. "Morning," the relief ship of the National Antarctic Expedition, was supplied with the ordinary equipment of meteorological instruments.

A large number of instruments of various kinds was obtained for the use of the Scottish Antarctic Expedition, partly at the expense of the Council and partly at the expense of the authorities of the Expedition. (*See p. 17.*)

**Magnetic observations at Valencia.** Magnetic observations at Valencia have been continued at the request of a Committee consisting of the Earl of Rosse, Professor Joly, and the Rev. Maxwell H. Close.

In the course of the year Mr. G. T. Walker, M.A., Fellow of Trinity College, Cambridge, who has been selected to succeed Sir J. Eliot upon his retirement from the post of Meteorological Reporter to the Government of India, attended at the Office for some months, and gave valuable assistance in the work of the telegraphic and observatory departments.

**Supply of Information to the Public.** 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.

**Acknowledgments.** 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 :—Allan ; American ; Anchor ; Atlantic Transport ; Bristol City ; Cayzer, Irvine ; Cunard ; Dominion ; Elder, Dempster ; Gulf Transport ; Harrison ; Johnston ; Leyland ; Liverpool Ship-owners' Association ; Liverpool Steamship Owners' Association ; Manchester Liners ; Mercantile Marine Service Association ; Merchant Service Guild ; Norfolk and North American ; North Atlantic Steamship Company ; Orient ; Peninsular and Oriental ; Philadelphia Trans-Atlantic ; Prince ; Royal Mail ; Scrutton ; Union Castle ; and White Star.



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 in the last two years 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, Harrogate, and Lowestoft, must now be added those of Dr. Thomas and Mr. H. V. Prigg, who send reports daily on behalf of the local authorities of Aberystwyth and Plymouth respectively, and of Mr. H. T. Tubbs for the Sunshine Report from Littlestone, Kent.

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The administration remains in the charge of the Secretary, with the assistance of the Marine Superintendent, Commander Campbell Hepworth, C.B., R.N.R., and a staff of 42 clerks and attendants. Organization  
of the Office.

In addition to this staff the Council at the commencement of the year decided to appoint a special assistant to the Secretary, whose principal duty should be to take part in scientific investigations. For this purpose Mr. R. G. K. Lempfert, M.A., of Emmanuel College, Cambridge, formerly demonstrator at the Cavendish Laboratory, and subsequently assistant master in charge of the Temple Observatory at Rugby School, was selected. During the year Mr. Lempfert has been chiefly engaged in the continuation of the inquiry into the occurrence and distribution of London fogs. He has also been engaged in the investigation in connexion with the falls of dust referred to above, and in the determination of the actual paths of air under the influence of certain typical distributions of barometric pressure. The last mentioned investigation has led to important modifications of the views currently accepted as to the paths of air in travelling storms. The subject will be dealt with in a paper on the storm of February 26th-27th, 1903, prepared by the Secretary at the request of the Royal Meteorological Society for communication to that Society.

Towards the close of the year Mr. Frederic Gaster, who has been in charge of the Telegraphic (Forecast and Storm Warning) Branch of the Office since 1868, intimated to the Council his desire to be relieved of his duties as head clerk of the branch on account of his health. The Council, thereupon, made provision for his retirement with an annuity in consideration of his long and faithful services. Mr. Gaster's connexion with the work of the Office extends over forty years, and dates back to the time when the Office formed a department of the Board of Trade. His duties included the superintendence of the preparation of the Weekly and Daily Weather Reports, and of the issue of Forecasts and Storm Warnings. He also superintended the preparation of a number of special publications of the Office, and contributed various papers to scientific journals upon meteorological subjects.

The Council regret the necessity for the retirement of so zealous an assistant. They hope that it may still be possible to

utilise his detailed knowledge of the weather conditions of the British Isles, accumulated during forty years of daily experience, by arranging for him to take part in inquiry into local variations of weather and the conditions associated therewith, as represented in the daily records of various kinds received by the Office. This inquiry will be undertaken with the view of formulating principles for the sub-division of the forecast districts of the British Isles, and of thereby determining whether any closer local application of the general forecasts issued by the Office for districts is practicable.

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 Mercantile Marine. 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 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 in this country, or by the Colonies and Dependencies, or 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.

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 1,028. Particulars as to the numbers of different kinds of instruments and their disposition at the close of the year are given in Appendix V.

Supply of Instruments to the Navy.

The agency at Dundee for the supply of instruments to the Mercantile Marine has been transferred to Mr. C. H. Brown, and a new agency has been opened at Sunderland, Messrs. J. J. Wilson and Son having undertaken the work.

Agencies.

The number of merchant ships supplied with instruments and log books during the year has been 140, as compared with 98 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 152.

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 696. 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 registers of all kinds received by the Office during the year from Officers of the Navy or from the Mercantile Marine numbered 1875. A list is given in Appendix IV.

Of the whole number of meteorological logs received, 131 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 ... ..      | 59 | Eastern, via Suez Canal ... | 19 |
| Mediterranean ... ..       | 10 | Far Eastern, via Cape of    |    |
| South America (East Coast) | 15 | Good Hope ... ..            | 30 |
| " " (West " )              | 5  | Far Eastern, via Suez       |    |
| South Africa ... ..        | 20 | Canal ... ..                | 41 |
| Eastern, via Cape of Good  |    | Pacific ... ..              | 32 |
| Hope ... ..                | 7  | Polar ... ..                | 2  |



Appendix III. (p. 84) 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.                 |
|--------------------------|-----------------------|
| Alexander, D. ... ..     | S.S. "Clan Grant."    |
| Caie, G. ... ..          | S.S. "Austrian."      |
| De Vine, J. A. F. ... .. | S.S. "Reynolds."      |
| Fair, R. ... ..          | S.S. "Mombassa."      |
| Hayward, W. ... ..       | S.S. "Ceylon."        |
| Hunter, W. M. ... ..     | S.S. "Chicago City."  |
| Pattman, R. ... ..       | "Loch Torridon."      |
| Robinson, J. C. ... ..   | S.S. "Walmer Castle." |
| Schleman, H. A. ... ..   | S.S. "Sophocles."     |

Recognition  
of "excellent"  
observers.

As a mark of recognition of valuable co-operation, the Council have presented various publications of the Office to observers who have returned well-kept logs.

The Council note with regret the death of five of their old observers. Captain James Price, R.N.R., President of the Mercantile Marine Service Association, at Liverpool, in April, 1902; Captain S. Morrish, who had kept several excellent logs in sailing ships, in May, 1902; Commander E. Scobell Clapp, R.N., who was drowned at Holyhead, in August, 1902; Commander S. T. S. Lecky, R.N.R., late Marine Superintendent of the Great Western Railway, at Las Palmas, on 23rd November, 1902; and Captain G. H. B. Wood, of the barque "Lutterworth."

Supple-  
mentary  
Information.

The arrangements for obtaining meteorological registers from the captains and officers of ocean-going ships who use their own instruments have been continued, and a very large amount of information has thereby been collected, which is immediately utilised in the Monthly Pilot Charts of the North Atlantic and Mediterranean. The arrangements 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 pressure and of air and sea temperatures, 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 temperatures have been taken at a number of coast-guard stations, light-houses, and light-vessels.

Use of  
Information  
received.

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, or in some cases for a shorter period. 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 3,500.

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 which are now practically completed, and upon 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 South America, North Sea, and China Sea.

Hydrographic notices have been extracted from the meteorological logs and forwarded to the Admiralty. Among those sent during the year were notes by Captain A. Simpson, S.S. "Moravian"; Captain F. W. Vibert, R.N.R., S.S. "India"; Captain F. C. A. Lyon, R.N.R., S.S. "Arcadia"; Captain J. W. C. Martyr, F.R.A.S., F.R. Met. Soc., H.M.T. "Montrose"; and Captain G. T. Dann, ship "Erne."

#### 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.

The following instruments were obtained and supplied for the use of the Scottish Antarctic Expedition:—

|  |  |
|--|--|
| 2 Marine Barometers.                         | 2 Solar Radiation Thermometers, 0° to 200°.          |
| 1 New Pattern Station Barometer.             | 4 Terrestrial Radiation Thermometers, -80° to + 50°. |
| 1 Mountain Siphon Barometer.                 | 2 Earth Thermometers, 3 and 6 feet.                  |
| 3 Watch Aneroids.                            | 3 Sea Temperature Thermometers in Cases.             |
| 3 Maximum Thermometers, -30° to 100°.        | 1 Spirit Standard Thermometer.                       |
| 3 Minimum Thermometers, -80° to + 50°.       | 1 Robinson's Anemometer (Spare Cups).                |
| 12 Mercurial Thermometers, 0° to 120°.       | 1 Exner's Electroscope.                              |
| 6 Mercurial Thermometers, -40° to + 90°.     | 2 Special Sunshine Recorders and Cards.              |
| 6 Spirit Thermometers, -80° to + 50°.        | 1 Ordinary Sunshine Recorder and Cards.              |
| 6 Spirit Sling Thermometers, -80° to + 50°.  | 1 Dines' Self Recording Anemometer.                  |
| 3 Mercury Sling Thermometers, -10° to + 90°. | 1 Shipboard Screen.                                  |

Wind Charts of the South Atlantic Ocean and South American Coastal Regions.

Information supplied for the Admiralty.

Royal Navy and Mercantile Marine. Scottish Antarctic Expedition.

**Stations.**

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

**Fishery  
Barometers.**

A fishery barometer has been supplied to Boreray on the application of the Fishery Board for Scotland. There are now 229 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, 86 in Scotland, 4 in the Isle of Man, and 1 in Jersey. A list of the stations is given in Appendix II.

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.

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## PART II.

### WEATHER TELEGRAPHY AND FORECASTS.

**Daily  
weather  
Reports.**

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.

**Telegraphic  
reporting  
stations.**

The stations in the British Isles from which telegraphic reports are received are marked with the letter "T" in the list given in Appendix II. (p. 53). The same Appendix contains at p. 74 a list of the Foreign Stations from which daily telegrams have been received at the Office.

In addition to the stations which belong to the regular service of the Office the Council have had the advantage of full telegraphic reports daily from the Azores (through the courtesy of the Portuguese Government and the Eastern Telegraph and Commercial Cable Companies) (*see* p. 6), from Newton Reigny (Penrith), and from Bath (*see* p. 13).

The Council regret to report that the observations at Loughborough, which have been personally reported without any intermission for 20 years by Mr. W. Berridge, have been discontinued on account of ill health, and they desire to record their appreciation of the admirable way in which Mr. Berridge has performed the duty of telegraphic observer. They have failed to obtain a station in Loughborough to continue the reports from that district, but hope that the Corporation of Nottingham will be able to take up the duties which were undertaken for many years by the late Mr. E. J. Lowe, F.R.S., of Nottingham.



The Council also regret the loss of another inland telegraphic station owing to Mr. T. G. Benn's removal from Newton Reigny. The Council have had frequent reason to record their appreciation of Mr. Benn's interest in various ways in the telegraphic weather service.

*Inspection of the Telegraphic Reporting Stations.*—The stations marked in the list in Appendix II., p. 53, have been inspected during the year. The Reports of the Inspectors, p. 103, 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 is given in Appendix II. 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 Supplementary Charts on page 2 of the report have represented the average distribution of temperature at 8 a.m., the average distribution of sunshine, of rainfall, and of extremes of temperature respectively. The Daily Weather Report.

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.

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. Distribution of Daily Weather Reports.

The substance of the morning and afternoon reports received by telegraph as to the state of the weather at certain stations on the sea coasts has been displayed on the balcony of the Office at 63, Victoria Street, S.W., and 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.*—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. 37-40. Weather Forecasts.

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; Messrs. Curry & Paxton's, 195, Great Portland 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 1902 was 74. There were no applications from persons residing in any part of Scotland or in Ireland, N. In other districts the number ranged from 24 in England, S., and 21 in the Midland counties to 2 in Ireland, S., and 1 in England, N.E.

By many of the recipients a record of the weather experienced during the time the forecasts were sent was kept and supplied to the Office. A comparison between the forecasts issued and the subsequent weather, as entered on the returns, shows that for the country generally 51 per cent. of the forecasts were completely successful, and 39 per cent. partially successful. The highest proportion of success occurred in England, S., where 64 per cent. were wholly correct, and 32 per cent. partially so. A total percentage of successes exceeding 90 was reached also in England, E., and in England, N.W.

8.30 *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.

Telegraphic  
and personal  
inquiries for  
forecasts.

The number of inquiries for forecasts by telegraph in accordance with the revised arrangement with the Post Office indicated on p. 39 was 227. There were also 707 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.

Transcripts  
of  
observations.

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



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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.

Results of  
Forecasts.

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, 1902-1903.

| Districts.          | Per-centages.     |                  |                  |                   |   |
|---------------------|-------------------|------------------|------------------|-------------------|---|
|                     | Complete Success. | Partial Success. | Partial Failure. | Complete Failure. | Sum of Successes, Complete and Partial. |
| SCOTLAND, N. ...    | 52                | 32               | 13               | 3                 | 84                                      |
| „ E. ...            | 50                | 38               | 11               | 1                 | 88                                      |
| ENGLAND, N.E. ...   | 51                | 39               | 9                | 1                 | 90                                      |
| „ E. ...            | 51                | 36               | 11               | 2                 | 87                                      |
| MIDLAND COUNTIES... | 55                | 35               | 9                | 1                 | 90                                      |
| ENGLAND, S. ...     | 55                | 34               | 10               | 1                 | 89                                      |
| SCOTLAND, W. ...    | 54                | 34               | 10               | 2                 | 88                                      |
| ENGLAND, N.W. ...   | 53                | 37               | 9                | 1                 | 90                                      |
| „ S.W. ...          | 56                | 33               | 10               | 1                 | 89                                      |
| IRELAND, N. ...     | 57                | 31               | 11               | 1                 | 88                                      |
| „ S. ...            | 55                | 32               | 11               | 2                 | 87                                      |
| Summary ...         | 53                | 35               | 10               | 2                 | 88                                      |

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| SCOTLAND, N. ...    | 52                | 32               | 13               | 3                 | 84                                      |
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| MIDLAND COUNTIES... | 55                | 35               | 9                | 1                 | 90                                      |
| ENGLAND, S. ...     | 55                | 34               | 10               | 1                 | 89                                      |
| SCOTLAND, W. ...    | 54                | 34               | 10               | 2                 | 88                                      |
| ENGLAND, N.W. ...   | 53                | 37               | 9                | 1                 | 90                                      |
| "    S.W. ...       | 56                | 33               | 10               | 1                 | 89                                      |
| IRELAND, N. ...     | 57                | 31               | 11               | 1                 | 88                                      |
| "    S. ...         | 55                | 32               | 11               | 2                 | 87                                      |
| Summary ...         | 53                | 35               | 10               | 2                 | 88                                      |

In order to test the success of the Forecasts of the year in comparison with those of previous years, the following table has been drawn up. It shows for each year of the decade 1893-1902 the percentages of complete and partial successes of the Forecasts issued at 8.30 p.m. It will be noticed that the sum of successes, complete and partial, for 1902, is large, though the number of complete successes is below the average.

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. |
|----------------|-------------------|------------------|---|
| 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                                      |
| 1902 ... ..    | 53                | 35               | 88                                      |
| Average ... .. | 55.7              | 27.3             | 83.0                                    |

The 311 forecasts for the N.W. district of England issued at 11 a.m., during 1902 have been checked by Mr. T. G. Benn of Newton Reigny, with the following results :—

| —                       | Wind. | Weather. | Average. |
|-------------------------|-------|----------|----------|
| Complete success ... .. | 237   | 211      | 224      |
| Partial success ... ..  | 68    | 88       | 78       |
| Failure ... ..          | 6     | 12       | 9        |
| Total ... ..            | 311   | 311      | 311      |

This independent checking gives 72 per cent. of complete successes. The number is much higher than the result of the official checking of the evening forecasts, which is based upon reports of wind and weather from all the stations in the district.

**Storm Warnings.**

*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.

A list of the stations is given in Appendix II., p. 40. At the end of March, 1903, 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.



The Council regret that they are unable to record any substantial progress with arrangements by which the drawbacks referred to in last year's report as incidental to the existing arrangements for the transmission of storm warnings and exhibition of signals 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 IX.

The following table contains a statement of the amount of success of storm warnings in each year and the average for the decade 1893-1902 :—

Comparison  
of results for  
1902 with  
previous  
years.

| Years.    | Total No. of Warnings issued. | Warnings justified by subsequent Gales. | Warnings justified by subsequent strong Winds. | Total Warnings justified. | Warnings not justified by subsequent Weather. |
|-----------|-------------------------------|---|--|---------------------------|---|
|           |                               | p.c.                                    | p.c.   | p.c.                      | p.c.  |
| 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   |
| 1902 ...  | 535                           | 55·5                                    | 32·0   | 87·5                      | 9·0   |
| 1893-1902 | 520                           | 62·4                                    | 27·7   | 90·1                      | 6·1   |

The corresponding figures for the average of the ten years 1873-1882 and 1883-1892, are as follows :—

| Decade. | 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. |
|---------|-------------------------------|---|--|---------------------------|---|
| 1873-82 | 390                           | 54·2                                    | 25·1   | 79·3                      | 16·8  |
| 1883-92 | 512                           | 57·6                                    | 25·9   | 83·5                      | 14·1  |

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 have received 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. The number of volunteer stations, particularly of normal climatological stations, has been largely increased by the incorporation of the stations included in the organisation of the late Mr. J. Glaisher, F.R.S., for the supply of meteorological information to the Registrar-General of Births, Deaths and Marriages. A complete list of the stations which furnished returns in the year ended March 31, 1903, is given in Appendix II., p. 53. The nature of the information supplied is indicated by the letters in the fifth column of the table, which are explained on pp. 51 and 52. § The stations which have been added to the list since last year are marked \*, and those which have been discontinued since the close of last year are marked †. The names of the observers at the stations belonging to the several groups are given on pp. 66–75.

First Order  
stations.  
Observato-  
ries.

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 regularly received. 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.

At Aberdeen Mr. Clarke has replaced Mr. Boswell as observer, and the telegraphic reporting station has been combined with the observatory under the general superintendence of Professor C. Niven, F.R.S., otherwise no change has been made in any of the arrangements for the first order stations during the year.

Ben Nevis  
observatories.

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.

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§ Particulars as to the principles of classification of stations, and the instruments in use at the stations in connexion with the Office are given in the Report for 1901–2, p. 20, and in previous Reports.

In the Report for last year it was intimated that, at the request of the Scottish Meteorological Society, the Council had decided to continue the grant to the Fort William Observatory until December, 1902. At the request of the First Lord of the Treasury, the Council decided to continue the grant for a further period, pending the report of the Treasury Committee referred to on p. 5.

As already mentioned, the letters in column 5 of the table in Appendix II., p. 53, 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.

**ANEMOGRAPH 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; 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 which had been temporarily dismounted for the reconstruction of the building has been re-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. The Council are glad to record that, in the course of the year, they received the offer of the traces from a Dines' pressure tube Anemometer in charge of the Superintendent of Experiments at Shoeburyness, in exchange for weather information, and they are thus placed in possession of very valuable records of wind velocity in the Thames estuary, with eye observations of direction of the wind as well as of other meteorological elements recorded at Shoeburyness.

Anemograph  
stations.

In compliance with the representations made to the Council by Sir J. Fayrer, F.R.S., on behalf of the Royal Cornwall Polytechnic Society, a Dines' Anemograph has been installed by permission of the Admiralty and with the sanction of the War Office on the Tower of Pendennis Castle, and placed in charge of the Chief Officer of the Coast Guard.

Dines'  
Anemograph  
for Falmouth

\* 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.



The instrument was erected in July, 1902, and very interesting traces of the wind velocity have been recorded. At the request of the Council, Mr. Wilson Fox, the Secretary of the Society, has made arrangements for the exhibition of the records at the Falmouth Custom House, so that the information may be immediately available for the seafaring community at Falmouth.

Barograph stations.

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

A large number of barographic and anemographic records have been lent to the Council by private observers in connexion with the investigation of the meteorological conditions of the storm of February 26th-27th, 1903.

Sunshine stations.

SUNSHINE STATIONS.—Complete returns of the original cards for the year have been received from 72 stations.

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 24 other stations for insertion in the Weekly Weather Report, &c. Of these, five 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 (96) AT MARCH 31, 1903.

| Stations.              | No. | Stations.            | No. |
|------------------------|-----|----------------------|-----|
| Scotland, N. ... ..    | 6   | England, N.E. ... .. | 7   |
| .. E. ... ..           | 3   | .. N.W. and N. Wales | 13  |
| .. W. ... ..           | 3   | .. Midland Counties  | 13  |
| Ireland, N. ... ..     | 2   | .. E. ... ..         | 10  |
| .. S. ... ..           | 4   | .. S. ... ..         | 19  |
| Channel Islands ... .. | 3   | .. S.W. and S. Wales | 13  |

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.

**ADDITIONAL INSTRUMENTS.**—The Callendar self-recording thermometer referred to in last year's report has been kept in operation at the Office, and, apart from difficulties in connexion with the maintenance of the battery power, has worked very satisfactorily. The Council have also had upon trial a self-recording mercury barometer, designed by Mr. W. H. Dines, and obtained originally for use at the base station at Crinan Harbour in connexion with the kite experiments. They have, moreover, made a trial on the roof of the Office of a self-recording rain-gauge with very open scale, made and lent for the purpose by Mr. Halliwell of Southport. They have also had under comparison a number of Solar radiation thermometers and some aneroid barometers of a new pattern by Mr. J. J. Hicks.

**NORMAL CLIMATOLOGICAL STATIONS. STATIONS OF THE SECOND ORDER OF THE INTERNATIONAL CLASSIFICATION.**—These stations, as well as many of the sunshine stations, and all the stations supplying information indicated by the letters F, G, and R, are maintained by private persons or local authorities or institutions, who provide their own outfit of instruments. Returns for 1902 were received from 84 stations. The arrangement with the Royal Meteorological Society and the Scottish Meteorological Society, under which, for a certain payment, the Societies forward to the Office returns already prepared for publication, as well as returns for the Weekly Weather Report, has been continued. These 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 the International Form A, from 12 on Form B, and from 5 on the Weekly Forms; the Scottish Meteorological Society observations from 3 stations on Form A, from 16 on Form B, and from 7 on the Weekly Forms. 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 1902 were distributed as follows:—

| Stations.              | No. | Stations.               | No. |
|------------------------|-----|-------------------------|-----|
| Scotland, N. ... ..    | 7   | England, N.E. ... ..    | 11  |
| "    E. ... ..         | 6   | "    N.W., and N. Wales | 8   |
| "    W. ... ..         | 9   | "    Midland Counties   | 14  |
| Ireland, N. ... ..     | 4   | "    E. ... ..          | 9   |
| "    S. ... ..         | 5   | "    S. ... ..          | 9   |
| Channel Islands ... .. | 1   | "    S.W., and S. Wales | 5   |



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.

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The stations of the Second Order for 1902 were distributed as follows :—

| Stations.              | No. | Stations.            | No. |
|------------------------|-----|----------------------|-----|
| Scotland, N. ... ..    | 7   | England, N.E. ... .. | 11  |
| " E. ... ..            | 6   | " N.W., and N. Wales | 8   |
| " W. ... ..            | 9   | " Midland Counties   | 14  |
| Ireland, N. ... ..     | 4   | " E. ... ..          | 9   |
| " S. ... ..            | 5   | " S. ... ..          | 9   |
| Channel Islands ... .. | 1   | " S.W., and S. Wales | 5   |



Sea tempera-  
ture 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 July, 1879–June, 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 on the Irish Sea and North Channel, 2 on St. George’s Channel, 3 on the Bristol Channel, 7 on the English Channel, and 16 on the North Sea.

The returns are now being used in connexion with monthly charts of the surface temperature of the North Atlantic Ocean, embodied in the Monthly Pilot Charts.

AUXILIARY CLIMATOLOGICAL STATIONS.—These include all stations which make climatological returns of a less complete character than those of a normal station, or at which the hours of observation do not correspond with those of a normal station. Particulars of the information received from the several stations are given in the general list of stations, pp. 71, 72. Those which have been added in the course of the year are marked \*, those which have lapsed since last year are marked †.

Inspection of  
stations.

*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 in the list on pp. 53–65 are regularly inspected, while the others are visited as opportunity offers. The stations 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 the North of Ireland. 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. 53, the year when each station was last visited by an Inspector from the Office, is indicated by the figures in the sixth column.

Extracts from the reports of the Inspectors are given in Appendix VII., p. 103. 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 1902-1903 may be summarised as follows:—

| Number and Description.                                   | Class. | Nature of the Information received.<br>(See p. 51.) |
|---|--------|---|
| 13 Observatories ... ..                                   | I.     | A.  |
| 11 Additional Anemograph stations ... ..                  | —      | B.  |
| 16 " Barograph stations ... ..                            | —      | C.  |
| 3 " Thermograph stations ... ..                           | —      | C'.   |
| 87 " Sunshine stations ... ..                             | —      | S.  |
| 84 Normal Climatological stations. Second Order stations. | II.    | D.E.  |
| 28 Telegraphic stations—British ... ..                    | III.   | T.  |
| 31 " Foreign ... ..                                       | —      | —   |
| 69 Auxiliary Climatological stations ... ..               | III.   | G.  |
| 61 Additional Rainfall stations ... ..                    | III.   | R.  |
| 22 Fishery Barometer stations ... ..                      | —      | H.  |
| 51 Sea Temperature stations ... ..                        | —      | W.  |

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.

Use of the information from climatological stations.

Weekly and quarterly summaries have been prepared for the reports of the Registrars-General for Births, Deaths, and Marriages for England and Wales and for Ireland.

Reports supplied to Registrar-General for Ireland.

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

Rainfall observations.

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

Ben Nevis observations.

The information is also used to furnish replies to inquiries. During the year 127 requests for statistical information of more or less extensive character have been dealt with. Some of these have been required for scientific inquiries, and some for personal use, while many have been from firms of solicitors and have reference to disputed claims for damages and other legal actions; these refer principally to statistics of heavy rains, winds and fogs.

Miscellaneous inquiries.

## II.—FOREIGN AND COLONIAL STATIONS.

A list of Foreign and Colonial Stations from which documents have been received in the course of the year is given in Appendix II., p. 76.

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. Eight are in the West Indies, of which six are in the Bahamas. Five of the Bahamas returns are lighthouse registers. Twelve stations are in the West of

Africa, eleven in Central Africa, and eleven in British East Africa. Three are on the Mediterranean Coast. Two are in Central or South America, one in the Falkland Islands, one at Teneriffe, two in the Indian Ocean (Madagascar and Mauritius), and one in the South Pacific Ocean.

The returns from distant stations have been largely used for the compilation of meteorological information for the Admiralty. (*See* p. 17.)

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## 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. The Library consists at present of about 17,000 volumes and pamphlets.

Appendix XI., p. 137, gives a list of the accessions to the Library during the year. These amounted to 558 books and pamphlets.

An interesting addition to the series of Daily Weather Charts is furnished by the daily Report of the Argentine Republic, which was commenced during the year.

The most important additions to the Library acquired by purchase have been the set of 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, and a work on the Climatology of the Philippine Islands issued by the Manila Observatory.

The Council have again 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.

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## PART V.

### MISCELLANEOUS INVESTIGATIONS.

Miscellaneous.

The comparison of anemometers at Holyhead has been continued.

The Council have thought it desirable to draw up a brief statement of the conspicuous features of the weather during the year 1902 for the purposes of future reference, and this is printed in Appendix X.

The work in connexion with the London Fog Inquiry, the Kite observations at Crinan, the gale of February 26-27, and the falls of red rain have been already referred to (pp. 10, 7, 13, and 12).



The paper by Mr. Brodie on the Gales of the British Islands during the last thirty years referred to last year has been published by the Royal Meteorological Society, and a further discussion of the material is in progress.

## PART VI.

### PUBLICATIONS.

Applications for free copies of one or more of the current publications of the Office, from University College of South Wales and Monmouthshire, McGill University Library, Montreal, Liverpool Underwriters' Association, Solar Physics Observatory, South Kensington, and Central Observatory, Belgrade, have been granted.

The Daily Weather Report, embodying the reports obtained from the Telegraphic Reporting Stations, and some additional information as indicated on pp. 13 and 19, has been regularly issued. Daily  
Weather  
Report.

The Weekly Weather Report (*see* p. 43), with monthly, quarterly, and annual supplements has been regularly issued. Weekly  
Weather  
Report.

*Observatories.*—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. First Ord  
Stations.

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 these were continued in the volume for 1899 prepared in the past year.

The Council have decided to revise the form of publication of the results of observations from the observatories, and to issue the complete hourly readings from each of the four observatories—Aberdeen, Kew, Falmouth, and Valencia—for each month upon four quarto pages. This decision will take effect as regards the volume of results for 1900 now in course of preparation. As provision is made elsewhere for the publication of hourly readings at Fort William and Ben Nevis, the hourly values at Fort William will not be included in the new volume.

Means of the meteorological elements for each hour of the day over a long period of years are 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 "*Meteorological Observations at Stations of the Second Order*," of which twenty-four volumes have been issued, the last being that for 1899.

Pilot Charts.

*Publications on Marine Meteorology.*—The issue of Monthly Pilot Charts for the North Atlantic and Mediterranean (*see* p. 48) has been continued.

Temperature  
Tables of the  
British Isles.

*Occasional Publications.*—The completion at the end of 1900 of thirty years of continuous meteorological records at four of the observatories in connexion with the Office was 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 representation 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.

A supplement has been issued in the course of the year 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 with those of the neighbouring stations.

Captain Carpenter's report upon the Fog inquiry for the winter of 1901-2 has been printed, and will be issued with the Council's report upon the whole inquiry, taking into account the observations of the winter of 1902-3 as well.

A complete list of the publications which have been issued by the Office is given in Appendix II., p. 79, and in Appendix XII., p. 168, 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.

## PART VII.

## FINANCE.

Appendix XIII., p. 174, shows the receipts and payments during the year ending 31st March, 1903. The amount voted by Parliament was £15,300, as in the previous year, and the miscellaneous receipts amounted to £1,988 0s. 7d.

The following abstract of expenditure shows approximately the net charge against the Parliamentary grants of this and the preceding year, together with the increase or decrease in 1902-3, as compared with the previous year :—

| NET EXPENDITURE.   | 1901-2. | 1902-3. | Increase. | Decrease. |
|--|---------|---------|-----------|-----------|
| GENERAL ADMINISTRATION :   |         |         |           |           |
|  | £       | £       | £         | £         |
| <i>Payment of Council and Secretary</i> ... ..                             | 1,471   | 1,476   | 5         | —         |
| <i>Office</i> ... ..   | 967     | 1,053   | 86        | —         |
| <i>Rent, Fuel, and Lighting</i> ... ..                                     | 725     | 723     | —         | 2         |
| <i>Alterations to premises and contingencies</i> ... ..                    | 529     | 359     | —         | 170       |
| <i>Expenses incidental to International Meteorological Congress</i> ... .. | —       | —       | —         | —         |
| SPECIAL RESEARCHES ... ..  | 899     | 789     | —         | 110       |
| LAND METEOROLOGY ... ..  | 3,530   | 3,795   | 265       | —         |
| WEATHER INFORMATION ... ..   | 3,233   | 3,123   | —         | 110       |
| INSPECTIONS ... ..   | 401     | 429     | 28        | —         |
| OCEAN METEOROLOGY ... ..   | 2,528   | 2,422   | —         | 106       |
| SUPERANNUATION ACCOUNT   | 2,016   | 1,243   | —         | 773       |
| Total ... .. £   | 16,299  | 15,412  | 384       | 1,271     |

NOTES.—The increase under "Land Meteorology" is chiefly due to the re-arrangement of Office Staff. The sum of £2,217 0s. 9d. was paid to the Post Office during the year 1902-3, on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

R. STRACHEY,  
Chairman.



## APPENDIX.

### APPENDIX I.

#### INSTRUCTION POUR LES OBSERVATIONS INTERNATIONALES DE NUAGES. (See p. 7.)

1. Les observations seront faites aux jours internationaux et, si possible, surtout pour les nuages supérieurs, aussi la veille et le lendemain. On pourra choisir les heures d'observation ordinaires. Si entre les heures d'observation, des changements importants s'opèrent dans l'état du ciel, p. E. s'il apparaît des nuages dont la direction est importante à connaître, comme les Cirrus, on les notera également, si possible. Si les nuages supérieurs sont mal visibles ou se meuvent lentement on devra quand-même déterminer la direction au moins approchée.

2. Outre la Nébulosité générale on pourra noter, dans quelle proportion les espèces observés y participent p. E. Néb. 10, Ci-S. 10, Ci-Cu 3. (C.à.d. entièrement couvert de Ci-S; en plus 3/10 Ci-Cu au-dessous.)

3. Pour l'indication de l'espèce on se basera sur les définitions du texte de la Classification Internationale en citant au besoin les figures; dans le cas contraire on nous indiquera la Classification choisie. Le plus souvent il sera désirable d'ajouter à la désignation de l'espèce quelques mots explicatifs qu'on pourra aussi mettre dans la rubrique des remarques.

4. La *Direction* doit être déterminée avec toute la précision possible; avec le néphoscope on l'obtient facilement à quelques degrés près le plus souvent; la désignation N.N.W., S.S.E. est souvent insuffisante. S'il y a plusieurs espèces, il faut bien en distinguer les directions.

5. La Vitesse des nuages sera indiquée en la réduisant à une hauteur supposée de 1,000 m.,  $\left(\frac{1000 V}{H}\right)$  ou bien en indiquant la hauteur, où la vitesse en m. serait égale à l'unité (Hauteur relative =  $\frac{H}{V}$ ). Ces nombres sont réciproques. Ces déterminations très importantes ne doivent pas être laissées de côté. Mais elles sont faciles à faire en employant un néphoscope. Outre les instruments connus nous recommandons tout particulièrement pour la facilité et la précision des observations la herse néphoscopique Besson, instrument peu coûteux.

6. On notera aussi le Vent qu'il fait au sol.

7. On ne négligera pas la rubrique des Remarques, en y notant brièvement tout ce qui paraît important (orientation des bandes de Ci, etc.).

EXEMPLE.

| Date<br>et<br>heure.   | Nébulosité. | Espèce.   | Direction.               | Vitesse<br>$\frac{1,000 V.}{H.}$ ou bien $\frac{H}{V}$ | Vent au Sol.<br>Échelle 1-12. | Remarquez.  |
|--|-------------|---|--------------------------|--|-------------------------------|---|
| 5. IX. 2 <sup>h</sup> p.   | 0           | Ci (Fig. 3) ..  | W. 50° S.                | 1,0 1,000  | —                             | Beau : q. q. Ci : le<br>soir Ci-S à l'horizon<br>W.   |
| 6. IX. 7 <sup>h</sup> a.   | 3           | Fr-S 3 ..   | E. 10° N.                | 1,6 625  | E. 1                          | 9 <sup>h</sup> Formation des<br>Cu commence.  |
| 2 <sup>h</sup> p.  | 4           | Fr-Cu Cu2<br>(Fig. 19) ..   | S. 35° E.                | 2,5 400  | S.E. 1                        | 1 <sup>h</sup> les Ci-S. at-<br>teignent le zénith.   |
|  |             | Ci-S 4 mince  | W. 62° S.                | 1,8 550  | —                             | Ci-S. en bandes ori-<br>entées dans la<br>dir. W. 40° S. Halo<br>de 22°.  |
| 6 <sup>h</sup> p.  | 8           | Ci-S 8 plus<br>dense, tend<br>vers A-S :<br>plus bas<br>Ci-Cu2 .. | { W. 58° S.<br>W. 82° S. | { 2,0 500<br>1,6 625                                   | { S. 2<br>S.W. 3              | Ci-Cu en paquets,<br>se rapprochant<br>des A-Cu.<br>Les Cu ont disparu.<br>9 <sup>h</sup> complètement<br>couvert.<br>Le lendemain il<br>pleut. |
| 7. IX. { 7 <sup>h</sup> a.<br>2 <sup>h</sup> p.<br>9 <sup>h</sup> p. } | 10          | Ni  | W. 20° S.                | 3,0 330  | S.W. 2-3                      | Nimbus uniforme.  |

N.B.—W. 50° S. veut dire : venant de W. 50° vers S.

Les vitesses sont exprimées ici des deux manières, on adoptera l'une ou l'autre.

## APPENDIX II.

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

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

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## 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., Sc.D., 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.  
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.

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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.

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. Office hours.

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#### A. TELEGRAPHIC INFORMATION.

##### DAILY WEATHER REPORTS. FORECASTS AND STORM WARNINGS.

Between 8 a.m. and 10 a.m. telegraphic messages are received daily, reporting meteorological observations at 25 stations (see list of stations, p. 73) in the British Isles, chiefly on the coast, and at 29 stations (p. 74) 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. Daily information received.

These reports are supplemented by telegraphic reports from the Azores, through the courtesy of the Portuguese Government and the Eastern Telegraph Company and the Commercial Cable 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.

**Daily  
Weather  
Report.**

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.

**Subscrip-  
tions.**

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.

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  
Reports for  
the Press.**

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.

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  
forecasts.**

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.

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

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.

# 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.

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. Inquiries by telegraph.

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).

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." Inquiries by post.

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 an additional charge of 3*d.* per telegram for a forecast for a single district, and 6*d.* for two or more districts.

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. Harvest forecasts.



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.

Transcripts  
of the  
observations

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.

#### STORM WARNINGS.

Storm  
Signals.

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.

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 :—

Storm  
Warning  
Stations.

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

[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.—<br><i>cont.</i> | IRELAND, S.W.—<br><i>cont.</i> |                     | ENGLAND, N.E.—<br><i>cont.</i> |
| Wick.                           | Kinsale (Old Head).            |                     | Filey.                         |
| Farbet Ness L.H.                | Galley Head L.H.               |                     | Flamborough H.                 |
| Avoch.                          | Castletownshend.               |                     | Bridlington.                   |
| Inverness.                      | Fastnet Rock L.H.              |                     | Hull.                          |
| Nairn.                          | Brow Head.                     |                     | Goole.                         |
| Burghead.                       | Tralee.                        |                     | Grimsby.                       |
| Lossiemouth.                    | †Limerick.                     |                     | Boston.                        |
| Buckie.                         | Loophead L.H.                  |                     |                                |
| †Port Knockie.                  | Galway.                        |                     |                                |
| Cullen.                         |                                |                     |                                |
| Portsoy.                        |                                |                     |                                |
| Banff.                          | IRELAND, N.W.                  |                     |                                |
| Fraserburgh.                    | Killybegs L.H.                 |                     |                                |
| Peterhead.                      | Tory Island L.H.               |                     |                                |
| †Aberdeen.                      | Lough Swilly L.H.              |                     |                                |
| Girdleness L.H.                 | Rathmullan.                    |                     |                                |
|                                 | 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.                       |                     |                                |
|                                 | Hoylake.                       |                     |                                |
|                                 | New Brighton.                  |                     |                                |
|                                 | Connah's Quay.                 | ENGLAND, S.E.       |                                |
|                                 | Penmaenmawr.                   | Beachy Head.        |                                |
| SCOTLAND, N.W.                  | Port Penrhyn.                  | Eastbourne.         |                                |
| C. Wrath L.H.                   | Point Lynas L.H.               | †Hastings.          |                                |
| Stourhead L.H.                  | Skerries L.H.                  | Rye.                |                                |
| Port of Ness.                   | Holyhead.                      | Sandgate.           |                                |
| Stornoway.                      | South Stack L.H.               | Folkestone.         |                                |
| Island Glass L.H.               | Caernarvon.                    | Dover.              |                                |
| Portnaguran.                    | Port Dinorwic.                 | Deal.               |                                |

[ *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, W.         | ST. GEORGE'S<br>CHANNEL. | ENGLAND, S.E.—<br><i>cont.</i> |          |
| *Glasgow.            | Courtown.                | Ramsgate.                      |          |
| †Greenock.           | Aberystwyth.             | Margate.                       |          |
| Rothesay.            | Milford.                 | Faversham.                     |          |
| Lamlash.             |                          | Sheerness.                     |          |
| Carradale.           |                          | Chatham.                       |          |
| Campbelton.          | BRISTOL CHANNEL.         | Greenhithe.                    |          |
| Mull of Cantire L.H. | Smalls L.H.              |                                |          |
| Rhuvaal L.H.         | Caldy L.H.               |                                |          |
| Rhinns of Islay L.H. | †Tenby.                  |                                |          |
| Ardrossan.           | Pembrey.                 |                                |          |
| Girvan.              | Llanelly.                |                                |          |
| Ballantrae.          | Swansea.                 |                                |          |
| Cairn Ryan.          | Briton Ferry.            |                                |          |
| Corsewall Point      | Porthcawl.               |                                |          |
| L.H.                 | Nash L.H.                |                                |          |
| Mull of Galloway     | Penarth.                 |                                |          |
| L.H.                 | 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.                 |                                |          |
|                      | Godrevy L.H.             |                                |          |
|                      | Hayle.                   |                                |          |
|                      | 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.

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.

Weekly  
Weather  
Report.

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. 37), 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 returns of daily observations supplied by volunteer observers from about 90 other stations. Of these 33 supply only the daily amounts of bright sunshine. 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.

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.

Tables of  
Accumulated  
Temperature

Accumulated Temperature is expressed in *Day degrees*, a Day degree signifying  $1^{\circ}$  F. of excess or defect of temperature above or below the base ( $42^{\circ}$  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  $42^{\circ}$  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 $42^{\circ}$ F.   | Below $42^{\circ}$ F.  |
| If the minimum is above $42^{\circ}$ F., or equal to $42^{\circ}$ F.                       | Subtract $42^{\circ}$ F. from the mean.   | There is none.   |
| If the minimum is below $42^{\circ}$ F., but the mean for the day is above $42^{\circ}$ F. | From the difference between the mean for the day and the minimum deduct the accumulated temperature below $42^{\circ}$ F., calculated as stated in the next column. | The required quantity is the excess of $42^{\circ}$ F. over the minimum, multiplied by the coefficient 0.4.  |
| If the mean for the day is below $42^{\circ}$ F., but the maximum is above $42^{\circ}$ F. | The required quantity is the excess of the maximum over $42^{\circ}$ F., multiplied by the coefficient 0.4.   | From the difference between the mean for the day and the minimum deduct the accumulated temperature above $42^{\circ}$ F., calculated as stated in the preceding column. |
| If the maximum is below $42^{\circ}$ F., or equal to $42^{\circ}$ F.                       | There is none.  | Subtract the mean from $42^{\circ}$ 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  $42^{\circ}$  F. The following are its values for other base temperatures :—for  $32^{\circ}$  F., 0.4 ; for  $52^{\circ}$  F., 0.33 ; for  $62^{\circ}$  F., 0.25.\*

\* 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.

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

Monthly, Annual, and Quinquennial Supplements to the Weekly Weather Report.

I. A *Monthly Supplement* giving (1) a complete summary of the observations at the Telegraphic Reporting Stations, and at certain of the Normal Climatological Stations; (2) a summary of maximum and minimum temperature, rainfall, and sunshine at the additional stations which furnish weekly 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 January, 1902, this Monthly Summary has been enlarged, and the number for March, 1903, contains complete tables of results for 46 stations, namely:—25 telegraphic stations and 21 selected normal climatological stations, together with a summary of temperature, rainfall and sunshine, or one or more of these elements, at 74 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.

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.

Advance copy for the use of newspapers.



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 6*d.* each, exclusive of postage, and the separate appendices are priced at from 4*d.* to 1*s.*

### C. OTHER INFORMATION FROM STATIONS IN THE BRITISH ISLES.

Observatories  
with self-  
recording  
instruments,

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 (Fort William) and the summit of Ben Nevis. They receive in return from the four first-named observatories curves and hourly tabulations of pressure, dry bulb temperature, wet bulb temperature, rainfall, direction and velocity of the wind, and sunshine, together with regular observations of the character and movement of the clouds and the state of the weather; from Fort William similar information except for wind, the position of Fort William Observatory not being suitable for an anemometer; and from the observatory on the summit of Ben Nevis full copies of the hourly observations.

An annual volume embodying the results of the observations at the five Observatories is published in the usual way. That for 1899 has recently been issued, price 37*s.* 6*d.*

The Council also receive in return for an annual grant 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, Falmouth (Pendennis Castle), Fleetwood, Kingstown, Holyhead, North Shields, Scilly, Shoeburyness, and Yarmouth.

Sunshine returns are received from 97 stations, 72 of which furnish a continuous record from the Campbell-Stokes Recorder, while the remaining 25 stations report the daily amounts.

Continuous records of pressure by some form of self-recording aneroid are received from 16 stations.

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

Normal  
Climato-  
logical  
Stations.

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.

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. | 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.  |                                 |             |            |               |                     |       |  |                         |                         |           |                     | Dew point.                   | Max |                              |                  |          | Min. |
|                                     |              |   |           |            |            |                                 |             |            |               |                     |       |  |                         |                         |           |                     |                              |     |                              |                  |          |      |

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

An annual volume embodying the results of these observations is published; that for 1899 has recently been issued, price 22s. 6d.

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 daily 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. 53 to 65.

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,

British East Africa (11 stations), Falkland Islands, Cape Spartel, Cyprus (six stations), Eastern Soudan, British Guiana, Gibraltar, Gold Coast (nine stations), Madagascar, Malden Island, Mauritius, Panama, St. Helena (four stations), Sierra Leone, Sombrero, Tenerife, Uganda (ten stations), and West Africa (two stations).

A list of the stations is given on pp. 76-78.

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.

### 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. 82.*

#### Pilot charts.

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.

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 do not lend instruments for the use of observers except Loan of instruments in the following cases :—

- (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—Mr. T. L. Ainsley, Bute Dock.

Dundee—Mr. 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., 56, Lister Street.

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

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

Sunderland—Messrs. J. J. Wilson & Son, 18, Hudson Road.

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.

The Council have been in the habit of supplying Barometers Fishery 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, Rosehearty, 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, Kilcredane, Kilronan, Galway, Spiddal, Elly Bay, Cleggan, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Malinmore, Portnoo, Burton Port, Kincaslugh, Bunbeg, Inniscgo.

*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, Ardsneaskan, Shieldaig, Gruinard, Badachro, Ullapool, East Mey, Gills, Stroma (2).

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

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.

Supply of instruments on commission for observers at Land Stations.

For further information as to the supply of instruments, 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, 1903.

The returns from Stations marked "S" are supplied by the Scottish Meteorological Society, and those from Stations marked "R" by 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 fifth column, as follows:—

A. Observatories.—Continuous records or hourly readings of pressure, temperature, wind, sunshine, and rain, with eye observations of the amount, form, and motion of the clouds, and notes on the weather. The indication (A.) in the fifth column denotes that the station is included in Group A. of p. 66, although the information regularly received by the Office is confined to that denoted by the other letters in the column.

B. Additional Anemograph Stations.—Continuous record of the direction and velocity (or force) of the wind.



- C. Additional Barograph Stations.—Continuous record of pressure.
- C'. Additional Thermograph Stations.—Continuous record of temperature.
- D. Normal Climatological Stations : Second Order Stations of the International Classification.—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 remarks on the weather.
- E. Normal Climatological Stations : Second Order Stations of the International Classification.—Monthly means and summaries of observations taken at 9 a.m. and 9 p.m. each day as above.
- F. Climatological Returns.—Weekly reports of 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." Returns of sunshine are included in many cases.
- G. Auxiliary Climatological Stations : Third Order Stations of the International Classification.—Observations of the same kind as at Stations under D and E, but either—  
(a) less full, (b) taken only once daily, (c) taken at hours other than 9 a.m. and 9 p.m.
- H.—Fishery Barometer Stations : Monthly Charts of daily readings of the Fishery Barometer and attached Thermometer.
- R. Additional Rainfall Stations.—Monthly sheets containing the daily observations of the amount of rainfall, with remarks on the weather.
- S. Additional Sunshine Stations.—Continuous record of bright sunshine.
- T. Telegraphic Stations.—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."
- W. Sea Temperature Stations.—Daily observations of the temperature of the air and of the sea water.
-

LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES.

The Districts are numbered as follows :—

- |  |  |
|--|--|
| 0. Scotland, N.                                | 6. Scotland, W. (including part of Cumberland), and the Isle of Man. |
| 1. Scotland, E.                                | 7. England, N.W., and North Wales.                                   |
| 2. England, N.E. (including part of Scotland). | 8. South Wales, and England, S.W.                                    |
| 3. England, E.                                 | 9. Ireland, N.   |
| 4. Midland Counties.                           | 10. Ireland, S.  |
| 5. England, S., and English Channel.           |  |

| County and Station.        | Lat.  | Long.   | Height in feet above M.S.L. | Nature of Information received. See p. 51. | Year of last Inspection. |
|----------------------------|-------|---------|-----------------------------|--|--------------------------|
| <b>0. SCOTLAND, NORTH.</b> |       |         |                             |  |                          |
| Caithness :—               |       |         |                             |  |                          |
| Wick ... ..                | 58 27 | 3 6 W.  | 80                          | T. W.                                      | 02                       |
| " ... ..                   | 58 27 | 3 6 W.  | —                           | —  | —                        |
| Cromarty :—                |       |         |                             |  |                          |
| Cromarty ... ..            | 57 41 | 4 0 W.  | —                           | W.   | —                        |
| Strathpeffer Spa ... ..    | 57 37 | 4 28 W. | 253                         | D.F.S.                                     | 01                       |
| Inverness :—               |       |         |                             |  |                          |
| § Ben Nevis ... ..         | 56 48 | 5 0 W.  | 4,405                       | A.E.                                       | 01                       |
| § Fort Augustus ... ..     | 57 8  | 4 40 W. | 68                          | E.F.S.                                     | 01                       |
| Fort William ... ..        | 56 49 | 5 7 W.  | 31                          | A.F.                                       | 02                       |
| Orkney :—                  |       |         |                             |  |                          |
| Deerness ... ..            | 58 56 | 2 45 W. | 160                         | B.D.S.                                     | 02                       |
| Kirkwall ... ..            | 58 59 | 2 57 W. | —                           | W.   | —                        |
| Perth :—                   |       |         |                             |  |                          |
| No station.                |       |         |                             |  |                          |
| (See also District 1.)     |       |         |                             |  |                          |
| Ross :—                    |       |         |                             |  |                          |
| Ardross Castle ... ..      | 57 45 | 4 21 W. | 449                         | R.   | —                        |
| § Glencarron ... ..        | 57 30 | 5 14 W. | 489                         | E.F.                                       | 00                       |
| Kinlochewe ... ..          | 57 36 | 5 24 W. | —                           | R.   | —                        |
| Stornoway ... ..           | 58 11 | 6 22 W. | 29                          | C.S.T.                                     | 02                       |
| " ... ..                   | 58 11 | 6 22 W. | —                           | H.W.                                       | —                        |
| Shetlands :—               |       |         |                             |  |                          |
| Lerwick ... ..             | 60 9  | 1 8 W.  | —                           | H.W.                                       | —                        |
| Sumburgh Head ... ..       | 59 51 | 1 17 W. | 126                         | C.T.                                       | 01                       |
| Symbister ... ..           | 60 14 | 1 25 W. | —                           | H.   | —                        |
| Sutherland :—              |       |         |                             |  |                          |
| § Dunrobin Castle... ..    | 57 59 | 3 56 W. | 12                          | D.   | 02                       |
| § Lairg ... ..             | 58 1  | 4 22 W. | 335                         | E.F.                                       | 02                       |

## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

| County and Station.      | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br>See p. 51. | Year<br>of last<br>Inspection. |
|--------------------------|-------|---------|--------------------------------------|--|--------------------------------|
| 1. SCOTLAND, EAST.       |       |         |                                      |  |                                |
| <b>Aberdeen :—</b>       |       |         |                                      |  |                                |
| Aberdeen Observatory ... | 57 10 | 2 6 W.  | 46                                   | A. T.  | 02                             |
| Cove Bay ...             | 57 9  | 2 5 W.  | —                                    | W.   | —                              |
| *Braemar ...             | 57 0  | 3 24 W. | 1,111                                | D.F.   | 00                             |
| Pennan Bay ...           | 57 40 | 2 16 W. | —                                    | W.   | —                              |
| <b>Banff :—</b>          |       |         |                                      |  |                                |
| *Gordon Castle ...       | 57 37 | 3 5 W.  | 101                                  | E.   | 02                             |
| <b>Berwick :—</b>        |       |         |                                      |  |                                |
| Burnmouth ...            | 55 51 | 2 4 W.  | —                                    | W.   | —                              |
| *Marchmont ...           | 55 41 | 2 25 W. | 498                                  | E.F.S.   | 02                             |
| <b>Clackmannan :—</b>    |       |         |                                      |  |                                |
| No station.              |       |         |                                      |  |                                |
| <b>Edinburgh :—</b>      |       |         |                                      |  |                                |
| Edinburgh ...            | 55 57 | 3 12 W. | 253                                  | S.   | —                              |
| Leith ...                | 55 58 | 3 10 W. | 19                                   | T.   | 02                             |
| <b>Elgin :—</b>          |       |         |                                      |  |                                |
| No station.              |       |         |                                      |  |                                |
| <b>Fife :—</b>           |       |         |                                      |  |                                |
| Buratisland ...          | 56 4  | 3 14 W. | —                                    | W.   | —                              |
| <b>Forfar :—</b>         |       |         |                                      |  |                                |
| *Dundee ...              | 56 28 | 2 56 W. | 160                                  | D.   | 02                             |
| *Lednathic ...           | 56 45 | 3 7 W.  | 719                                  | E.   | 00                             |
| Uzon ...                 | 56 40 | 2 28 W. | —                                    | W.   | —                              |
| <b>Haddington :—</b>     |       |         |                                      |  |                                |
| No station.              |       |         |                                      |  |                                |
| <b>Kincardine :—</b>     |       |         |                                      |  |                                |
| Cove Bay ...             | 57 9  | 2 5 W.  | —                                    | W.   | —                              |
| <b>Kinross :—</b>        |       |         |                                      |  |                                |
| No station.              |       |         |                                      |  |                                |
| <b>Linlithgow :—</b>     |       |         |                                      |  |                                |
| No station.              |       |         |                                      |  |                                |
| <b>Nairn :—</b>          |       |         |                                      |  |                                |
| Nairn ...                | 57 36 | 3 52 W. | 82                                   | T.   | 02                             |
| <b>Peebles :—</b>        |       |         |                                      |  |                                |
| No station.              |       |         |                                      |  |                                |



## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

| County and Station.      | Lat.    | Long.     | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>supplied.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|--------------------------|---------|-----------|--------------------------------------|---|--------------------------------|
| 1. SCOTLAND, EAST.       |         |           |                                      |   |                                |
| Aberdeen :—              |         |           |                                      |   |                                |
| Aberdeen Observatory ... | 57° 10' | 2° 6' W.  | 46                                   | A. T.   | 02                             |
| Cove Bay ...             | 57° 9'  | 2° 5' W.  | —                                    | W.  | —                              |
| *Braemar ...             | 57° 0'  | 3° 24' W. | 1,111                                | D.F.  | 00                             |
| Pennant Bay ...          | 57° 40' | 2° 16' W. | —                                    | W.  | —                              |
| Banff :—                 |         |           |                                      |   |                                |
| *Gordon Castle ...       | 57° 37' | 3° 5' W.  | 101                                  | E.  | 02                             |
| Berwick :—               |         |           |                                      |   |                                |
| Burnmouth ...            | 55° 51' | 2° 4' W.  | —                                    | W.  | —                              |
| *Marchmont ...           | 55° 44' | 2° 25' W. | 498                                  | E.F.S.  | 02                             |
| Clackmannan :—           |         |           |                                      |   |                                |
| No station.              |         |           |                                      |   |                                |
| Edinburgh :—             |         |           |                                      |   |                                |
| Edinburgh ...            | 55° 57' | 3° 12' W. | 253                                  | S.  | —                              |
| Leith ...                | 55° 58' | 3° 10' W. | 19                                   | T.  | 02                             |
| Elgin :—                 |         |           |                                      |   |                                |
| No station.              |         |           |                                      |   |                                |
| Fife :—                  |         |           |                                      |   |                                |
| Burntisland ...          | 56° 4'  | 3° 14' W. | —                                    | W.  | —                              |
| Forfar :—                |         |           |                                      |   |                                |
| *Dundee ...              | 56° 28' | 2° 56' W. | 160                                  | D.  | 02                             |
| *Lednathie ...           | 56° 45' | 3° 7' W.  | 719                                  | E.  | 00                             |
| Uzon ...                 | 56° 40' | 2° 28' W. | —                                    | W.  | —                              |
| Haddington :—            |         |           |                                      |   |                                |
| No station.              |         |           |                                      |   |                                |
| Kincardine :—            |         |           |                                      |   |                                |
| Cove Bay ...             | 57° 9'  | 2° 5' W.  | —                                    | W.  | —                              |
| Kinross :—               |         |           |                                      |   |                                |
| No station.              |         |           |                                      |   |                                |
| Linlithgow :—            |         |           |                                      |   |                                |
| No station.              |         |           |                                      |   |                                |
| Nairn :—                 |         |           |                                      |   |                                |
| Nairn ...                | 57° 36' | 3° 52' W. | 82                                   | T.  | 02                             |
| Peebles :—               |         |           |                                      |   |                                |
| No station.              |         |           |                                      |   |                                |

LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.   | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|---|-------|---------|--------------------------------------|---|--------------------------------|
| <b>1. SCOTLAND, EAST—<i>continued.</i></b>                        |       |         |                                      |   |                                |
| Perth :—  |       |         |                                      |   |                                |
| Forgandenny ... ..  | 56 21 | 3 29 W. | 175                                  | C.  | —                              |
| *Ochertyre ... ..   | 56 23 | 3 53 W. | 329                                  | E.F.  | 02                             |
| Selkirk :—  |       |         |                                      |   |                                |
| No station.   |       |         |                                      |   |                                |
| Stirling :—   |       |         |                                      |   |                                |
| No station.   |       |         |                                      |   |                                |
| <b>2. ENGLAND, NORTH EAST (IN-<br/>CLUDING PART OF SCOTLAND).</b> |       |         |                                      |   |                                |
| Durham :—   |       |         |                                      |   |                                |
| Durham ... ..   | 54 46 | 1 35 W. | 336                                  | D.F.S.  | 02                             |
| Seaham Harbour ... ..   | 54 50 | 1 19 W. | 148                                  | D.  | 02                             |
| Sunderland ... ..   | 54 54 | 1 23 W. | —                                    | W.  | —                              |
| Lincolnshire :—   |       |         |                                      |   |                                |
| Caistor ... ..  | 53 30 | 0 20 W. | 99?                                  | R.  | 01                             |
| Fulbeck ... ..  | 53 3  | 0 37 W. | 185                                  | C.D.F.  | 02                             |
| Mareham-le-Fen ... ..   | 53 8  | 0 5 W.  | 33                                   | R.  | 01                             |
| Rauceby Hall ... ..   | 53 0  | 0 29 W. | 125                                  | G.S.  | 02                             |
| Tealby ... ..   | 53 24 | 0 16 W. | 251                                  | D.  | 00                             |
| Temple Bruer ... ..   | 53 4  | 0 30 W. | —                                    | R.  | 99                             |
| Northumberland :—   |       |         |                                      |   |                                |
| Alnwick Castle ... ..   | 55 25 | 1 43 W. | 210                                  | B.F.  | 02                             |
| Chertners ... ..  | 55 16 | 2 0 W.  | 1,000                                | R.  | —                              |
| Cockle Park, Morpeth ... ..                                       | 55 13 | 1 41 W. | 324                                  | D.S.  | 02                             |
| Dam Site ... ..   | 55 14 | 1 54 W. | 620                                  | R.  | —                              |
| Fallowlees ... ..   | 55 15 | 1 57 W. | 850                                  | R.  | —                              |
| Newcastle-on-Tyne ... ..  | 54 59 | 1 36 W. | 152                                  | G.S.  | 01                             |
| Newton Hall ... ..  | 54 57 | 1 54 W. | 524                                  | R.  | —                              |
| North Shields ... ..  | 55 0  | 1 27 W. | 99                                   | T.  | 02                             |
| N. Shields High Lighthouse ... ..                                 | 55 0  | 1 27 W. | —                                    | B.  | 02                             |
| Red Path ... ..   | 55 13 | 2 0 W.  | 850                                  | R.  | —                              |
| Tod Crag ... ..   | 55 15 | 2 1 W.  | 1,000                                | R.  | —                              |
| Roxburgh :—   |       |         |                                      |   |                                |
| *Wolfelee ... ..  | 55 23 | 2 39 W. | 587                                  | E.  | 02                             |
| Yorkshire :—  |       |         |                                      |   |                                |
| Ampleforth ... ..   | 54 12 | 1 5 W.  | 349                                  | D.  | 01                             |
| Hull ... ..   | 53 45 | 0 16 W. | 2                                    | D.F.S.  | 02                             |
| Northallerton ... ..  | 54 20 | 1 26 W. | 129                                  | R.  | 95                             |
| Rounton ... ..  | 54 24 | 1 18 W. | 242                                  | E.  | 02                             |
| *Scarborough ... ..   | 54 18 | 0 24 W. | 62                                   | D.F.S.  | 02                             |
| " ... ..  | 54 17 | 0 23 W. | —                                    | W.  | 02                             |
| Spurn Head ... ..   | 53 34 | 0 7 E.  | 26                                   | T.  | 02                             |
| Spurn Lightship ... ..  | 53 34 | 0 13 E. | —                                    | W.  | —                              |
| York, The Museum ... ..   | 53 57 | 1 5 W.  | 56                                   | D.  | 02                             |
| " Bootham ... ..  | 53 57 | 1 5 W.  | 105                                  | S.  | 02                             |
| (See also Districts 4 and 7).                                     |       |         |                                      |   |                                |



LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.                                       | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>supplied.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|---|-------|---------|--------------------------------------|---|--------------------------------|
| 1. SCOTLAND, EAST— <i>continued.</i>                      |       |         |                                      |   |                                |
| Perth :—  |       |         |                                      |   |                                |
| Forgandenny ... ..  | 56 21 | 3 29 W. | 175                                  | C.  | —                              |
| Ochtertyre ... ..   | 56 23 | 3 53 W. | 329                                  | E.F.  | 02                             |
| Selkirk :—  |       |         |                                      |   |                                |
| No station.   |       |         |                                      |   |                                |
| Stirling :—   |       |         |                                      |   |                                |
| No station.   |       |         |                                      |   |                                |
| 2. ENGLAND, NORTH EAST (IN-<br>CLUDING PART OF SCOTLAND). |       |         |                                      |   |                                |
| Durham :—   |       |         |                                      |   |                                |
| Durham ... ..   | 54 46 | 1 35 W. | 336                                  | D.F.S.  | 02                             |
| Seaham Harbour ... ..                                     | 54 50 | 1 19 W. | 148                                  | D.  | 02                             |
| Sunderland ... ..   | 54 54 | 1 23 W. | —                                    | W.  | —                              |
| Lincolnshire :—   |       |         |                                      |   |                                |
| Caistor ... ..  | 53 30 | 0 20 W. | 99?                                  | R.  | 01                             |
| Fulbeck ... ..  | 53 3  | 0 37 W. | 185                                  | C.D.F.  | 02                             |
| Marcham-le-Fen ... ..                                     | 53 8  | 0 5 W.  | 33                                   | R.  | 01                             |
| Rauceby Hall ... ..                                       | 53 0  | 0 29 W. | 125                                  | G.S.  | 02                             |
| Tealby ... ..   | 53 24 | 0 16 W. | 251                                  | D.  | 00                             |
| Temple Bruer ... ..                                       | 53 4  | 0 30 W. | —                                    | R.  | 99                             |
| Northumberland :—   |       |         |                                      |   |                                |
| Alnwick Castle ... ..                                     | 55 25 | 1 43 W. | 210                                  | B.F.  | 02                             |
| Chertners ... ..  | 55 16 | 2 0 W.  | 1,000                                | R.  | —                              |
| Cockle Park, Morpeth ... ..                               | 55 13 | 1 41 W. | 324                                  | D.S.  | 02                             |
| Dam Site ... ..   | 55 14 | 1 54 W. | 620                                  | R.  | —                              |
| Fallowlees ... ..   | 55 15 | 1 57 W. | 850                                  | R.  | —                              |
| Newcastle-on-Tyne ... ..                                  | 54 59 | 1 36 W. | 152                                  | G.S.  | 01                             |
| Newton Hall ... ..  | 54 57 | 1 54 W. | 524                                  | R.  | —                              |
| North Shields ... ..                                      | 55 0  | 1 27 W. | 99                                   | T.  | 02                             |
| N. Shields High Lighthouse ... ..                         | 55 0  | 1 27 W. | —                                    | B.  | 03                             |
| Red Path ... ..   | 55 13 | 2 0 W.  | 850                                  | R.  | —                              |
| Tod Crag ... ..   | 55 15 | 2 1 W.  | 1,000                                | R.  | —                              |
| Roxburgh :—   |       |         |                                      |   |                                |
| Wolfelee ... ..   | 55 23 | 2 39 W. | 587                                  | E.  | 02                             |
| Yorkshire :—  |       |         |                                      |   |                                |
| Ampleforth ... ..   | 54 12 | 1 5 W.  | 349                                  | D.  | 01                             |
| Hull ... ..   | 53 45 | 0 16 W. | 2                                    | D.F.S.  | 02                             |
| Northallerton ... ..                                      | 54 20 | 1 26 W. | 129                                  | R.  | 95                             |
| Rounton ... ..  | 54 24 | 1 18 W. | 242                                  | E.  | 02                             |
| Scarborough ... ..  | 54 18 | 0 24 W. | 62                                   | D.F.S.  | 02                             |
| " ... ..  | 54 17 | 0 23 W. | —                                    | W.  | 02                             |
| Spurn Head ... ..   | 53 34 | 0 7 E.  | 26                                   | T.  | 02                             |
| Spurn Lightship ... ..                                    | 53 34 | 0 13 E. | —                                    | W.  | —                              |
| York, The Museum ... ..                                   | 53 57 | 1 5 W.  | 56                                   | D.  | 02                             |
| " Bootham ... ..  | 53 57 | 1 5 W.  | 105                                  | S.  | 02                             |
| (See also Districts 4 and 7).                             |       |         |                                      |   |                                |



LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.  | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|--|-------|---------|--------------------------------------|---|--------------------------------|
| 3. ENGLAND, EAST   |       |         |                                      |   |                                |
| Bedford :—   |       |         |                                      |   |                                |
| Langford, Biggleswade ...<br>( <i>See also District 4.</i> ) | 52 7  | 0 16 W. | 111                                  | R.  | —                              |
| Cambridge :—   |       |         |                                      |   |                                |
| Cambridge (Observatory)                                      | 52 13 | 0 6 E.  | 83                                   | D.F.S.  | 02                             |
| " " "  | 52 13 | 0 6 E.  | 40                                   | G.  | —                              |
| Essex :—   |       |         |                                      |   |                                |
| Clacton-on-Sea ...   | 51 48 | 1 9 E.  | —                                    | S.T.  | 02                             |
| Dunmow ...   | 51 53 | 0 23 E. | 297                                  | D.S.  | 02                             |
| Shoeburyness ...   | 51 32 | 0 47 E. | —                                    | B.F.  | —                              |
| West Mersea ...  | 51 47 | 0 54 E. | —                                    | H.  | —                              |
| Hertford :—  |       |         |                                      |   |                                |
| Buntingford ...  | 51 56 | 0 0 W.  | 314                                  | G.  | —                              |
| Bennington ...   | 51 54 | 0 5 W.  | 407                                  | E.  | 00                             |
| Berkhamsted ...  | 51 46 | 0 34 W. | 400                                  | E.  | 00                             |
| Rothamsted ...<br>( <i>See also District 4.</i> )            | 51 48 | 0 22 W. | 368                                  | F.G.S.  | 02                             |
| Huntingdon :—  |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Middlesex :—   |       |         |                                      |   |                                |
| Barnet ...<br>( <i>See also Districts 4 and 5.</i> )         | 51 39 | 0 10 W. | 212                                  | G.  | —                              |
| Norfolk :—   |       |         |                                      |   |                                |
| Cromer ...   | 52 56 | 1 17 E. | 139                                  | D.S.  | 02                             |
| East Dereham ...   | 52 41 | 0 57 E. | 158                                  | F.  | —                              |
| Geldeston ...  | 52 28 | 1 31 E. | 37                                   | D.F.S.  | 99                             |
| Hillington ...   | 52 48 | 0 33 E. | 88                                   | D.F.S.  | 02                             |
| Norwich (Brundall) ...                                       | 52 38 | 1 23 E. | —                                    | F.  | —                              |
| Yarmouth ...   | 52 37 | 1 43 E. | 10                                   | B.C.T.  | 02                             |
| Suffolk :—   |       |         |                                      |   |                                |
| Brandon ...  | 52 27 | 0 37 E. | 48                                   | R.  | —                              |
| Felixstowe ...   | 51 58 | 1 22 E. | 76                                   | F.S.  | 02                             |
| Gorleston ...  | 52 35 | 1 43 E. | —                                    | H.  | —                              |
| Hollesley Bay ...  | 52 3  | 1 27 E. | 38                                   | D.S.  | 02                             |
| Lowestoft ...  | 52 29 | 1 44 E. | 84                                   | E.S.  | 02                             |
| " " "  | 52 29 | 1 44 E. | —                                    | H.  | —                              |
| 4. MIDLAND COUNTIES.   |       |         |                                      |   |                                |
| Bedford :—   |       |         |                                      |   |                                |
| Aspley Guise ...   | 52 1  | 0 38 W. | 410                                  | S.  | —                              |
| Ridgmont ...<br>( <i>See also District 3.</i> )              | 52 1  | 0 36 W. | 291                                  | D.  | 02                             |
| Buckingham :—  |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Derby :—   |       |         |                                      |   |                                |
| Buxton ...   | 53 14 | 1 54 W. | 987                                  | E.  | 02                             |
| Chatsworth ...   | 53 14 | 1 37 W. | —                                    | C.C.G.  | 02                             |

LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.                    | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See p. 61.</i> | Year<br>of last<br>Inspection. |
|--|-------|---------|--------------------------------------|---|--------------------------------|
| 4. MIDLAND COUNTIES— <i>continued.</i> |       |         |                                      |   |                                |
| Gloucester :—                          |       |         |                                      |   |                                |
| Cheltenham ... ..                      | 51 54 | 2 3 W.  | 184                                  | E.  | 01                             |
| Cirencester ... ..                     | 51 43 | 1 57 W. | 446                                  | F.S.  | 01                             |
| Dursley ... ..                         | 51 41 | 2 21 W. | 250                                  | R.  | 96                             |
| Hidcote ... ..                         | 52 5  | 1 46 W. | 524                                  | R.  | 97                             |
| (See also District 8.)                 |       |         |                                      |   |                                |
| Hereford :—                            |       |         |                                      |   |                                |
| Hereford ... ..                        | 52 5  | 2 45 W. | 291                                  | D.F.  | 01                             |
| Wessington Court ... ..                | 52 1  | 2 35 W. | 439                                  | D.  | 01                             |
| Hertford :—                            |       |         |                                      |   |                                |
| No station.                            |       |         |                                      |   |                                |
| (See also District 3.)                 |       |         |                                      |   |                                |
| Leicester :—                           |       |         |                                      |   |                                |
| Belvoir Castle ... ..                  | 52 54 | 0 47 W. | 259                                  | D.  | 02                             |
| Loughborough ... ..                    | 52 47 | 1 12 W. | 146                                  | T.  | 01                             |
| Syston ... ..                          | 52 43 | 1 5 W.  | 178                                  | R.  | 96                             |
| Thurcaston ... ..                      | 52 42 | 1 10 W. | 253                                  | S.  | 96                             |
| Middlesex :—                           |       |         |                                      |   |                                |
| Harefield ... ..                       | 51 36 | 0 29 W. | 247                                  | R.  | —                              |
| (See also Districts 3 and 5.)          |       |         |                                      |   |                                |
| Northampton :—                         |       |         |                                      |   |                                |
| Colly Weston ... ..                    | 52 37 | 0 31 W. | 280                                  | F.  | 01                             |
| Great Billing ... ..                   | 52 16 | 0 50 W. | 273                                  | R.  | —                              |
| Oundle ... ..                          | 52 29 | 0 28 W. | 144                                  | R.  | —                              |
| Montgomery :—                          |       |         |                                      |   |                                |
| Churchstoke ... ..                     | 52 31 | 3 5 W.  | 538                                  | D.F.S.  | 01                             |
| Llandinam ... ..                       | 52 29 | 3 26 W. | 500                                  | R.  | —                              |
| Nottingham :—                          |       |         |                                      |   |                                |
| Bawtry, Hesley Hall ... ..             | 53 27 | 1 4 W.  | 65                                   | F.  | 02                             |
| Nottingham ... ..                      | 52 57 | 1 9 W.  | 192                                  | F.G.  | 02                             |
| Worksop ... ..                         | 53 22 | 1 5 W.  | 56                                   | S.  | 96                             |
| Oxford :—                              |       |         |                                      |   |                                |
| Oxford ... ..                          | 51 46 | 1 16 W. | 208                                  | A.T.  | 02                             |
| Rutland :—                             |       |         |                                      |   |                                |
| Ketton ... ..                          | 52 38 | 0 32 W. | 109                                  | R.  | 99                             |
| Ridlington ... ..                      | 52 37 | 0 45 W. | 522                                  | R.  | —                              |
| Shropshire :—                          |       |         |                                      |   |                                |
| Stokesay ... ..                        | 52 26 | 2 52 W. | 370                                  | D.  | 01                             |
| Stafford :—                            |       |         |                                      |   |                                |
| Cheadle ... ..                         | 52 58 | 1 57 W. | 646                                  | E.F.  | 02                             |
| Wrottesley ... ..                      | 52 37 | 2 12 W. | 500                                  | F.  | 02                             |
| Warwick :—                             |       |         |                                      |   |                                |
| Birmingham, Edgbaston ... ..           | 52 28 | 1 56 W. | 534                                  | D.F.S.  | 02                             |
| Coventry ... ..                        | 52 25 | 1 30 W. | 269                                  | G.S.  | 02                             |
| Rugby School ... ..                    | 52 22 | 1 15 W. | 379                                  | G.  | 98                             |

LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.                            | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|--|-------|---------|--------------------------------------|---|--------------------------------|
| <b>4. MIDLAND COUNTIES—<i>continued.</i></b>   |       |         |                                      |   |                                |
| Worcester :—                                   |       |         |                                      |   |                                |
| Rochford ... ..                                | 52 18 | 2 36 W. | 316                                  | C.R.  | 01                             |
| Yorkshire :—                                   |       |         |                                      |   |                                |
| Ackworth ... ..                                | 53 39 | 1 20 W. | —                                    | D.  | 02                             |
| Bradford ... ..                                | 53 48 | 1 45 W. | —                                    | F.S.  | 02                             |
| Garforth ... ..                                | 53 48 | 1 22 W. | 195                                  | D.S.  | 02                             |
| Harrogate ... ..                               | 54 0  | 1 33 W. | 480                                  | F.S.  | 02                             |
| Huddersfield ... ..                            | 53 39 | 1 47 W. | —                                    | F.  | 02                             |
| Leeds ... ..                                   | 53 48 | 1 33 W. | 132                                  | F.G.  | 02                             |
| Sheffield ... ..                               | 53 23 | 1 29 W. | 429                                  | D.S.  | 02                             |
| " Attercliffe ... ..                           | 53 24 | 1 25 W. | —                                    | S.  | 02                             |
| Wakefield ... ..                               | 53 41 | 1 30 W. | 96                                   | E.  | 02                             |
| (See also Districts 2 and 7.)                  |       |         |                                      |   |                                |
| <b>5. ENGLAND, SOUTH, AND ENGLISH CHANNEL.</b> |       |         |                                      |   |                                |
| Berkshire :—                                   |       |         |                                      |   |                                |
| Maidenhead ... ..                              | 51 30 | 0 43 W. | 99                                   | G.  | 99                             |
| Reading ... ..                                 | 51 26 | 0 57 W. | 261                                  | G.  | —                              |
| Dorset :—                                      |       |         |                                      |   |                                |
| Parkstone ... ..                               | 50 43 | 1 56 W. | 197                                  | D.  | 00                             |
| Portland Bill ... ..                           | 50 32 | 2 27 W. | 177                                  | T.  | 01                             |
| Shaftesbury ... ..                             | 51 1  | 2 12 W. | 722                                  | F.  | 01                             |
| Hampshire :—                                   |       |         |                                      |   |                                |
| Bournemouth ... ..                             | 50 43 | 1 53 W. | —                                    | S.  | 02                             |
| Haslar ... ..                                  | 50 47 | 1 7 W.  | —                                    | H.  | —                              |
| Portsmouth ... ..                              | 50 48 | 1 6 W.  | 11                                   | F.G.S.  | 02                             |
| Osborne ... ..                                 | 50 46 | 1 15 W. | 171                                  | G.  | —                              |
| Southampton ... ..                             | 50 55 | 1 24 W. | 78                                   | D.F.S.  | 02                             |
| Swarraton ... ..                               | 51 8  | 1 11 W. | 310                                  | F.  | 90                             |
| Totland Bay ... ..                             | 50 41 | 1 33 W. | 84                                   | G.  | 00                             |
| Ventnor ... ..                                 | 50 36 | 1 13 W. | 80                                   | G.S.  | 97                             |
| Yarmouth, I. of Wight ... ..                   | 50 42 | 1 29 W. | —                                    | H.  | —                              |
| Kent :—  |       |         |                                      |   |                                |
| Broadstairs ... ..                             | 51 21 | 1 26 E. | —                                    | S.  | —                              |
| Canterbury ... ..                              | 51 16 | 1 5 E.  | 39                                   | D.  | 01                             |
| Chatham ... ..                                 | 51 23 | 0 32 E. | 136                                  | G.  | 99                             |
| Dover ... ..                                   | 51 7  | 1 18 E. | 198                                  | R.  | 96                             |
| Dungeness ... ..                               | 50 55 | 0 58 E. | 26                                   | T.  | 02                             |
| Greenwich ... ..                               | 51 28 | 0 0 E.  | 153                                  | (A.)E.F.  | —                              |
| Kearsney Abbey ... ..                          | 51 8  | 1 17 E. | 100?                                 | R.  | 96                             |
| " Chilton Farm ... ..                          | 51 8  | 1 17 E. | 135                                  | R.  | —                              |
| " Littlestone-on-Sea ... ..                    | 50 59 | 0 59 E. | —                                    | G.S.  | 02                             |
| Margate ... ..                                 | 51 24 | 1 24 E. | 83                                   | S.  | 00                             |
| Sandgate ... ..                                | 51 4  | 1 9 E.  | 56                                   | R.  | 99                             |
| Tunbridge Wells ... ..                         | 51 8  | 0 16 E. | 419                                  | S.  | —                              |
| Sandwich ... ..                                | 51 17 | 1 20 E. | 6                                    | R.  | —                              |



LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued*.

| County and Station.                     | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>supplied.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|---|-------|---------|--------------------------------------|---|--------------------------------|
| 4. MIDLAND COUNTIES— <i>continued</i> . |       |         |                                      |   |                                |
| Worcester :—                            |       |         |                                      |   |                                |
| Rochford ... ..                         | 52 18 | 2 36 W. | 316                                  | C.R.  | 01                             |
| Yorkshire :—                            |       |         |                                      |   |                                |
| Ackworth ... ..                         | 53 39 | 1 20 W. | —                                    | D.  | 02                             |
| Bradford ... ..                         | 53 48 | 1 45 W. | —                                    | F.S.  | 02                             |
| Garforth ... ..                         | 53 48 | 1 22 W. | 195                                  | D.S.  | 02                             |
| Harrogate ... ..                        | 54 0  | 1 33 W. | 480                                  | F.S.  | 02                             |
| Huddersfield ... ..                     | 53 39 | 1 47 W. | —                                    | F.  | 02                             |
| Leeds ... ..                            | 53 48 | 1 33 W. | 132                                  | F.G.  | 02                             |
| Sheffield ... ..                        | 53 23 | 1 29 W. | 429                                  | D.S.  | 02                             |
| Attercliffe ... ..                      | 53 24 | 1 25 W. | —                                    | S.  | 02                             |
| Wakefield ... ..                        | 53 41 | 1 30 W. | 96                                   | E.  | 02                             |
| (See also Districts 2 and 7.)           |       |         |                                      |   |                                |
| 5. ENGLAND, SOUTH, AND ENGLISH CHANNEL. |       |         |                                      |   |                                |
| Berkshire :—                            |       |         |                                      |   |                                |
| Maidenhead ... ..                       | 51 30 | 0 43 W. | 99                                   | G.  | 99                             |
| Reading ... ..                          | 51 26 | 0 57 W. | 261                                  | G.  | —                              |
| Dorset :—                               |       |         |                                      |   |                                |
| Parkstone ... ..                        | 50 43 | 1 56 W. | 197                                  | D.  | 00                             |
| Portland Bill ... ..                    | 50 32 | 2 27 W. | 177                                  | T.  | 01                             |
| Shaftesbury ... ..                      | 51 1  | 2 12 W. | 722                                  | F.  | 01                             |
| Hampshire :—                            |       |         |                                      |   |                                |
| Bournemouth ... ..                      | 50 43 | 1 53 W. | —                                    | S.  | 02                             |
| Haslar ... ..                           | 50 47 | 1 7 W.  | —                                    | H.  | —                              |
| Portsmouth ... ..                       | 50 48 | 1 6 W.  | 11                                   | F.G.S.  | 02                             |
| Osborne ... ..                          | 50 46 | 1 15 W. | 171                                  | G.  | —                              |
| Southampton ... ..                      | 50 55 | 1 24 W. | 78                                   | D.F.S.  | 02                             |
| Swarraton ... ..                        | 51 8  | 1 11 W. | 310                                  | F.  | 00                             |
| Totland Bay ... ..                      | 50 41 | 1 33 W. | 84                                   | G.  | 00                             |
| Ventnor ... ..                          | 50 36 | 1 13 W. | 80                                   | G.S.  | 97                             |
| Yarmouth, I. of Wight ...               | 50 42 | 1 29 W. | —                                    | H.  | —                              |
| Kent :—                                 |       |         |                                      |   |                                |
| Broadstairs ... ..                      | 51 21 | 1 26 E. | —                                    | S.  | —                              |
| Canterbury ... ..                       | 51 16 | 1 5 E.  | 39                                   | D.  | 01                             |
| Chatham ... ..                          | 51 23 | 0 32 E. | 136                                  | G.  | 99                             |
| Dover ... ..                            | 51 7  | 1 18 E. | 198                                  | R.  | 96                             |
| Dungeness ... ..                        | 50 55 | 0 58 E. | 26                                   | T.  | 02                             |
| Greenwich ... ..                        | 51 28 | 0 0 E.  | 155                                  | (A.)E.F.  | —                              |
| Kearsney Abbey ... ..                   | 51 8  | 1 17 E. | 100 ?                                | R.  | 96                             |
| Chilton Farm ... ..                     | 51 8  | 1 17 E. | 135                                  | R.  | —                              |
| Littlestone-on-Sea ... ..               | 50 59 | 0 59 E. | —                                    | G.S.  | 02                             |
| Margate ... ..                          | 51 24 | 1 24 E. | 83                                   | S.  | 00                             |
| Sandgate ... ..                         | 51 4  | 1 9 E.  | 56                                   | R.  | 99                             |
| Tunbridge Wells ... ..                  | 51 8  | 0 16 E. | 419                                  | S.  | —                              |
| Sandwich ... ..                         | 51 17 | 1 20 E. | 6                                    | R.  | —                              |

LIST OF STATIONS ARRANGED ACCORDING TO DISTRICT AND COUNTIES—*continued*.

| County and Station.  | Lat.    | Long.     | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See p. 51.</i> | Year<br>of last<br>inspec-<br>tion. |
|--|---------|-----------|--------------------------------------|---|-------------------------------------|
| 5. ENGLAND, SOUTH, AND ENGLISH CHANNEL— <i>continued</i> .         |         |           |                                      |   |                                     |
| Middlesex :—   |         |           |                                      |   |                                     |
| London, Camden Square...   | 51° 33' | 0° 8' W.  | 110                                  | D.  | —                                   |
| „ Chelsea ...  | 51° 29' | 0° 10' W. | —                                    | R.  | —                                   |
| „ City ...   | 51° 31' | 0° 5' W.  | 80                                   | S.  | —                                   |
| „ Hampstead...   | 51° 34' | 0° 10' W. | —                                    | C.  | —                                   |
| „ Pall Mall ...  | 51° 30' | 0° 7' W.  | —                                    | C.  | —                                   |
| „ Westminster ...  | 51° 30' | 0° 8' W.  | 76                                   | C.C. <sup>1</sup> G.  | —                                   |
| „ „ Training College   | 51° 30' | 0° 8' W.  | —                                    | S   | —                                   |
| Surrey :—  |         |           |                                      |   |                                     |
| Bramley ...  | 51° 11' | 0° 33' W. | 148                                  | D.  | 00                                  |
| Brixton ...  | 51° 27' | 0° 8' W.  | 77                                   | T.  | 02                                  |
| Caterham ...   | 51° 17' | 0° 5' W.  | 609!                                 | G.  | —                                   |
| Croydon ...  | 51° 22' | 0° 6' W.  | 185                                  | G.  | —                                   |
| Kew ...  | 51° 28' | 0° 19' W. | 18                                   | A.  | —                                   |
| W Norwood ...  | 51° 26' | 0° 6' W.  | 220                                  | E.  | —                                   |
| Sussex :—  |         |           |                                      |   |                                     |
| Bognor ...   | 50° 47' | 0° 40' W. | —                                    | S.  | —                                   |
| „ ...  | 50° 47' | 0° 40' W. | 11                                   | G.  | —                                   |
| Brighton ...   | 50° 49' | 0° 8' W.  | 65                                   | F.S.  | 96                                  |
| Cuckfield ...  | 51° 1'  | 0° 9' W.  | 389                                  | R.  | 97                                  |
| Eastbourne ...   | 50° 46' | 0° 17' E. | 39                                   | D.S.  | 00                                  |
| „ ...  | 50° 44' | 0° 19' E. | 12                                   | G.  | —                                   |
| Forest Row ...   | 51° 7'  | 0° 2' E.  | 619                                  | R.  | —                                   |
| Hastings ...   | 50° 51' | 0° 34' E. | 149!                                 | R.  | 00                                  |
| „ Waterworks ...   | 50° 51' | 0° 34' E. | —                                    | S.  | 00                                  |
| St. Leonards ...   | 50° 51' | 0° 33' E. | 178                                  | D.F.  | 00                                  |
| „ West Marina...   | 50° 51' | 0° 32' E. | —                                    | G.  | 00                                  |
| Watgate Park ...   | 50° 56' | 0° 55' W. | 236                                  | S.  | 99                                  |
| Westbourne ...   | 50° 52' | 0° 55' W. | 30                                   | S.  | 99                                  |
| Worthing ...   | 50° 49' | 0° 22' W. | 38                                   | S.  | 99                                  |
| Wilts :—   |         |           |                                      |   |                                     |
| Salisbury ...  | 51° 4'  | 1° 51' W. | 186                                  | D.  | 02                                  |
| Marlborough ...  | 51° 25' | 1° 44' W. | 424                                  | S.  | —                                   |
| Channel Islands :—   |         |           |                                      |   |                                     |
| Jersey :—  |         |           |                                      |   |                                     |
| St. Aubin's ...  | 49° 12' | 2° 11' W. | 25                                   | T.  | 02                                  |
| St. Helier's ...   | 49° 11' | 2° 6' W.  | —                                    | S.  | 02                                  |
| Guernsey :—  |         |           |                                      |   |                                     |
| St. Peter Port ...   | 49° 27' | 2° 32' W. | 180                                  | S.  | 00                                  |
| „ Fort Road ...  | 49° 27' | 2° 31' W. | 297                                  | D.S.  | —                                   |
| 6. SCOTLAND, WEST (INCLUDING PART OF CUMBERLAND), AND ISLE OF MAN. |         |           |                                      |   |                                     |
| Argyleshire :—   |         |           |                                      |   |                                     |
| Crinan Harbour ...   | 56° 6'  | 5° 33' W. | 20                                   | G.  | —                                   |
| Grunline, Isle of Mull ...   | —       | —         | 100                                  | R.  | —                                   |
| Laudale ...  | 56° 41' | 5° 41' W. | 14                                   | D.F.  | 01                                  |
| Machrihanish ...   | 55° 25' | 5° 45' W. | 16                                   | G.  | 95                                  |
| SPoltalloch ...  | 56° 8'  | 5° 30' W. | 132                                  | E.  | 02                                  |



LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.  | Lat.    | Long.    | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>supplied.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|--|---------|----------|--------------------------------------|---|--------------------------------|
| 5. ENGLAND, SOUTH, AND ENGLISH CHANNEL— <i>continued.</i>          |         |          |                                      |   |                                |
| Middlesex :—   |         |          |                                      |   |                                |
| London, Camden Square...   | 51° 33' | 0° 8' W. | 110                                  | D.  | —                              |
| " Chelsea ...  | 51 29   | 0 10 W.  | —                                    | R.  | —                              |
| " City ...   | 51 31   | 0 5 W.   | 80                                   | S.  | —                              |
| " Hampstead...   | 51 34   | 0 10 W.  | —                                    | C.  | —                              |
| " Pall Mall ...  | 51 30   | 0 7 W.   | —                                    | C.  | —                              |
| " Westminster ...  | 51 30   | 0 8 W.   | 76                                   | C.C. & G.   | —                              |
| " " Training College   | 51 30   | 0 8 W.   | —                                    | S.  | —                              |
| Surrey :—  |         |          |                                      |   |                                |
| Bramley ...  | 51 11   | 0 33 W.  | 148                                  | D.  | 00                             |
| Brixton ...  | 51 27   | 0 8 W.   | 77                                   | T.  | 02                             |
| Caterham ...   | 51 17   | 0 5 W.   | 609?                                 | G.  | —                              |
| Croydon ...  | 51 22   | 0 6 W.   | 185                                  | G.  | —                              |
| Kew ...  | 51 28   | 0 19 W.  | 18                                   | A.  | —                              |
| Putney Norwood ...   | 51 26   | 0 6 W.   | 220                                  | E.  | —                              |
| Sussex :—  |         |          |                                      |   |                                |
| Bognor ...   | 50 47   | 0 40 W.  | —                                    | S.  | —                              |
| " ...  | 50 47   | 0 40 W.  | 11                                   | G.  | —                              |
| Brighton ...   | 50 49   | 0 8 W.   | 65                                   | F.S.  | 96                             |
| Cuckfield ...  | 51 1    | 0 9 W.   | 389                                  | R.  | 97                             |
| Eastbourne ...   | 50 46   | 0 17 E.  | 39                                   | D.S.  | 00                             |
| " ...  | 50 44   | 0 19 E.  | 12                                   | G.  | —                              |
| Forest Row ...   | 51 7    | 0 2 E.   | 619                                  | R.  | —                              |
| Hastings ...   | 50 51   | 0 34 E.  | 149?                                 | R.  | 00                             |
| " Waterworks ...   | 50 51   | 0 34 E.  | —                                    | S.  | 00                             |
| St. Leonards ...   | 50 51   | 0 33 E.  | 178                                  | D.F.  | 00                             |
| " West Marina...   | 50 51   | 0 32 E.  | —                                    | G.  | 00                             |
| Watergate Park ...   | 50 56   | 0 55 W.  | 236                                  | S.  | 99                             |
| Westbourne ...   | 50 52   | 0 55 W.  | 30                                   | S.  | 99                             |
| Worthing ...   | 50 49   | 0 22 W.  | 38                                   | S.  | 99                             |
| Wilts :—   |         |          |                                      |   |                                |
| Salisbury ...  | 51 4    | 1 51 W.  | 186                                  | D.  | 02                             |
| Marlborough ...  | 51 25   | 1 44 W.  | 424                                  | S.  | —                              |
| Channel Islands :—   |         |          |                                      |   |                                |
| Jersey :—  |         |          |                                      |   |                                |
| St. Aubin's ...  | 49 12   | 2 11 W.  | 25                                   | T.  | 02                             |
| St. Helier's ...   | 49 11   | 2 6 W.   | —                                    | S.  | 02                             |
| Guernsey :—  |         |          |                                      |   |                                |
| St. Peter Port ...   | 49 27   | 2 32 W.  | 180                                  | S.  | 00                             |
| " Fort Road ...  | 49 27   | 2 31 W.  | 297                                  | D.S.  | —                              |
| 6. SCOTLAND, WEST (INCLUDING PART OF CUMBERLAND), AND ISLE OF MAN. |         |          |                                      |   |                                |
| Argyleshire :—   |         |          |                                      |   |                                |
| Crinan Harbour ...   | 56 6    | 5 33 W.  | 20                                   | G.  | —                              |
| Gruline, Isle of Mull ...  | —       | —        | 100                                  | R.  | —                              |
| Laudale ...  | 56 41   | 5 41 W.  | 14                                   | D.F.  | 01                             |
| Machrihanish ...   | 55 25   | 5 45 W.  | 16                                   | G.  | 95                             |
| Poltalloch ...   | 56 8    | 5 30 W.  | 132                                  | E.  | 02                             |



LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.  | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|--|-------|---------|--------------------------------------|---|--------------------------------|
| 6. SCOTLAND, WEST (INCLUDING PART OF CUMBERLAND), AND ISLE OF MAN— <i>continued.</i> |       |         |                                      |   |                                |
| Ayr :—   |       |         |                                      |   |                                |
| Ballantrae ... ..  | 55 6  | 5 6 W.  | —                                    | W.  | —                              |
| *Pinmore ... ..  | 55 12 | 4 49 W. | 187                                  | E.  | 02                             |
| Bute :—  |       |         |                                      |   |                                |
| Lamlash ... ..   | 55 32 | 5 8 W.  | —                                    | H.W.  | —                              |
| *Rothesay ... ..   | 55 50 | 5 4 W.  | 115                                  | E.  | 02                             |
| Cumberland :—  |       |         |                                      |   |                                |
| Aspatia ... ..   | 54 46 | 3 21 W. | 250                                  | D.S.  | 01                             |
| (See also District 7.)   |       |         |                                      |   |                                |
| Dumbarton :—   |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Dumfries :—  |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Kirkcudbright :—   |       |         |                                      |   |                                |
| *Cally ... ..  | 54 52 | 4 12 W. | 120                                  | E.F.  | 02                             |
| *Cargen ... ..   | 55 2  | 3 37 W. | 72                                   | E.  | 02                             |
| Lanark :—  |       |         |                                      |   |                                |
| Glasgow ... ..   | 55 53 | 4 18 W. | 180                                  | A.D.F.  | 02                             |
| Peebles :—   |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Renfrew :—   |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Stirling :—  |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Wigton :—  |       |         |                                      |   |                                |
| Stranraer ... ..   | 54 54 | 5 2 W.  | —                                    | H.  | —                              |
| Isle of Man :—   |       |         |                                      |   |                                |
| Cronkbourne ... ..   | 54 10 | 4 29 W. | 137                                  | D.F.S.  | 01                             |
| 7. ENGLAND, NORTH WEST, AND NORTH WALES.   |       |         |                                      |   |                                |
| Cheshire :—  |       |         |                                      |   |                                |
| Bidston ... ..   | 53 24 | 3 4 W.  | 188                                  | (A.) D.T.   | 01                             |
| Chester, Hawarden Bridge ...   | 53 12 | 3 1 W.  | 22                                   | F.C.  | 02                             |
| Hoylake ... ..   | 53 23 | 3 12 W. | 307                                  | S.  | 02                             |
| Cumberland :—  |       |         |                                      |   |                                |
| Carlisle ... ..  | 54 53 | 2 57 W. | 111                                  | D.  | 02                             |
| Newton Reigny ... ..   | 54 41 | 2 48 W. | 579                                  | C.F.S.T.  | 01                             |
| (See also District 6.)   |       |         |                                      |   |                                |

## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

| County and Station.  | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>supplied.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|--|-------|---------|--------------------------------------|---|--------------------------------|
| 6. SCOTLAND, WEST (INCLUDING PART OF CUMBERLAND), AND ISLE OF MAN—continued. |       |         |                                      |   |                                |
| Ayr:—  |       |         |                                      |   |                                |
| Ballantrae ... ..  | 55 6  | 5 0 W.  | —                                    | W.  | —                              |
| §Pinmore ... ..  | 55 12 | 4 49 W. | 187                                  | E.  | 02                             |
| Bute:—   |       |         |                                      |   |                                |
| Lamlash .. ...   | 55 32 | 5 8 W.  | —                                    | H.W.  | —                              |
| §Rothesay ... ..   | 55 50 | 5 4 W.  | 115                                  | E.  | 02                             |
| Cumberland:—   |       |         |                                      |   |                                |
| Aspatia ... ..   | 54 46 | 3 21 W. | 250                                  | D.S.  | 01                             |
| (See also District 7.)   |       |         |                                      |   |                                |
| Dumbarton:—  |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Dumfries:—   |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Kirkcudbright:—  |       |         |                                      |   |                                |
| §Cally ... ..  | 54 52 | 4 12 W. | 120                                  | E.F.  | 02                             |
| §Cargen ... ..   | 55 2  | 3 37 W. | 72                                   | E.  | 02                             |
| Lanark:—   |       |         |                                      |   |                                |
| Glasgow ... ..   | 55 53 | 4 18 W. | 180                                  | A.D.F.  | 02                             |
| Peebles:—  |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Renfrew:—  |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Stirling:—   |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Wigton:—   |       |         |                                      |   |                                |
| Stranraer ... ..   | 54 54 | 5 2 W.  | —                                    | H.  | —                              |
| Isle of Man:—  |       |         |                                      |   |                                |
| Cronkbourne ... ..   | 54 10 | 4 29 W. | 137                                  | D.F.S.  | 01                             |
| 7. ENGLAND, NORTH WEST, AND NORTH WALES.                                     |       |         |                                      |   |                                |
| Cheshire:—   |       |         |                                      |   |                                |
| Bidston ... ..   | 53 24 | 3 4 W.  | 188                                  | (A.) D.T.   | 01                             |
| Chester, Hawarden Bridge   | 53 12 | 3 1 W.  | 22                                   | F.C. <sup>1</sup>   | 02                             |
| Hoylake ... ..   | 53 23 | 3 12 W. | 30?                                  | S.  | 02                             |
| Cumberland:—   |       |         |                                      |   |                                |
| Carlisle ... ..  | 54 53 | 2 57 W. | 111                                  | D.  | 02                             |
| Newton Reigny ... ..   | 54 41 | 2 48 W. | 579                                  | C.F.S.T.  | 01                             |
| (See also District 6.)   |       |         |                                      |   |                                |

LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

| County and Station.                                | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|--|-------|---------|--------------------------------------|---|--------------------------------|
| 7. ENGLAND, NORTH WEST, AND NORTH WALES—continued. |       |         |                                      |   |                                |
| Lancashire :—                                      |       |         |                                      |   |                                |
| Blackpool ... ..                                   | 53 48 | 3 3 W.  | 62                                   | F.S.  | 02                             |
| Bolton ... ..                                      | 53 35 | 2 27 W. | 389                                  | G.  | —                              |
| Darwen ... ..                                      | 53 41 | 2 28 W. | 710                                  | G.S.  | 02                             |
| Fleetwood ... ..                                   | 53 56 | 3 1 W.  | —                                    | B.  | 02                             |
| Lytham ... ..                                      | 53 44 | 2 58 W. | 21                                   | G.S.  | 02                             |
| Manchester, Oldham Road ...                        | 53 29 | 2 13 W. | 190                                  | D.S.  | 00                             |
| " Whitworth Park... ..                             | 53 28 | 2 14 W. | 125                                  | D.S.  | 00                             |
| " Prestwich... ..                                  | 53 32 | 2 17 W. | 320                                  | D.F.S.  | 02                             |
| Preston ... ..                                     | 53 46 | 2 42 W. | 148                                  | F.  | 02                             |
| St. Helen's ... ..                                 | 53 28 | 2 45 W. | 151                                  | G.  | 00                             |
| Southport ... ..                                   | 53 39 | 2 59 W. | 37                                   | (A.)G.S.  | 02                             |
| Stonyhurst ... ..                                  | 53 51 | 2 28 W. | 375                                  | A.D.F.  | 02                             |
| Westmorland :—                                     |       |         |                                      |   |                                |
| Casterton ... ..                                   | 54 12 | 2 36 W. | 304                                  | R.  | —                              |
| Yorkshire :—                                       |       |         |                                      |   |                                |
| Aysgarth ... ..                                    | 54 18 | 1 58 W. | 646                                  | D.  | 99                             |
| Halifax (Bermerside) ... ..                        | 53 43 | 1 52 W. | 509                                  | G.  | 02                             |
| " (Pub. Lib.) ... ..                               | 53 43 | 1 52 W. | 624                                  | G.  | 02                             |
| (See also Districts 2 and 4.)                      |       |         |                                      |   |                                |
| Anglesey :—  |       |         |                                      |   |                                |
| Holyhead, Harbour Office ...                       | 53 18 | 4 39 W. | 57                                   | B.W.  | 02                             |
| " Sailor's Home ... ..                             | 53 18 | 4 39 W. | 48                                   | T.  | 02                             |
| Carnarvon :—                                       |       |         |                                      |   |                                |
| Llandudno ... ..                                   | 53 21 | 3 50 W. | 72                                   | E.F.S.  | 01                             |
| Penrhyn Quarry... ..                               | 53 10 | 4 6 W.  | —                                    | R.  | 01                             |
| Denbigh :—   |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Flint :—   |       |         |                                      |   |                                |
| Penbedw ... ..                                     | 53 12 | 3 11 W. | 650                                  | C.  | —                              |
| Rhyl ... ..  | 53 19 | 3 29 W. | —                                    | S.  | 02                             |
| Merioneth :—                                       |       |         |                                      |   |                                |
| Aberdovey ... ..                                   | 52 33 | 4 4 W.  | —                                    | S.  | —                              |
| Montgomery :—                                      |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| (See also District 4.)                             |       |         |                                      |   |                                |
| 8. SOUTH WALES AND ENGLAND, SOUTH WEST.            |       |         |                                      |   |                                |
| Brecknock :—                                       |       |         |                                      |   |                                |
| Llangammarch Wells ... ..                          | 52 7  | 3 34 W. | 550                                  | G.S.  | —                              |
| Cardigan :—  |       |         |                                      |   |                                |
| Aberystwyth ... ..                                 | 52 25 | 4 4 W.  | —                                    | G.  | —                              |



## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

| County and Station.                                | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>supplied.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|--|-------|---------|--------------------------------------|---|--------------------------------|
| 7. ENGLAND, NORTH WEST, AND NORTH WALES—continued. |       |         |                                      |   |                                |
| Lancashire :—                                      |       |         |                                      |   |                                |
| Blackpool ... ..                                   | 53 48 | 3 3 W.  | 62                                   | F.S.  | 02                             |
| Bolton ... ..                                      | 53 35 | 2 27 W. | 389                                  | G.  | —                              |
| Darwen ... ..                                      | 53 41 | 2 28 W. | 710                                  | G.S.  | 02                             |
| Fleetwood ... ..                                   | 53 56 | 3 1 W.  | —                                    | B.  | 02                             |
| Lytham ... ..                                      | 53 44 | 2 58 W. | 21                                   | G.S.  | 02                             |
| Manchester, Oldham Road ...                        | 53 29 | 2 13 W. | 190                                  | D.S.  | 00                             |
| " Whitworth Park...                                | 53 28 | 2 14 W. | 125                                  | D.S.  | 00                             |
| " Prestwich ... ..                                 | 53 32 | 2 17 W. | 320                                  | D.F.S.  | 02                             |
| Preston ... ..                                     | 53 46 | 2 42 W. | 148                                  | F.  | 02                             |
| St. Helen's ... ..                                 | 53 28 | 2 45 W. | 151                                  | G.  | 00                             |
| Southport ... ..                                   | 53 39 | 2 59 W. | 37                                   | (A.) G.S.   | 02                             |
| Stonyhurst ... ..                                  | 53 51 | 2 28 W. | 375                                  | A.D.F.  | 02                             |
| Westmorland :—                                     |       |         |                                      |   |                                |
| Casterton ... ..                                   | 54 12 | 2 36 W. | 304                                  | R.  | —                              |
| Yorkshire :—                                       |       |         |                                      |   |                                |
| Aysgarth ... ..                                    | 54 18 | 1 58 W. | 646                                  | D.  | 99                             |
| Halifax (Bermerside) ... ..                        | 53 43 | 1 52 W. | 500                                  | G.  | 02                             |
| " (Pub. Lib.) ... ..                               | 53 43 | 1 52 W. | 624                                  | G.  | 02                             |
| (See also Districts 2 and 4)                       |       |         |                                      |   |                                |
| Anglesey :—  |       |         |                                      |   |                                |
| Holyhead, Harbour Office ...                       | 53 18 | 4 39 W. | 57                                   | B.W.  | 02                             |
| " Sailor's Home ... ..                             | 53 18 | 4 39 W. | 48                                   | T.  | 02                             |
| Carnarvon :—                                       |       |         |                                      |   |                                |
| Llandudno ... ..                                   | 53 21 | 3 50 W. | 72                                   | E.F.S.  | 01                             |
| Penrhyn Quarry ... ..                              | 53 10 | 4 6 W.  | —                                    | R.  | 01                             |
| Denbigh :—   |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| Flint :—   |       |         |                                      |   |                                |
| Pentredw ... ..                                    | 53 12 | 3 11 W. | 650                                  | C.  | —                              |
| Rhyl ... ..  | 53 19 | 3 29 W. | —                                    | S.  | 02                             |
| Merioneth :—                                       |       |         |                                      |   |                                |
| Aberdovey ... ..                                   | 52 33 | 4 4 W.  | —                                    | S.  | —                              |
| Montgomery :—                                      |       |         |                                      |   |                                |
| No station.  |       |         |                                      |   |                                |
| (See also District 4.)                             |       |         |                                      |   |                                |
| 8. SOUTH WALES AND ENGLAND, SOUTH WEST.            |       |         |                                      |   |                                |
| Brecknock :—                                       |       |         |                                      |   |                                |
| Llangammarch Wells ... ..                          | 52 7  | 3 34 W. | 550                                  | G.S.  | —                              |
| Cardigan :—  |       |         |                                      |   |                                |
| Aberystwyth ... ..                                 | 52 25 | 4 4 W.  | —                                    | G.  | —                              |

LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.   | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|---|-------|---------|--------------------------------------|---|--------------------------------|
| <b>8. SOUTH WALES AND ENGLAND,<br/>SOUTH WEST—<i>continued.</i></b> |       |         |                                      |   |                                |
| Carmarthen :—   |       |         |                                      |   |                                |
| Llandovery ... ..   | 51 59 | 3 48 W. | 217                                  | F.  | 01                             |
| Glamorgan :—  |       |         |                                      |   |                                |
| Port Talbot ... ..  | 51 34 | 3 45 W. | —                                    | R.S.  | 00                             |
| Pembroke :—   |       |         |                                      |   |                                |
| Haverfordwest ... ..  | 51 48 | 4 58 W. | —                                    | S.  | 01                             |
| St. Ann's Head ... ..   | 51 41 | 5 30 W. | 150                                  | S.T.W.  | 02                             |
| St. David's ... ..  | 51 53 | 5 16 W. | 215                                  | D.  | 01                             |
| Tenby ... ..  | 51 41 | 4 42 W. | 79                                   | S.  | 00                             |
| Radnor :—   |       |         |                                      |   |                                |
| Disserth ... ..   | 52 13 | 3 24 W. | 711                                  | R.  | 00                             |
| Cornwall :—   |       |         |                                      |   |                                |
| Falmouth... ..  | 50 9  | 5 4 W.  | 167                                  | A.F.  | 02                             |
| " Pendennis Castle ... ..   | 50 8  | 5 3 W.  | —                                    | B.  | 02                             |
| Newquay ... ..  | 50 25 | 5 4 W.  | 250                                  | S.  | 02                             |
| " ... ..  | 50 25 | 5 5 W.  | —                                    | W.  | —                              |
| Scilly ... ..   | 49 56 | 6 18 W. | 65                                   | B.C.S.  | 02                             |
| Truro ... ..  | 50 17 | 5 4 W.  | 83                                   | T.W.<br>G.  | 02                             |
| Devonshire :—   |       |         |                                      |   |                                |
| Arlington Court... ..   | 51 8  | 3 58 W. | 613                                  | F.  | 01                             |
| Barnstaple ... ..   | 51 5  | 4 4 W.  | 24                                   | G.  | 02                             |
| in Cullompton ... ..  | 50 51 | 3 23 W. | 202                                  | F.S.  | 01                             |
| Plymouth ... ..   | 50 22 | 4 8 W.  | 116                                  | D.F.S.  | 02                             |
| in Rousdon ... ..   | 50 43 | 3 0 W.  | 515                                  | E.  | 01                             |
| Salcombe ... ..   | 50 14 | 3 46 W. | —                                    | S.  | —                              |
| " ... ..  | 50 14 | 3 46 W. | —                                    | W.  | —                              |
| Torquay ... ..  | 50 28 | 3 31 W. | 286                                  | S.  | 00                             |
| in Whitchurch ... ..  | 50 32 | 4 6 W.  | 593                                  | E.  | 01                             |
| in Woolacombe ... ..  | 51 10 | 4 12 W. | 59                                   | D.  | 01                             |
| Gloucester :—   |       |         |                                      |   |                                |
| Bristol, Overcourt Park ... ..                                      | 51 32 | 2 35 W. | —                                    | F.  | 02                             |
| " Clifton College ... ..  | 51 27 | 2 37 W. | 230                                  | F.  | 00                             |
| (See also District 4.)  |       |         |                                      |   |                                |
| Monmouth :—   |       |         |                                      |   |                                |
| Abersychan ... ..   | 51 44 | 3 5 W.  | 688                                  | R.  | —                              |
| Newchurch ... ..  | 51 41 | 2 48 W. | —                                    | R.  | —                              |
| Newport ... ..  | 51 35 | 3 0 W.  | —                                    | R.  | 00                             |
| Pant-y-reos ... ..  | 51 38 | 3 4 W.  | 449                                  | R.  | 00                             |
| Ynis-y-bro ... ..   | 51 38 | 3 3 W.  | 115                                  | R.  | 00                             |
| Somerset :—   |       |         |                                      |   |                                |
| Bath ... ..   | 51 23 | 2 21 W. | 66                                   | G.T.S.  | 01                             |
| Simonsbath ... ..   | 51 8  | 3 45 W. | 1,099                                | R.  | —                              |



LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.  | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>supplied.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|--|-------|---------|--------------------------------------|---|--------------------------------|
| 8. SOUTH WALES AND ENGLAND,<br>SOUTH WEST— <i>continued.</i> |       |         |                                      |   |                                |
| Carmarthen :—<br>Llandovery ... ..                           | 51 59 | 3 48 W. | 217                                  | F.  | 01                             |
| Glamorgan :—<br>Port Talbot ... ..                           | 51 34 | 3 45 W. | —                                    | R.S.  | 00                             |
| Pembroke :—<br>Haverfordwest ... ..                          | 51 48 | 4 58 W. | —                                    | S.  | 01                             |
| St. Ann's Head ... ..  | 51 41 | 5 30 W. | 150                                  | S.T.W.  | 02                             |
| St. David's ... ..   | 51 53 | 5 16 W. | 215                                  | D.  | 01                             |
| Tenby ... ..   | 51 41 | 4 42 W. | 79                                   | S.  | 00                             |
| Radnor :—<br>Disserth ... ..                                 | 52 13 | 3 24 W. | 711                                  | R.  | 00                             |
| Cornwall :—<br>Falmouth... ..                                | 50 9  | 5 4 W.  | 167                                  | A.F.  | 02                             |
| " Pendennis Castle ... ..                                    | 50 8  | 5 3 W.  | —                                    | B.  | 02                             |
| Newquay ... ..   | 50 25 | 5 4 W.  | 250?                                 | S.  | 02                             |
| " ... ..   | 50 25 | 5 5 W.  | —                                    | W.  | —                              |
| Scilly ... ..  | 49 56 | 6 18 W. | 65                                   | B.C.S.  | 02                             |
| Truro ... ..   | 50 17 | 5 4 W.  | 83                                   | T.W.<br>G.  | 02                             |
| Devonshire :—<br>Arlington Court... ..                       | 51 8  | 3 58 W. | 613                                  | F.  | 01                             |
| Barnstaple ... ..  | 51 5  | 4 4 W.  | 24                                   | G.  | 02                             |
| W Cullompton ... ..  | 50 51 | 3 23 W. | 202                                  | F.S.  | 01                             |
| Plymouth ... ..  | 50 22 | 4 8 W.  | 116                                  | D.F.S.  | 02                             |
| W Rousdon ... ..   | 50 43 | 3 0 W.  | 515                                  | E.  | 01                             |
| Salcombe ... ..  | 50 14 | 3 46 W. | —                                    | S.  | —                              |
| " ... ..   | 50 14 | 3 46 W. | —                                    | W.  | —                              |
| Torquay ... ..   | 50 28 | 3 31 W. | 286                                  | S.  | 00                             |
| W Whitechurch ... ..   | 50 32 | 4 6 W.  | 593                                  | E.  | 01                             |
| W Woolacomb ... ..   | 51 10 | 4 12 W. | 59                                   | D.  | 01                             |
| Gloucester :—<br>Bristol, Overcourt Park ... ..              | 51 32 | 2 35 W. | —                                    | F.  | 02                             |
| " Clifton College ... ..                                     | 51 27 | 2 37 W. | 230                                  | F.  | 00                             |
| Monmouth :—<br>Abersychan ... ..                             | 51 44 | 3 5 W.  | 688                                  | R.  | —                              |
| Newchurch ... ..   | 51 41 | 2 48 W. | —                                    | R.  | —                              |
| Newport ... ..   | 51 35 | 3 0 W.  | —                                    | R.  | 00                             |
| Pant-y-reos ... ..   | 51 38 | 3 4 W.  | 449                                  | R.  | 00                             |
| Ynis-y-bro ... ..  | 51 38 | 3 3 W.  | 115                                  | R.  | 00                             |
| Somerset :—<br>Bath ... ..                                   | 51 23 | 2 21 W. | 66                                   | G.T.S.  | 01                             |
| Simonsbath ... ..  | 51 8  | 3 45 W. | 1,099                                | R.  | —                              |



LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.   | Lat.  | Long    | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See</i> p. 51. | Year<br>of last<br>inspec-<br>tion. |
|-----------------------|-------|---------|--------------------------------------|---|-------------------------------------|
| 9. IRELAND, NORTH.    |       |         |                                      |   |                                     |
| Antrim :—             |       |         |                                      |   |                                     |
| Belfast ... ..        | 54 35 | 5 56 W. | 61                                   | D.  | 02                                  |
| Glenarm ... ..        | 54 58 | 5 56 W. | 44                                   | R.  | —                                   |
| " ... ..              | 54 55 | 5 56 W. | —                                    | H.  | —                                   |
| Portrush ... ..       | 55 13 | 6 40 W. | —                                    | W.  | —                                   |
| Armagh :—             |       |         |                                      |   |                                     |
| Armagh ... ..         | 54 21 | 6 39 W. | 196                                  | (A.)D.F.  | 02                                  |
| Cavan :—              |       |         |                                      |   |                                     |
| No station.           |       |         |                                      |   |                                     |
| Donegal :—            |       |         |                                      |   |                                     |
| Dunfanaghy ... ..     | 55 11 | 7 58 W. | 39                                   | G.  | —                                   |
| Malin Head ... ..     | 55 23 | 7 24 W. | 230                                  | C.T.  | 02                                  |
| Sheep Haven ... ..    | 55 11 | 7 58 W. | —                                    | W.  | —                                   |
| Teelin ... ..         | 54 38 | 8 39 W. | —                                    | W.  | —                                   |
| Down :—               |       |         |                                      |   |                                     |
| Donaghadee ... ..     | 54 38 | 5 32 W. | 40                                   | T.  | 02                                  |
| Fermanagh :—          |       |         |                                      |   |                                     |
| No station.           |       |         |                                      |   |                                     |
| Galway :—             |       |         |                                      |   |                                     |
| Cleggan ... ..        | 53 33 | 10 8 W. | —                                    | W.  | —                                   |
| Recess ... ..         | 53 28 | 9 44 W. | 90                                   | R.  | —                                   |
| Spiddal ... ..        | 53 15 | 9 17 W. | —                                    | H.  | 90                                  |
| Leitrim :—            |       |         |                                      |   |                                     |
| Carrigallen ... ..    | 53 58 | 7 38 W. | 3507                                 | R.  | —                                   |
| Londonderry :—        |       |         |                                      |   |                                     |
| No station.           |       |         |                                      |   |                                     |
| Longford :—           |       |         |                                      |   |                                     |
| No station.           |       |         |                                      |   |                                     |
| Louth :—              |       |         |                                      |   |                                     |
| No station.           |       |         |                                      |   |                                     |
| Mayo :—               |       |         |                                      |   |                                     |
| Ballyglass ... ..     | 54 17 | 9 52 W. | —                                    | W.  | —                                   |
| Blacksod Point ... .. | 54 6  | 10 4 W. | 37                                   | T.W.  | 02                                  |
| Mallaranny ... ..     | 53 55 | 9 40 W. | 119                                  | R.  | 02                                  |
| Meath :—              |       |         |                                      |   |                                     |
| No station.           |       |         |                                      |   |                                     |
| Monaghan :—           |       |         |                                      |   |                                     |
| No station.           |       |         |                                      |   |                                     |
| Sligo :—              |       |         |                                      |   |                                     |
| Markree Castle ... .. | 54 11 | 8 27 W. | 122                                  | D.F.S.  | 02                                  |

## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

| County and Station.   | Lat.  | Long    | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>supplied.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|-----------------------|-------|---------|--------------------------------------|---|--------------------------------|
| 9. IRELAND, NORTH.    |       |         |                                      |   |                                |
| Antrim :—             |       |         |                                      |   |                                |
| Belfast ... ..        | 54 35 | 5 56 W. | 61                                   | D.  | 02                             |
| Glenarm ... ..        | 54 58 | 5 56 W. | 44                                   | R.  | —                              |
| " ... ..              | 54 55 | 5 56 W. | —                                    | H.  | —                              |
| Portrush ... ..       | 55 13 | 6 40 W. | —                                    | W.  | —                              |
| Armagh :—             |       |         |                                      |   |                                |
| Armagh ... ..         | 54 21 | 6 39 W. | 196                                  | (A.)D.F.  | 02                             |
| Cavan :—              |       |         |                                      |   |                                |
| No station.           |       |         |                                      |   |                                |
| Donegal :—            |       |         |                                      |   |                                |
| Dunfanaghy ... ..     | 55 11 | 7 58 W. | 39                                   | G.  | —                              |
| Malin Head ... ..     | 55 23 | 7 24 W. | 230                                  | C.T.  | 02                             |
| Sheep Haven ... ..    | 55 11 | 7 58 W. | —                                    | W.  | —                              |
| Teelin ... ..         | 54 38 | 8 39 W. | —                                    | W.  | —                              |
| Down :—               |       |         |                                      |   |                                |
| Donaghadee ... ..     | 54 38 | 5 32 W. | 40                                   | T.  | 02                             |
| Fermanagh :—          |       |         |                                      |   |                                |
| No station.           |       |         |                                      |   |                                |
| Galway :—             |       |         |                                      |   |                                |
| Cleggan ... ..        | 53 33 | 10 8 W. | —                                    | W.  | —                              |
| Recess ... ..         | 53 28 | 9 44 W. | 90                                   | R.  | —                              |
| Spiddal ... ..        | 53 15 | 9 17 W. | —                                    | H.  | 90                             |
| Leitrim :—            |       |         |                                      |   |                                |
| Carrigallen ... ..    | 53 58 | 7 38 W. | 3501                                 | R.  | —                              |
| Londonderry :—        |       |         |                                      |   |                                |
| No station.           |       |         |                                      |   |                                |
| Longford :—           |       |         |                                      |   |                                |
| No station.           |       |         |                                      |   |                                |
| Louth :—              |       |         |                                      |   |                                |
| No station.           |       |         |                                      |   |                                |
| Mayo :—               |       |         |                                      |   |                                |
| Ballyglass ... ..     | 54 17 | 9 52 W. | —                                    | W.  | —                              |
| Blacksod Point ... .. | 54 6  | 10 4 W. | 37                                   | T.W.  | 02                             |
| Mallaranny ... ..     | 53 55 | 9 40 W. | 119                                  | R.  | 02                             |
| Meath :—              |       |         |                                      |   |                                |
| No station.           |       |         |                                      |   |                                |
| Monaghan :—           |       |         |                                      |   |                                |
| No station.           |       |         |                                      |   |                                |
| Sligo :—              |       |         |                                      |   |                                |
| Markree Castle ... .. | 54 11 | 8 27 W. | 122                                  | D.F.S.  | 02                             |

LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.                  | Lat.  | Long.    | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|--------------------------------------|-------|----------|--------------------------------------|---|--------------------------------|
| 9. IRELAND, NORTH— <i>continued.</i> |       |          |                                      |   |                                |
| Tyrone :—                            |       |          |                                      |   |                                |
| Edenfel, Omagh ... ..                | 54 36 | 7 19 W.  | 300                                  | F.  | 00                             |
| Lissan ... ..                        | 54 41 | 6 45 W.  | 300                                  | E.  | 98                             |
| Westmeath :—                         |       |          |                                      |   |                                |
| No station.                          |       |          |                                      |   |                                |
| 10. IRELAND, SOUTH.                  |       |          |                                      |   |                                |
| Carlow :—                            |       |          |                                      |   |                                |
| No station.                          |       |          |                                      |   |                                |
| Clare :—                             |       |          |                                      |   |                                |
| Ennis ... ..                         | 52 51 | 8 59 W.  | 38                                   | R.  | —                              |
| Ennistymon ... ..                    | 52 57 | 9 17 W.  | 131                                  | R.  | —                              |
| Hurdlestown ... ..                   | 52 48 | 8 38 W.  | 157                                  | R.  | —                              |
| Kiloredane ... ..                    | 52 35 | 9 47 W.  | —                                    | W.  | —                              |
| Lahinch ... ..                       | 52 55 | 9 21 W.  | 52                                   | R.  | 99                             |
| Liscannor ... ..                     | 52 56 | 9 23 W.  | —                                    | W.  | —                              |
| Mount Callan ... ..                  | 52 53 | 9 16 W.  | 479                                  | R.  | 98                             |
| Newmarket-on-Fergus ... ..           | 52 46 | 8 53 W.  | —                                    | R.  | 98                             |
| Seafeld ... ..                       | 52 48 | 9 30 W.  | —                                    | W.  | —                              |
| Cork :—                              |       |          |                                      |   |                                |
| Baltimore ... ..                     | 51 28 | 9 22 W.  | —                                    | H.  | 90                             |
| Crookhaven ... ..                    | 51 28 | 9 43 W.  | —                                    | H.  | 90                             |
| Crosshaven ... ..                    | 51 48 | 8 18 W.  | —                                    | H.  | 01                             |
| Doneraile ... ..                     | 52 13 | 8 34 W.  | 266                                  | R.  | —                              |
| Lawrence Cove ... ..                 | 51 17 | 9 49 W.  | —                                    | H.  | —                              |
| Roche's Point ... ..                 | 51 47 | 8 15 W.  | 42                                   | T.  | 02                             |
| Schull ... ..                        | 51 32 | 9 32 W.  | —                                    | H.  | 90                             |
| Union Hall ... ..                    | 51 33 | 9 8 W.   | —                                    | H.  | 90                             |
| Dublin :—                            |       |          |                                      |   |                                |
| Dublin City ... ..                   | 53 20 | 6 15 W.  | 47                                   | D.F.  | 01                             |
| „ Phoenix Park ... ..                | 53 22 | 6 21 W.  | 155                                  | B.D.S.  | 02                             |
| „ Botanic Gardens ... ..             | 53 23 | 6 16 W.  | 67                                   | D.  | 02                             |
| Killiney ... ..                      | 53 16 | 6 7 W.   | 249                                  | R.  | 95                             |
| Kingstown ... ..                     | 53 17 | 6 8 W.   | —                                    | G.S.  | 02                             |
| „ Harbour ... ..                     | 53 17 | 6 8 W.   | —                                    | B.  | 02                             |
| „ Sandy Cove ... ..                  | 53 17 | 6 8 W.   | —                                    | W.  | —                              |
| Galway :—                            |       |          |                                      |   |                                |
| Arran ... ..                         | 53 6  | 9 40 W.  | —                                    | H.W.  | —                              |
| Kerry :—                             |       |          |                                      |   |                                |
| Killarney ... ..                     | 52 4  | 9 30 W.  | 174                                  | F.  | 02                             |
| Minard ... ..                        | 52 7  | 10 8 W.  | —                                    | W.  | —                              |
| Valencia ... ..                      | 51 56 | 10 15 W. | 30                                   | A.C.T.  | 02                             |
| „ Glanleam ... ..                    | 51 56 | 10 20 W. | —                                    | R.  | 01                             |
| „ Knightstown ... ..                 | 51 55 | 10 20 W. | —                                    | H.  | 01                             |
| Kildare :—                           |       |          |                                      |   |                                |
| No station.                          |       |          |                                      |   |                                |



LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued.*

| County and Station.                   | Lat.  | Long.   | Height<br>in feet<br>above<br>M.S.L. | Nature of<br>Infor-<br>mation<br>received.<br><i>See p. 51.</i> | Year<br>of last<br>Inspection. |
|---------------------------------------|-------|---------|--------------------------------------|---|--------------------------------|
| 10. IRELAND, SOUTH— <i>continued.</i> |       |         |                                      |   |                                |
| Kilkenny :—                           |       |         |                                      |   |                                |
| Kilkenny ... ..                       | 52 39 | 7 14 W. | 212                                  | C.F.  | 99                             |
| King's County :—                      |       |         |                                      |   |                                |
| Birr Castle...                        | 53 6  | 7 55 W. | 175                                  | D.S.T.  | 02                             |
| Limerick :—                           |       |         |                                      |   |                                |
| Corbally ... ..                       | 52 39 | 8 36 W. | 59                                   | R.  | 02                             |
| Foynes ... ..                         | 52 37 | 9 7 W.  | 108                                  | F.  | 02                             |
| Roxborough ... ..                     | 52 35 | 8 36 W. | 111                                  | R.  | 02                             |
| Queen's County :—                     |       |         |                                      |   |                                |
| No station.                           |       |         |                                      |   |                                |
| Roscommon :—                          |       |         |                                      |   |                                |
| No station.                           |       |         |                                      |   |                                |
| Tipperary :—                          |       |         |                                      |   |                                |
| No station.                           |       |         |                                      |   |                                |
| Waterford :—                          |       |         |                                      |   |                                |
| Waterford ... ..                      | 52 16 | 7 7 W.  | —                                    | C.  | 02                             |
| " ... ..                              | 52 16 | 7 7 W.  | —                                    | F.  | —                              |
| Wexford :—                            |       |         |                                      |   |                                |
| No station.                           |       |         |                                      |   |                                |
| Wicklow :—                            |       |         |                                      |   |                                |
| Bray ... ..                           | 53 12 | 6 6 W.  | —                                    | H.  | —                              |
| Newcastle ... ..                      | 53 5  | 6 6 W.  | 256                                  | D.  | 02                             |
| Wicklow ... ..                        | 52 58 | 6 2 W.  | —                                    | H.  | —                              |

### LIST OF OBSERVERS AT THE STATIONS OF THE SEVERAL ORDERS.

| Name of Station.                                | Observer.   |
|---|---|
| <b>GROUP A.—OBSERVATORIES.</b>                  |   |
| Aberdeen ... ..                                 | Professor C. Niven, F.R.S., for the Meteorological Council.   |
| <sup>1</sup> Armagh... ..                       | J. L. E. Dreyer, Ph.D., for the Meteorological Council.   |
| <sup>2</sup> Ben Nevis ... ..                   | A. Rankin, for Directors of Ben Nevis Observatory.  |
| <sup>2</sup> Bidston ... ..                     | W. E. Plummer, F.R.A.S., for the Mersey Docks and Harbour Board.  |
| Falmouth ... ..                                 | E. Kitto, for the Meteorological Council.   |
| <sup>3</sup> Fort William ... ..                | A. Rankin, for the Meteorological Council.  |
| Glasgow... ..                                   | Professor L. Becker, Ph.D., for the Meteorological Council.   |
| Greenwich ... ..                                | The Royal Observatory.  |
| Kew ... ..                                      | C. Chree, D.Sc., F.R.S., Superintendent of the Observatory Department, Natural Physical Laboratory, for the Meteorological Council. |
| Oxford ... ..                                   | The Radcliffe Observatory.  |
| Southport ... ..                                | J. Baxendell, for the Corporation.  |
| Stonyhurst College ... ..                       | Rev. W. Sidgreaves, S.J., for the Meteorological Council.   |
| Valencia ... ..                                 | J. E. Cullum, for the Meteorological Council.   |
| <b>GROUP B.—ADDITIONAL ANEMOGRAPH STATIONS.</b> |   |
| Alnwick Castle... ..                            | Robert Kyle, for the Duke of Northumberland, K.G.   |
| Deerness, Orkney Islands ... ..                 | M. Spence, for the Meteorological Council.  |
| Dublin, Phoenix Park... ..                      | Colonel Haynes, R.E., Ordnance Survey Office.   |
| Falmouth (Pendennis Castle) ... ..              | Coast Guard, for the Meteorological Council.  |
| Fleetwood ... ..                                | The Urban District Council, for the Meteorological Council.   |
| Holyhead, Harbour Office ... ..                 | F. M. Cotton, C.E., for the Meteorological Council.   |
| Kingstown ... ..                                | H.M. Office of Works.   |
| Scilly Islands, St. Mary's ... ..               | A. Hicks, for the Meteorological Council.   |
| Shields, North ... ..                           | T. Robson, for the Meteorological Council.  |
| *Shoeburyness ... ..                            | The Superintendent of Experiments.  |
| Yarmouth ... ..                                 | G. T. Watson, for the Meteorological Council.   |
| <b>GROUP C.—ADDITIONAL BAROGRAPH STATIONS.</b>  |   |
| Chatsworth ... ..                               | The Duke of Devonshire, K.G.  |
| Forgandenny ... ..                              | C. L. Wood.   |
| Fulbeck ... ..                                  | Rev. V. F. Willson, M.A.  |
| Kilkenny ... ..                                 | H. Carlton, for the Marquis of Ormonde, K.P.  |
| London, Hampstead ... ..                        | H. R. Beeton.   |
| "    Pall Mall ... ..                           | Athenæum Club.  |
| "    Westminster ... ..                         | The Staff of the Meteorological Office.   |
| Malin Head ... ..                               | A. C. Hailstone, for the Meteorological Council.  |

<sup>1</sup> Automatic Records of Wind, Sunshine, and Rainfall.<sup>2</sup> Automatic Records of Pressure, Hygrometry, Wind, and Rain.<sup>3</sup> There is no Anemograph at this Observatory.

\* Station added to the list since last Report.

LIST OF OBSERVERS AT THE STATIONS OF THE SEVERAL  
ORDERS—*continued*.

| Name of Station.   | Observer.   |
|--|---|
| GROUP C.—ADDITIONAL BAROGRAPH STATIONS— <i>continued</i> . |   |
| Newton Reigny ... ..                                       | T. G. Benn.   |
| Penbedw, Mold... ..  | H. W. Buddicom.   |
| Roohford, Tenbury ... ..                                   | Rev. John Tomson.   |
| Scilly Islands, St. Mary's ... ..                          | A. Hicks, for the Meteorological Council.                             |
| Stornoway ... ..   | J. Mackenzie, for the Meteorological Council.                         |
| Sumburgh Head ... ..                                       | Rev. W. Brand, for the Meteorological Council.                        |
| Waterford ... ..   | Harbour Authorities.  |
| Yarmouth ... ..  | G. T. Watson, for the Meteorological Council.                         |
| GROUP C'.—ADDITIONAL THERMOGRAPH STATIONS.                 |   |
| Chatsworth ... ..  | The Duke of Devonshire, K.G.  |
| Chester (Hawarden Bridge)... ..                            | F. A. Summers.  |
| London, Westminster ... ..                                 | The Meteorological Council.   |
| GROUP S.—ADDITIONAL SUNSHINE STATIONS.                     |   |
| †Aberdovey ... ..  | John Edwards.   |
| Aspatria ... ..  | J. Smith Hill, B.Sc.  |
| Aspley Guise... ..   | E. E. Dymond.   |
| Bath ... ..  | W. H. Symons, M.D., for the Corporation.                              |
| Belvoir Castle ... ..                                      | W. H. Divers, for the Duke of Rutland, K.G.                           |
| Birmingham... ..   | Alfred Cresswell, for the Midland Institute                           |
| Birr Castle ... ..   | G. A. Roe, for the Earl of Rosse, K.P.                                |
| ‡Blackpool ... ..  | F. J. H. Coutts, M.D., D.P.H., for the Corporation.                   |
| †Bognor ... ..   | H. C. L. Morris, M.D., for the Corporation.                           |
| †Bournemouth ... ..  | C. Dales, for Town Council.   |
| *†Bradford, Yorks. ... ..                                  | A. Johnson, A.M.I.C.E.  |
| §Braemar ... ..  | J. Aitken, J.P.   |
| †Brighton ... ..   | A. Newsholme, M.D., for the Corporation.                              |
| †Broadstairs ... ..  | W. H. White, for the District Council.                                |
| Cambridge ... ..   | Miss A. Walker, for Sir Robt. Ball, F.R.S.                            |
| ‡Churchstoke ... ..  | P. Wright, F.C.S.   |
| Cirencester ... ..   | Prof. G. T. Locke, M.A., for the R. A. College.                       |
| Clacton-on-Sea ... ..                                      | A. W. Shadick, for the Town Council.                                  |
| †Cockle Park, Morpeth ... ..                               | J. H. J. Farquhar, B.Sc., for the Northumber-<br>land County Council. |
| *Coventry ... ..   | E. Hugh Snell, M.D., for the Corporation.                             |
| †Cromer ... ..   | W. H. Archer, for the Urban District Council.                         |
| Cronkbourne, Douglas ... ..                                | A. W. Moore, M.A., J.P., C.V.O.                                       |
| ‡Cullompton ... ..   | T. Turner, J.P.   |
| Darwen ... ..  | G. Mainland, for the Corporation.                                     |
| †Deerness, Orkney ... ..                                   | M. Spence.  |
| Dublin, Phoenix Park ... ..                                | Col. Haynes, R.E., and Col. G. H. Sim, R.E.                           |
| §Dundee... ..  | J. Carnochan.   |
| †Dunmow ... ..   | Thos. Hasking, for the Countess of Warwick's<br>Agricultural School.  |
| Durham ... ..  | Prof. R. A. Sampson, M.A., F.R.S.                                     |
| †Eastbourne ... ..   | R. Sheward, for the Corporation.                                      |
| †Edinburgh ... ..  | Prof. I. B. Ballour, F.R.S.   |
| †Felixstowe ... ..   | Rev. J. G. Munday, M.A.   |

† There is a Dines Anemograph and a self-recording Rain-gauge at this Station.

\* Station added to the list since last Report.

† Information received weekly for use in the Weekly Weather Reports



LIST OF OBSERVERS AT THE STATIONS OF THE SEVERAL  
ORDERS—*continued.*

| Name of Station.   | Observer.  |
|--|--|
| GROUP S.—ADDITIONAL SUNSHINE STATIONS— <i>continued.</i> |  |
| ‡†Fort Augustus ... ..                                   | Rev. C. von Dieckhoff.   |
| *Garforth ... ..   | Prof. Seton, for the Yorkshire College, Leeds.                                     |
| †Geldeston ... ..  | E. T. Dowson.  |
| Guernsey. <i>See</i> St. Peter Port.                     |  |
| †Harrogate ... ..  | G. Paul, for the Corporation.  |
| Hastings, Waterworks ...                                 | —, Farnham, for the Corporation.   |
| Haverfordwest ... ..                                     | J. W. Phillips.  |
| ‡Hillington ... ..                                       | Rev. H. E. B. Ffolkes, M.A.  |
| †Holesley Bay ... ..                                     | Prof. C. G. Freer Thonger, F.C.S.  |
| †Hoylake ... ..  | Tom Robinson, for the Urban District Council.                                      |
| *†Hull ... ..  | H. B. Witty, for the Corporation.  |
| Kingstown ... ..   | Dr. J. B. Power, for the District Council.   |
| †Littlestone-on-Sea ... ..                               | H. T. Tabbs.   |
| ‡Llandudno ... ..  | Wm. Little, for Town Council.  |
| *Llangammarch Wells ...                                  | W. Black Jones, M.D.   |
| London, City ... ..                                      | Messrs. De La Rue.   |
| „ Westminster Training College.                          | H. A. Reatchlous, M.A.   |
| ‡†Lowestoft ... ..                                       | C. W. Edwards, for the Corporation.  |
| Lytham ... ..  | J. C. Fisher, M.A., M.B., for the Corporation.                                     |
| Manchester, Oldham Road...                               | J. Niven, M.A., M.B., for the Corporation.   |
| „ Whitworth Park ...                                     | Professor Schuster, Ph.D., F.R.S.  |
| „ Prestwich ... ..                                       | T. R. H. Clunn, M.D.   |
| ‡Marchmont ... ..  | J. A. Wood.  |
| ‡†Margate ... ..   | J. Stokes, J.P.  |
| *Markree Castle ... ..                                   | F. W. Henkel, B.A., and J. R. Armstrong, for the Trustees of the late Col. Cooper. |
| *†Marlborough... ..                                      | J. C. Alsop.   |
| †Newcastle-on-Tyne ... ..                                | N. H. Martin, F.C.S.   |
| †Newquay, Cornwall... ..                                 | A. Hardwicke, M.D., and C. C. Vigurs, M.D., for the Town Council.                  |
| Newton Reigny, Penrith ...                               | T. G. Benn.  |
| Plymouth, the Hoe ... ..                                 | H. Victor Prigg, A.M.I.C.E., for the Corporation.                                  |
| Port Talbot, Margam Park                                 | R. Milner, for Miss Talbot.  |
| *†Portsmouth ... ..                                      | A. Mearns Fraser, M.D., for the Corporation.                                       |
| Prestwich. <i>See</i> Manchester.                        |  |
| Rauceby ... ..   | J. Hope, for Gen. Sir M. Willson, K.C.B.   |
| †Rhyl ... ..   | A. A. Goodall, for District Council.   |
| Rothamsted ... ..  | The Lawes Agricultural Trust.  |
| St. Ann's Head, Pembroke...                              | G. H. Dunsford.  |
| St. Helier's, Jersey ... ..                              | Signal Officer, Fort Regent.   |
| †St. Peter Port, Guernsey ...                            | F. E. Carey, M.D.  |
| „ „ Fort Rd. „ ... ..                                    | Augustus Collenette.   |
| Salcombe ... ..  | W. Barrington Prowse, M.D.   |
| ‡†Scarborough ... ..                                     | W. W. Larkin, for the Corporation.   |
| Scilly Islands, St. Mary's ...                           | A. Hicks, for the Meteorological Council.  |
| †Sheffield, Weston Park ...                              | E. Howarth, F.R.A.S.   |
| „ Attercliffe ... ..                                     | J. Robertson, M.D., B.Sc., for the Corporation.                                    |
| Southampton ... ..                                       | A. Vaughan, for Dir. Gen. of Ordnance Survey.                                      |
| Stornoway ... ..   | J. Mackenzie.  |
| †Strathpeffer Spa, N.B. ...                              | J. Maclean, for R. Fortescue Fox, M.D.   |
| †Tenby ... ..  | R. J. Truscott, for the Corporation.   |
| †Thurcaston, Leicester ...                               | Rev. T. A. Preston, M.A.   |

\* Station added to the list since last Report.

† Information received weekly for use in the Weekly Weather Reports.

LIST OF OBSERVERS AT THE STATIONS OF THE SEVERAL  
ORDERS—*continued.*

| Name of Station.  | Observer.   |
|---|---|
| GROUP S.—SUNSHINE STATIONS— <i>continued.</i>           |   |
| †Torquay ... ..   | F. March, for the Corporation.  |
| †Tunbridge Wells ... ..                                 | F. G. Smart, M.B.   |
| †Ventnor ... ..   | Miss M. Gibson, for Royal National Hospital<br>for Consumption.       |
| †Watergate (Emsworth) ... ..                            | W. M. Christy.  |
| †Westbourne, Sussex ... ..                              | Rev. L. B. Birkett.   |
| †Worksop ... ..   | H. Mellish, J.P.  |
| †Worthing ... ..  | C. Kelly, M.D., for the Corporation.                                  |
| †York (Bootham) ... ..                                  | Hugh Richardson, M.A.   |
| GROUP D AND GROUP E.—NORMAL CLIMATOLOGICAL STATIONS.(¹) |   |
| *Ackworth ... ..  | E. B. Ludlam, M.Sc.   |
| Ampleforth ... ..                                       | Rev. J. B. McLaughlin, B.A., O.S.B.                                   |
| Aspatia ... ..  | J. Smith Hill, B.Sc.  |
| Aysgarth ... ..   | Rev. F. W. Stow, M.A.   |
| Belfast, Queen's College ... ..                         | John Wylie.   |
| Belvoir Castle ... ..                                   | W. H. Divers, for the Duke of Rutland, K.G.                           |
| ‡Bennington ... ..                                      | Rev. J. D. Parker, LL.D.  |
| ‡Berkhamsted ... ..                                     | E. Mawley, F.R. Met. Soc.   |
| †Birmingham ... ..                                      | Alfred Cresswell, for the Midland Institute.                          |
| Birr Castle ... ..                                      | G. A. Roe, for the Earl of Rosse, K.P.                                |
| ‡Braemar ... ..   | J. Aitken, J.P.   |
| Bramley ... ..  | J. Bartlett, M.A.   |
| ‡Buxton ... ..  | W. Pilkington.  |
| ‡Cally ... ..   | W. Thomson, for H. G. Murray Stewart.                                 |
| †Cambridge ... ..                                       | Miss A. Walker, for Sir Robert Ball, F.R.S.                           |
| Canterbury ... ..                                       | A. Lander.  |
| ‡Cargen ... ..  | A. Peacock.   |
| *Carlisle ... ..  | Studholme Cartmell, for the Corporation.                              |
| ‡Cheadle ... ..   | J. C. Philips.  |
| ‡Cheltenham ... ..                                      | R. Tyrer, B.A. (the late) and F. O. Bell.                             |
| ‡Churchstoke ... ..                                     | P. Wright, F.C.S.   |
| Cockle Park, Morpeth ... ..                             | J. H. J. Farquhar, B.Sc., for the Northumber-<br>land County Council. |
| Cromer ... ..   | W. H. Archer, for Urban District Council.                             |
| †Cronkbourne ... ..                                     | A. W. Moore, M.A., J.P., C.V.O.                                       |
| Deerness, Orkney ... ..                                 | M. Spence.  |
| Dublin, Botanic Gardens ... ..                          | F. W. Moore, M.R.I.A.   |
| †Dublin City ... ..                                     | Sir John W. Moore, M.D.   |
| Dublin, Phoenix Park ... ..                             | Col. Haynes, R.E., and Col. G. H. Sim., R.E.                          |
| ‡Dundee ... ..  | J. Carnochan.   |
| Dunmow ... ..   | Thos. Hacking, for the Countess of Warwick's<br>Agricultural School.  |
| ‡Dunrobin Castle ... ..                                 | D. Melville, for the Duke of Sutherland, K.G.                         |
| †Durham ... ..  | Professor R. A. Sampson, M.A., F.R.S.                                 |
| Eastbourne ... ..                                       | R. Sheward, for the Corporation.                                      |
| ‡Fort Augustus ... ..                                   | Rev. C. von Dieckhoff.  |
| †Fulbeck ... ..   | Rev. Vere F. Willson, M.A.  |
| *Garforth ... ..  | Prof. Seton, for the Yorkshire College, Leeds.                        |
| †Geldeston ... ..                                       | E. T. Dowson.   |
| ‡Glencarron ... ..                                      | D. D. Munro, for Lord Maclaren.                                       |

(¹) Second Order Stations of the International Classification.

\* Station added to the list since last Report.

† Information received weekly for use in the Weekly Weather Reports.

LIST OF OBSERVERS AT THE STATIONS OF THE SEVERAL  
ORDERS—*continued*.

| Name of Station.  | Observer.   |
|---|---|
| GROUP D AND GROUP E.—NORMAL CLIMATOLOGICAL STATIONS— <i>continued</i> . |   |
| *Gordon Castle ... ..   | C. Webster, for the Duke of Richmond and Gordon, K.G.                                 |
| Guernsey, St. Peter Port ...  | Adolphus Collenette.  |
| Hereford (Belmont) ...  | Rev. F. B. Harrington, O.S.B.   |
| †Hillington ... ..  | Rev. H. E. B. Ffolkes, M.A.   |
| †Hollisley Bay ... ..   | Prof. C. G. Freer Thonger, F.C.S.   |
| *†Hull ... ..   | H. B. Witty, for the Corporation.   |
| *†Lairg ... ..  | Rev. John K. Maclean.   |
| †Laudale ... ..   | A. Fletcher (the late), for T. H. G. Newton, M.A.                                     |
| *Lednathie ... ..   | W. Morrison, for P. Stormonth Darling.  |
| *Lissan ... ..  | James H. Staples.   |
| †Llandudno ... ..   | William Little, for the Town Council.   |
| *London (Camden Square) ...   | H. Robert Mill, D.Sc., LL.D.  |
| †Lowestoft ... ..   | C. W. Edwards, for the Corporation.   |
| Manchester, Oldham Road...  | J. Niven, M.A., M.B., for the Corporation.  |
| " Whitworth Park  | Prof. Schuster, Ph.D., F.R.S.   |
| " Prestwich ... ..  | T. R. H. Clunn, M.D.  |
| *†Marchmont ... ..  | J. A. Wood, for Sir H. P. Campbell, Bart.   |
| †Markree Castle ... ..  | F. W. Henkel, B.A., and J. R. Armstrong, for the Trustees of the late Colonel Cooper. |
| Newcastle, Co. Wicklow ...  | B. H. Steele, M.A., M.D.  |
| †Norwood ... ..   | W. Marriott ( <i>Sec.</i> , Royal Met. Soc.).   |
| *†Ochertyre ... ..  | G. Croucher, for Sir P. K. Murray, Bart.  |
| Parkstone ... ..  | R. Hawkesworth Barnes, B.A.   |
| *Pinnmore ... ..  | R. Torrance, for Captain Hamilton.  |
| †Plymouth ... ..  | H. Victor Prigg, A.M.I.C.E., for the Corporation.                                     |
| *Portlaoch ... ..   | D. S. Melville, for Lord Malcolm.   |
| Ridgmont ... ..   | H. M. Freear, F.C.S., for the Royal Agricultural Society.                             |
| *Rothesay ... ..  | J. Kay.   |
| †Rounton ... ..   | Sir I. Lothian Bell, Bart., F.R.S.  |
| †Rousdon ... ..   | The Hon. Lady Peek.   |
| St. David's ... ..  | W. P. Probert, M.A., LL.D.  |
| St. Leonard's... ..   | H. Colborne, M.R.C.S., for the Corporation.   |
| *Salisbury ... ..   | Thos. Challis, for the Earl of Pembroke.  |
| †Scarborough ... ..   | W. W. Larkin, for the Corporation.  |
| Seaham Harbour ... ..   | G. H. Aird.   |
| Sheffield, Weston Park Museum.  | E. Howarth, F.R.A.S.  |
| †Southampton ... ..   | A. Vaughan, for Director-General of Ordnance Survey.                                  |
| Stokesay ... ..   | Rev. W. La Touche, M.A., and Miss Tonkin.   |
| Strathpeffer Spa ... ..   | J. Maclean, for R. Fortescue Fox, M.D.  |
| Tealby... ..  | Rev. S. Lewin, B.A.   |
| †Wakefield ... ..   | A. Clyde.   |
| Wessington Court ... ..   | S. Lomas, for Miss L. Grafton.  |
| †Whitchurch, Devon... ..  | E. E. Glyde.  |
| *Wolfelee ... ..  | W. Gordon, for Major Elliot.  |
| †Woolacombe, Devon ... ..   | B. Fanshawe.  |
| York, The Museum ... ..   | H. M. Platnauer, B.Sc.  |

Monthly returns are also furnished for the Registrar-General's report, or for the publications of the Office, by the Royal Observatory, Greenwich, the Radcliffe Observatory, Oxford, Bidston Observatory, the Observatory of Stonyhurst College, Glasgow Observatory, and the Armagh Observatory.

\* Station added to the list since last Report.

† Station now discontinued.

‡ Information received weekly for use in the Weekly Weather Reports



LIST OF OBSERVERS AT THE STATIONS OF THE SEVERAL  
ORDERS—*continued.*

| Name of Station.                                | Observer.   |
|---|---|
| GROUP G.—AUXILIARY CLIMATOLOGICAL STATIONS. (2) |   |
| *Aberystwyth... ..                              | R. Kenrick.   |
| †Alnwick Castle ... ..                          | Robert Kyle, for the Duke of Northumberland, K.G.   |
| †Arlington Court, Devon ...                     | Lady Chichester.                                    |
| *Barnstaple ... ..                              | Thos. Wainwright, for the North Devon Athenæum.     |
| †Bath ... ..                                    | W. H. Symons, M.D., M.O.H., for the Corporation.    |
| *Barnet ... ..                                  | T. H. Martin, A.M.I.C.E.                            |
| †Bawtry (Hesley Hall) ...                       | B. I. Whitaker, J.P.                                |
| †Blackpool ... ..                               | F. J. H. Coutts, M.D., D.P.H., for the Corporation. |
| Bognor ... ..                                   | A. G. Thompson.                                     |
| Bolton... ..                                    | W. W. Midgley, for the Corporation.                 |
| *Bradford ... ..                                | H. A. Johnson, M.Inst.C.E.                          |
| †Brighton ... ..                                | A. Newsholme, M.D., for the Corporation.            |
| *Bristol (Overcourt Park) ...                   | R. Cann Lippincott.                                 |
| *Buntingford ... ..                             | Dr. G. M. Smith.                                    |
| †Cambridge (Trinity College)                    | J. W. L. Glaisher, Sc.D., F.R.S.                    |
| *Caterham ... ..                                | P. E. Campbell, M.B.                                |
| Chatham ... ..                                  | The Instructor in Surveying.                        |
| †Chatsworth ... ..                              | The Duke of Devonshire, K.G.                        |
| †Chester (Hawarden Bridge)                      | F. B. Summers.                                      |
| †Cirencester ... ..                             | Prof. G. T. Locke, M.A., for the R.A. College.      |
| †Clifton College ... ..                         | D. Rintoul, M.A.                                    |
| †Colly Weston ... ..                            | Miss A. Tasker.                                     |
| *Coventry ... ..                                | E. Hugh Snell, M.D., M.O.H., for the Corporation.   |
| †*Crinan Harbour ... ..                         | W. H. Dines, B.A.                                   |
| †*Croydon ... ..                                | James Glaisher, F.R.S. (the late).                  |
| Cullompton ... ..                               | T. Turner, J.P.                                     |
| Darwen ... ..                                   | G. Mainland, for the Corporation.                   |
| Dunfanaghy ... ..                               | J. J. Macgrath.                                     |
| *Eastbourne ... ..                              | Miss Brodie Hall.                                   |
| Edenfel (Omagh) ... ..                          | Col. Buchanan, C.B.                                 |
| Felixstowe ... ..                               | Rev. J. G. Munday, M.A.                             |
| Foynes ... ..                                   | W. H. Ward, for Lord Monteaale, K.P.                |
| *Halifax (Bermerside Oby.)                      | J. Gledhill, F.R.A.S.                               |
| *Halifax (Public Library) ...                   | J. Whiteley.  |
| †Harrogate ... ..                               | G. Paul, for the Corporation.                       |
| †Hereford (Belmont)... ..                       | Rev. F. B. Harrington, O.S.B.                       |
| *Huddersfield ... ..                            | J. Firth.   |
| Kilkenny ... ..                                 | H. Carlton, for the Marquess of Ormonde, K.P.       |
| Killarney ... ..                                | E. W. Griffin, M.D.                                 |
| Kingstown ... ..                                | Dr. J. B. Power, for the Corporation.               |
| *Leeds ... ..                                   | H. Crowther.  |
| Littlestone-on-Sea ... ..                       | H. T. Tubbs.  |
| †Llandoverly ... ..                             | J. Watkins (the late).                              |
| *Llangammarch Wells ... ..                      | W. Black Jones, M.D.                                |
| London, Westminster ... ..                      | The Staff of the Meteorological Office.             |
| Lytham ... ..                                   | J. C. Fisher, M.A., M.B., for the Corporation.      |
| Machrihanish ... ..                             | J. Franklin Adams.                                  |
| Maidenhead ... ..                               | G. H. Palmer.                                       |
| Newcastle-on-Tyne ... ..                        | N. H. Martin, F.R.S.E., F.C.S.                      |

(2) Third Order Stations of the International Classification.

\* Station added to the list since last Report.

† Station now discontinued.

‡ Information received weekly for use in the Weekly Weather Reports.

LIST OF OBSERVERS AT THE STATIONS OF THE SEVERAL ORDERS—*continued*.

| Name of Station.   | Observer.   |
|--|---|
| GROUP G.—AUXILIARY CLIMATOLOGICAL STATIONS— <i>continued</i> . |   |
| *Norwich (Brundall) ... ..                                     | A. W. Preston.  |
| *Notsingham ... ..   | Arthur Brown, M.Inst.C.E., and Philip Boobyer, M.D., for the Corporation. |
| *Osborne ... ..  | Robert Scott.   |
| *Portsmouth ... ..   | A. Mearns Fraser, M.B., for the Corporation.                              |
| *Preston ... ..  | Thomas Jackson.   |
| Rauceby Hall ... ..  | J. Hope, for General Sir M. Willson, K.C.B.                               |
| *Reading ... ..  | J. K. Backhouse and R. M. Goodbody.                                       |
| Rothamsted ... ..  | The Lawes Agricultural Trust.   |
| Rugby School ... ..  | R. G. K. Lempfert, M.A., and Denys E. Shorto, M.A.                        |
| St. Helen's ... ..   | F. Drew Harris, M.D., for the Corporation.                                |
| St. Leonard's ... ..   | H. Colborne, M.R.C.S., for the Corporation.                               |
| St. Leonard's, West Marina ...                                 | T. Eldridge, for the Corporation.   |
| Shaftesbury ... ..   | Miss L. H. Harris.  |
| *Shoeburyness ... ..   | The Superintendent of Experiments.  |
| *Swarraton ... ..  | Rev. W. L. W. Eyre, M.A.  |
| Totland Bay, Isle of Wight...                                  | J. Dover, M.A.  |
| *Truro ... ..  | G. Penrose, for the Royal Institution of Cornwall.                        |
| Ventnor ... ..   | Miss M. Gibson, for Royal National Hospital for Consumption.              |
| Waterford ... ..   | J. N. White.  |
| *†Wrotesley, near Wolverhampton.                               | Edwin Simpson.  |
| GROUP R.—ADDITIONAL RAINFALL STATIONS.                         |   |
| *Abersychan ... ..   | W. P. James.  |
| Ardross Castle ... ..  | W. Minty.   |
| Brandon ... ..   | Lt.-Col. B. E. Spragge, D.S.O.  |
| Caistor, Lincolnshire ... ..                                   | Thos. Ford.   |
| Carrigallen ... ..   | Mrs. J. Godley and Miss Morrow.   |
| *Chertners, Northumberland...                                  | Francis R. Hull, C.E.   |
| Corbally, Limerick ... ..                                      | Poole Gabbett.  |
| Cuckfield ... ..   | John Howe.  |
| Dam Site, Northumberland...                                    | Francis R. Hull, C.E.   |
| Disserth, Llandrindod ... ..                                   | Rev. J. Le Herbert.   |
| Doneraile ... ..   | Capt. J. W. Evans, J.P.   |
| Dover ... ..   | H. E. Stilgoe, C.E.   |
| Dursley ... ..   | R. W. Pinney.   |
| East Dereham ... ..  | G. H. Cooper.   |
| Ennis (Roslevan), Co. Clare...                                 | Miss A. L. Scott.   |
| Ennistymon ... ..  | Rev. C. W. McDowell, M.A.   |
| *Fallowlees, Northumberland                                    | Francis R. Hull, C.E.   |
| Forest Row, Sussex ... ..                                      | Rt. Hon. J. Bryce, D.C.L., M.P.   |
| Glenarm ... ..   | The Earl of Antrim.   |
| *Great Billing ... ..  | Rev. G. H. Mullins, M.A.  |
| Gruline, Isle of Mull ... ..                                   | J. W. Melles.   |
| Harefield ... ..   | G. Eland.   |
| Hastings, St. Helen's Crescent                                 | Rev. H. H. Breton, M. A.  |
| Hidcote, Campden ... ..  | Major W. Wright, R.A.   |
| Hurdlestown ... ..   | Lt.-Col. W. O. Bentley, R.A.  |
| Kearney Abbey, Dover ... ..                                    | O. W. Curtis.   |
| „ Chilton Farm ... ..  | H. E. Stilgoe, C.E.   |
| Ketton Vicarage ... ..   | Rev. A. Swire.  |

\* Station added to the list since last Report.

† Station now discontinued.

LIST OF OBSERVERS AT THE STATIONS OF THE SEVERAL ORDERS—*continued*.

| Name of Station.  | Observer.  |
|---|--|
| GROUP R.—ADDITIONAL RAINFALL STATIONS— <i>continued</i> . |  |
| Killiney, Co. Dublin ...                                  | R. O'Brien Farlong, C.B.   |
| Kinlochewe ...  | A. McLennan, for Hon. W. Peel, M.P.                              |
| Kirkby Lonsdale, Norwood ...                              | R. A. Clarke.  |
| Lahinch, Co. Clare ...                                    | Miss I. F. K. Bowes.   |
| *Langford, Biggleswade ...                                | F. J. Gurney.  |
| Llandinam ...   | John Owens.  |
| London, Chelsea ...                                       | T. W. E. Higgins, C.E.   |
| Mallaranny ...  | Miss M. Kilsby.  |
| Mareham-le-Fen ...  | Mrs. G. L. Kime.   |
| Mount Callan, Inagh ...                                   | Lt.-Col. Tottenham.  |
| Newchurch ...   | C. Cullum.   |
| Newmarket-on-Fergus ...                                   | W. W. A. Fitzgerald.   |
| Newport, Monmouth ...                                     | C. Cullum.   |
| Newton Hall ...   | Rev. J. Seymour St. John.  |
| Northallerton ...   | W. Stead, C.E.   |
| *Oundle ...   | N. E. Dixon.   |
| Pant-y-reos, Mon. ...                                     | C. Cullum.   |
| Penrhyn Quarry ...  | H. P. Meares, C.E.   |
| Port Talbot, Margam Park ...                              | G. Lipscombe, for Miss Talbot.                                   |
| Recess, Co. Galway ...                                    | A. A. Smith.   |
| *Redpath, Northumberland ...                              | Francis R. Hull, C.E.  |
| Ridlington ...  | N. W. Wortley.   |
| Rochford, Tenbury ...                                     | Rev. John Tomson.  |
| Roxborough ...  | A. W. Shaw.  |
| Sandgate ...  | A. Robert Bowles, C.E.   |
| *Sandwich ...   | Royal St. George's Golf Club.                                    |
| *Simonsbath ...   | Rev. John S. Martin.   |
| Syston ...  | S. K. Daniels.   |
| Temple Bruer, Lincs. ...                                  | Miss Alice S. Morley.  |
| *Tod Craig ...  | Francis R. Hull, C.E.  |
| Valencia Island, Glanleam ...                             | Miss E. Fitzgerald.  |
| Watergate (Emsworth) ...                                  | W. M. Christy.   |
| Ynis-y-bro, Newport ...                                   | C. Cullum.   |
| GROUP T.—TELEGRAPHIC REPORTING STATIONS.                  |  |
| Aberdeen Observatory... ..                                | G. A. Clarke.  |
| *Bath ... ..  | W. H. Symons, M.D., for the Corporation.                         |
| Bidston Observatory, Liverpool                            | W. E. Plummer, F.R.A.S., for the Mersey Docks and Harbour Board. |
| Birr Castle, Parsonstown ...                              | J. L. Roe.   |
| Blacksod Point, Co. Mayo ...                              | A. Marshall, Coastguard.   |
| Clacton-on-Sea ... ..                                     | A. W. Shadick, for the Town Council.                             |
| Donaghadee ... ..   | W. Keown, Coastguard.  |
| *Dungeness ... ..   | J. G. Williams, Lightkeeper.                                     |
| Holyhead ... ..   | T. Chope, Sailors' Home.   |
| Leith ... ..  | T. Richardson and A. J. Bottrill, Post Office.                   |
| London, Brixton ... ..                                    | F. Gaster.   |
| †Loughborough ... ..                                      | W. Berridge.   |
| Malin Head, Co. Donegal ...                               | A. C. Hailstone, Lloyd's Signal Station.                         |
| Nairn ... ..  | Miss Penny.  |
| Newton Reigny, Penrith ...                                | T. G. Benn.  |
| Oxford ... ..   | W. Wickham, Radcliffe Observatory.                               |
| Portland Bill ... ..                                      | W. J. Batton, Lightkeeper.                                       |
| Roche's Point, Co. Cork ...                               | B. Kelleher and James Mountjoy, Post Office.                     |

\* Station added to the list since last Report.

† Station now discontinued.

‡ There is an automatic record of Wind by a Dines' Anemometer at this Station.



LIST OF OBSERVERS AT THE STATIONS OF THE SEVERAL  
ORDERS—*continued*.

| Name of Station.  | Observer.                           |
|---|-------------------------------------|
| GROUP T.—TELEGRAPHIC REPORTING STATIONS— <i>continued</i> . |                                     |
| St. Ann's Head, Pembroke ...                                | G. H. Dunsford, Lightkeeper.        |
| St. Aubin's, Jersey ...                                     | J. Fisher.                          |
| Scilly Islands, St. Mary's ...                              | A. Hicks, Lloyd's Signal Station.   |
| Shields, North ...  | W. B. Clark, Post Office.           |
| Spurn Head ...  | A. S. Badcock, Lightkeeper.         |
| Stornoway ...   | J. Mackenzie, Lloyd's Agent.        |
| Sumburgh Head ...   | Rev. W. Brand.                      |
| Valencia Observatory, Cahir-civeen.                         | J. E. Cullum, Valencia Observatory. |
| Wick ...  | J. Sinclair.                        |
| Yarmouth, Norfolk ...                                       | G. T. Watson, Sailors' Home.        |

LIST OF FOREIGN STATIONS FROM WHICH REPORTS ARE  
RECEIVED DAILY BY TELEGRAPH. *See PAGE 37.*

| Station.                                | Authority.                             |
|---|--|
| Haparanda ...                           | Meteorological Office, Stockholm.      |
| Hernösand ...                           |  |
| <sup>2</sup> Stockholm ...              |  |
| Wishy ...                               |  |
| Karlstad ...                            |  |
| Bodö ...                                | Meteorological Institute, Christiania. |
| <sup>2</sup> Christiansund ...          |  |
| <sup>12</sup> Skudesnaes ...            |  |
| Færder ...                              |  |
| <sup>2</sup> The Scaw ...               |  |
| Fanö ...                                | Meteorological Institute, Copenhagen.  |
| Cuxhaven ...                            |  |
| Berlin ...                              |  |
| Frankfurt ...                           |  |
| Munich ...                              |  |
| <sup>2</sup> The Helder ...             | Deutsche Seewarte, Hamburg.            |
| Brussels ...                            |  |
| Cape Gris Nez ...                       |  |
| <sup>2</sup> Brest (St. Mathieu) ...    |  |
| Lorient (Ile de Groix) ...              |  |
| <sup>12</sup> Rochefort (Ile d'Aix) ... | Bureau Central Météorologique, Paris.  |
| <sup>2</sup> Biarritz ...               |  |
| <sup>2</sup> Paris ...                  |  |
| Belfort ...                             |  |
| Lyons ...                               |  |
| Nice ...                                | Observatory, Lisbon.                   |
| Perpignan ...                           |  |
| Corunna ...                             |  |
| <sup>2</sup> Lisbon ...                 |  |
| Azores (P. Delgada) ...                 |  |
| „ (Horta) ...                           | Meteorological Service of the Azores.  |

*Note.*—The stations marked <sup>(1)</sup> report also at 2h. p.m., and those marked <sup>(2)</sup> 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 OBSERVERS AT THE STATIONS OF THE SEVERAL  
ORDERS—*continued.*

| Name of Station.                        | Observer.          |
|---|--------------------|
| GROUP W.—SEA TEMPERATURE STATIONS.      |                    |
| Aberdeen, Cove Bay ...                  | Coastguard.        |
| Arran, North, Galway ...                | "                  |
| Bahama Bank lightship ...               | Lightkeepers.      |
| Ballantrae, Ayrshire ...                | Coastguard.        |
| Ballydonegan, Co. Cork ...              | "                  |
| Ballyglass, Co. Mayo ...                | "                  |
| Blackod Point, Co. Mayo ...             | "                  |
| Burnmouth, Ayton, Berwick...            | "                  |
| Burntisland ...                         | "                  |
| Caernarvon Bay Lightship ...            | Lightkeepers.      |
| Cardigan Bay Lightship ...              | "                  |
| Cleggan, Co. Galway ...                 | Coastguard.        |
| Coningbeg Lightship ...                 | Lightkeepers.      |
| Cromarty ...                            | Coastguard.        |
| East Goodwin Lightship ...              | Lightkeepers.      |
| English and Welsh Grounds<br>Lightship. | "                  |
| Holyhead Harbour Office ...             | F. M. Cotton, C.E. |
| Kilcredane, Co. Clare ...               | Coastguard.        |
| Kingstown, Sandy Cove ...               | "                  |
| Kirkwall ...                            | "                  |
| Kish Bank Lightship ...                 | Lightkeepers.      |
| Lamlash, Isle of Arran ...              | Coastguard.        |
| Leman and Ower Lightship ...            | Lightkeepers.      |
| Lerwick ...                             | Coastguard.        |
| Liscannor, Co. Clare ...                | "                  |
| Minard, Co. Kerry ...                   | "                  |
| Newarp Lightship ...                    | Lightkeepers.      |
| Newquay, Cornwall ...                   | Coastguard.        |
| North-West Lightship ...                | Lightkeepers.      |
| Outer Dowsing Lightship ...             | "                  |
| Owers Lightship ...                     | Lightkeepers.      |
| Pennant Bay, Aberdour ...               | Coastguard.        |
| Portrush ...                            | "                  |
| Royal Sovereign Lightship ...           | Lightkeepers.      |
| St. Anne's Head, Pembroke ...           | "                  |
| Salcombe, Devon ...                     | Coastguard.        |
| Scarborough ...                         | "                  |
| Scilly Islands, St. Mary's ...          | A. Hicks.          |
| Seafeld, Co. Clare ...                  | Coastguard.        |
| Seven Stones Lightship ...              | Lightkeepers.      |
| Shambles Lightship ...                  | "                  |
| Sheephaven, Dunfanaghy ...              | Coastguard.        |
| Shipwash Lightship ...                  | Lightkeepers.      |
| Solway Lightship ...                    | "                  |
| South Rock Lightship ...                | "                  |
| Spurn Lightship ...                     | "                  |
| Stornoway ...                           | Coastguard.        |
| Sunderland ...                          | "                  |
| Teelin, Co. Donegal ...                 | "                  |
| Uzon, Montrose ...                      | "                  |
| Wick ...                                | "                  |

1.—LIST OF STATIONS in the COLONIES and DEPENDENCIES and in FOREIGN COUNTRIES from which RETURNS are received in MANUSCRIPT.

NOTE.—Returns received in printed form are included in the list of additions to the Library. Appendix XI., p. 137.

| Station.                       | Latitude. | Longitude. | Height in Feet above M.S.L. | Nature of Information Received. (See p. 51.) | Year of Commencement of Observations. | Observer   |
|--------------------------------|-----------|------------|-----------------------------|--|---------------------------------------|--|
| <b>MEDITERRANEAN.</b>          |           |            |                             |  |                                       |  |
| Cyprus, Famagusta              | 35 7 N.   | 33 57 E.   | 34                          | D.   | 1881                                  | L. Berand, for Dr. Heidenstam, C.M.O.                  |
| " Kyrenia                      | 35 21 N.  | 33 19 E.   | 54                          | D.   | 1881                                  | P. Michaelides "                                       |
| " Larnaca                      | 34 55 N.  | 33 37 E.   | 19                          | D.   | 1881                                  | P. Micopoulles "                                       |
| " Limassol                     | 34 40 N.  | 33 1 E.    | 26                          | D.   | 1881                                  | M. Theodorides "                                       |
| " Nicosia                      | 35 11 N.  | 33 22 E.   | 493                         | D.   | 1881                                  | J. Josif "   |
| " Papho                        | 34 46 N.  | 32 25 E.   | 202                         | D.   | 1881                                  | M. Enotiades "   |
| Gibraltar                      | 36 6 N.   | 5 21 W.    | 48                          | D.   | 1883                                  | Staff-Sergt. Tuson, for Col. J. McNamara, M.D., C.M.O. |
| Syria, Beyrout                 | 33 54 N.  | 35 28 E.   | 172                         | D.   | 1883                                  | Robt. West, M.A.                                       |
| Tangier, Cape Spartel          | 35 47 N.  | 5 55 W.    | 191                         | D.   | 1893                                  | Edwin C. Hathaway.                                     |
| <b>AFRICA.</b>                 |           |            |                             |  |                                       |  |
| British East Africa, Fort Hall | 40 52 S.  | 37 13 E.   | 4,000                       | R.   | 1901                                  | R. B. Humphrey.  |
| " Kikuyu                       | 41 14 S.  | 36 40 E.   | 6,400                       | R.   | 1894                                  | Rev. F. Watson and Rev. D. G. R. Scott, D.D.           |
| " Kitui                        | 41 22 S.  | 37 45 E.   | 3,700                       | G.   | 1900                                  | H. R. Tate.  |
| " Kisumu                       | 40 22 S.  | 43 33 E.   | —                           | G.   | 1894                                  | Major Harrison and Capt. Salkeld.                      |
| " Lamu                         | 42 16 S.  | 40 54 E.   | —                           | G.   | 1894                                  | Capt. Rogers and P. De Sousa.                          |
| " Machakos                     | 41 31 S.  | 37 18 E.   | 5,400                       | G.   | 1894                                  | W. M. Wilson.  |
| " Malindi                      | 43 13 S.  | 40 7 E.    | —                           | G.   | 1891                                  | Ralph Skeen.   |
| " Mombasa                      | 44 4 S.   | 39 42 E.   | 60                          | G.   | 1894                                  | J. T. C. Johnson.                                      |
| " Nairobi                      | 41 18 S.  | 36 50 E.   | 5,450                       | R.   | 1899                                  | John Ainsworth.  |
| " Takaungu                     | 43 41 S.  | 39 52 E.   | —                           | R.   | 1894                                  | W. F. Braganza and J. Suorer.                          |
| " Shimoni                      | 44 38 S.  | 39 21 E.   | —                           | D.   | 1894                                  | J. A. D'Sa.  |



| Central:—                  |     |     |       |    |       |       |     |      |  |
|----------------------------|-----|-----|-------|----|-------|-------|-----|------|--|
| Eastern Soudan, Wadelai    | ... | +2  | 40 N. | 31 | 35 E. | 2,200 | G.  | 1901 | F. A. Knowles.                           |
| Uganda, Eldama Ravine      | ... | +0  | 3 N.  | 35 | 43 E. | 7,420 | G.  | 1901 | F. W. Isaacs.                            |
| " Entebbe                  | ... | 0   | 3 S.  | 32 | 30 E. | 3,902 | D.  | 1896 | John Mahon.                              |
| " Fort Portal              | ... | +0  | 40 N. | 30 | 20 E. | 4,770 | R.  | 1901 | L. Ormsby.                               |
| " Gondokoro                | ... | +4  | 52 N. | 31 | 44 E. | 1,500 | G.  | 1901 | Fred. Spire.                             |
| " Jinja                    | ... | +0  | 27 N. | 33 | 12 E. | 3,800 | G.  | 1901 | A. D. P. Hodges, M.D.                    |
| " Kisumu                   | ... | 0   | 6 S.  | 34 | 46 E. | —     | R.  | 1900 | H. B. Partington.                        |
| " Masaba (Mount Elgon)     | ... | +1  | 0 N.  | 34 | 15 E. | 4,500 | G.  | 1902 | Rev. W. A. Crabtree.                     |
| " Masaka                   | ... | +0  | 20 S. | 31 | 50 E. | —     | D.  | 1902 | G. C. Ishmael.                           |
| " Mbarara                  | ... | +0  | 39 S. | 30 | 49 E. | 4,500 | D.  | 1901 | R. Stoney.                               |
| " Mumias                   | ... | +0  | 20 N. | 34 | 30 E. | 4,400 | G.  | 1897 | J. Bragonza.                             |
| West:—                     |     |     |       |    |       |       |     |      |  |
| Congo Free State, Monsempi | ... | 1   | 12 N. | 18 | 30 E. | —     | —   | 1902 | Rev. G. E. Moore.                        |
| Gold Coast, Aburi          | ... | —   | —     | —  | —     | —     | —   | 1893 | A. E. Evans.                             |
| " Accra                    | ... | +5  | 35 N. | 0  | 6 W.  | —     | G.  | 1893 | Dr. R. H. Kennan.                        |
| " Adda                     | ... | +5  | 50 N. | 0  | 36 E. | —     | G.  | 1895 | Dr. W. S. Webb.                          |
| " Axim                     | ... | +4  | 50 N. | 2  | 12 W. | —     | G.  | 1895 | Dr. W. M. Graham.                        |
| " Cape Coast Castle        | ... | +5  | 15 N. | 0  | 30 W. | —     | G.  | 1895 | Dr. G. L. Barker.                        |
| " Gambaga                  | ... | +10 | 31 N. | 0  | 26 W. | —     | G.  | 1899 | Dr. P. J. Garland.                       |
| " Kintampo                 | ... | 8   | 5 N.  | 1  | 40 W. | —     | G.  | 1901 | Dr. W. M. Graham.                        |
| " Kumasi                   | ... | +6  | 50 N. | 2  | 16 W. | —     | G.  | 1899 | Dr. E. H. Tweedy.                        |
| " Kwitta                   | ... | +5  | 59 N. | 0  | 59 E. | —     | G.  | 1895 | Dr. M. S. Webb.                          |
| Nigeria, Gassol...         | ... | 8   | 32 N. | 10 | 28 E. | —     | G.  | 1902 | Capt. F. H. Ruxton.                      |
| Sierra Leone               | ... | 8   | 30 N. | 13 | 9 W.  | 179   | D.  | 1895 | Dr. Chas. G. Thomson, Lieut. R.A.M.C.    |
| WEST INDIES.               |     |     |       |    |       |       |     |      |  |
| Bahamas, Abaco             | ... | 25  | 52 N. | 77 | 11 W. | 70    | D.* | 1859 | R. A. A. Espie and T. A. Thompson, senr. |
| " Cay Lobos                | ... | 22  | 33 N. | 77 | 36 W. | 15    | D.* | 1877 | Lightkeepers.                            |
| " Cay Sal...               | ... | 23  | 42 N. | 80 | 25 W. | 30    | D.* | 1859 | "  |
| " Inagua                   | ... | 21  | 21 N. | 73 | 1 W.  | 21    | D.* | 1871 | "  |
| " Nassau                   | ... | +25 | 2 N.  | 77 | 25 W. | —     | G.  | 1895 | R. W. D. Albury.                         |
| " Watling Island           | ... | 23  | 57 N. | 74 | 28 W. | 60    | D.* | 1889 | F. W. Lunn.                              |
| Barbados                   | ... | +13 | 12 N. | 59 | 35 W. | 181   | E.  | 1895 | John R. Bovill.                          |
| Sombrero                   | ... | 18  | 36 N. | 63 | 23 W. | 30    | D.* | 1867 | J. A. Richardson and A. L. Richardson.   |

\* Lighthouse Register containing observations every 4 hours.

† The positions and heights of the stations are those given by the observers, except in cases marked †, for which the information given has been obtained from other sources.

LIST OF STATIONS in the COLONIES, &amp;c., from which RETURNS are received in MANUSCRIPT—continued.

| Station.                                  | Latitude. | Longitude. | Height in Feet above M.S.L. | Nature of Information Received. (See p. 18.) | Year of Commencement of Observations. | Observer.                              |
|---|-----------|------------|-----------------------------|--|---------------------------------------|--|
| <b>AMERICA.</b>                           |           |            |                             |  |                                       |  |
| Central:—                                 |           |            |                             |  |                                       |  |
| Panama, Colon ...                         | †9 23 N.  | 79 23 W.   | —                           | D.   | 1897                                  | The Ven. Archdeacon S. P. Hendrick.    |
| South:—                                   |           |            |                             |  |                                       |  |
| British Guiana, Georgetown...             | 6 49 N.   | 56 10 W.   | 0                           | D.S.   | 1887                                  | E. G. Christian.                       |
| <b>ATLANTIC.</b>                          |           |            |                             |  |                                       |  |
| North:—                                   |           |            |                             |  |                                       |  |
| Canary Islands, Tenerife ...              | 28 25 N.  | 16 30 W.   | 454                         | D.C.C. <sup>1</sup>                          | 1888                                  | Alfred F. Perry,                       |
| South:—                                   |           |            |                             |  |                                       |  |
| Falkland Islands (Cape Pembroke).         | 51 41 S.  | 57 42 W.   | 70                          | D.*  | 1859                                  | G. K. Broom                            |
| St. Helena, St. Matthew's Vicarage.       | 16 0 S.   | 5 40 W.    | 1,887                       | B.D.   | 1885                                  | A. L. C. Hands.                        |
| " Central, Oak Bank                       | —         | —          | 1,696                       | R.   | 1902                                  | J. Homagee.                            |
| " Jamestown ...                           | —         | —          | 145                         | R.   | 1897                                  | A. E. Broadway.                        |
| " Mount Pleasant ...                      | —         | —          | 1,997                       | R.   | 1896                                  | T. C. Barker.                          |
| <b>INDIAN AND PACIFIC OCEANS, &amp;c.</b> |           |            |                             |  |                                       |  |
| Madagascar, Mojuanga ...                  | 15 45 S.  | 46 19 E.   | 134                         | G.D.   | 1892                                  | Stratton C. Knott, H.B.M. Vice-Consul. |
| Mauritius, Royal Alfred Observatory.      | 20 6 S.   | 57 31 E.   | 181                         | E.   | 1901                                  | T. F. Claxton.                         |
| Malden Island ...                         | †4 3 S.   | 154 55 W.  | 14                          | D.   | 1888                                  | W. H. Evans.                           |

\* Lighthouse Register containing observations every 4 hours.

† The positions and heights of the stations are those given by the observers, except in cases marked †, for which the information given has been obtained from other sources.

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

The list is arranged under the following headings :—

1. Periodical Publications.
2. Occasional Publications and Reports.
3. Instructions in the use of Instruments, &c.
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, 161.) 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), 1s. 1878-79 (No. 38), 5d. 1879-80 (No. 41), 1s.  
 1880-81 (No. 42), 1s. 2d. 1881-82 (No. 48), 1s. 1882-83 (No. 58), 10½d.  
 1883-84 (No. 64), 1s. 2d. 1884-85 (No. 67), 4s. 4d. 1885-86 (No. 72), 8d.  
 1886-87 (No. 75), 8d. 1887-88 (No. 79), 1s. 1888-89 (No. 84), 5½d.  
 1889-90 (No. 91), 7½d. 1890-91 (No. 99), 5½d. 1891-92 (No. 104), 6d.  
 1892-93 (No. 109), 8d. 1893-94 (No. 112), 7½d. 1894-95 (No. 119), 8½d.  
 1895-96 (No. 122), 8½d. 1896-97 (No. 130), 8d. 1897-98 (No. 136), 11d.  
 1898-99 (No. 140), 7½d. 1899-1900 (No. 147), 11½d. 1900-01 (No. 153),  
 1s. 1½d. 1901-02 (No. 158), 1s. 2d.

## Observatories and Stations.

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

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

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

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

## Meteorological Observations at Stations of the Second Order :—

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

## 2. Occasional Publications and Reports.

## ATLAS :—

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

## CONGRESSES, CONFERENCES, &amp;c., Reports of Proceedings :—

Leipzig. 1872. (Non-Official, No. 6.) 1s.  
 Vienna. 1873. (Official, No. 21.) 1s.  
 Vienna and Utrecht. 1873 and 1874. (Non-Official, No. 9.) 1s. 6d.  
 London. 1874. Maritime Meteorology. (Official, No. 23.) 2s.  
 London. 1876. With Supplement. (Non-Official, No. 11.) 2s.  
 Utrecht. 1878. (Non-Official, No. 13.) 6d.  
 Rome. 1879. (Official, No. 36.) 1s. 6d.  
 Berne. 1880. (Non-Official, No. 14.) 1s.  
 Copenhagen. 1882. (Non-Official, No. 15.) 2s. 6d.  
 Paris. 1885. (Non-Official, No. 16.) 1s.  
 Zürich. 1888. (Non-Official, No. 17.) 4d.

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

† The Observations at Stations of the Second Order for 1873-76 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*.

- Munich. 1891. (Official, No. 102.) 1*s.* 6*d.*  
 Upsala. 1894. (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.*

FOG :—

- London Fog Inquiry, 1901-02. Report to the Council by Captain A. Carpenter, R.N., D.S.O. (Official, No. 160. 1902.) Part I., 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. 10*s.* 6*d.* Supplement :—  
 Difference Tables for each Five Years for the Extrapolation of Mean Values. 3*s.* (Official, No. 154. 1902.)

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, extensively revised. 1902. (Official, No. 61.) 3*d.*  
 Fishery Barometer Manual. New Edition. 1887. (Official, No. 3.) 6*d.*  
 Hints to Meteorological Observers in Tropical Africa, with Instructions for taking Observations, and Notes on Methods of Recording Lake Levels. 1902. (Official, No. 162.) (In the Press.)  
 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.* [Out of print.]

FORECASTING :—

- Aids to the Study and Forecast of Weather.—By W. Clement Ley, M.A. (Official, No. 40. 1880.) 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. 30. 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 (North) 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 who have sent in Logs classed as "Excellent" during the year ending March 31, 1903. 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.                                   | Number<br>of "Ex-<br>cellent"<br>Logs. | Ship.                          |
|--|--|--------------------------------|
| Alexander, D. ... ..                               | 1                                      | S.S. Clan Grant.               |
| Alsop, J. J. ... ..                                | 5                                      | Hermione.                      |
| Andersen, O. E. ... ..                             | 20                                     | S.S. Elswick Grange.           |
| Angus, T. S. ... ..                                | 20                                     | S.S. China.                    |
| Bertie, J. L. ... ..                               | 5                                      | S.S. European.                 |
| Caie, G. ... ..                                    | 1                                      | S.S. Austrian.                 |
| Clinock, T. C. ... ..                              | 7                                      | S.S. Harlech Castle.           |
| Crewe, E. ... ..                                   | 12                                     | S.S. Victoria.                 |
| Crowley, C. ... ..                                 | 15                                     | Verajean.                      |
| De Vine, J. A. F. ... ..                           | 1                                      | S.S. Reynolds.                 |
| Docherty, H. ... ..                                | 10                                     | Tinto Hill.                    |
| Duguid, W. ... ..                                  | 9                                      | S.S. Rangoon.                  |
| Fair, R. ... ..                                    | 1                                      | S.S. Mombassa.                 |
| Hayward, W. ... ..                                 | 1                                      | S.S. Ceylon.                   |
| Holmes, W. B., R.N.R. ... ..                       | 5                                      | S.S. Matatua.                  |
| Hunter, W. M. ... ..                               | 1                                      | S.S. Chicago City.             |
| Lyon, F. C. A., R.N.R. ... ..                      | 3                                      | S.S. Arcadia.                  |
| McAllister, D. ... ..                              | 6                                      | S.S. Ava.                      |
| Martyr, J. W. C., F.R.A.S.,<br>F.R.Met.Soc. ... .. | 5                                      | S.S. Montrose.                 |
| Millican, J. W. ... ..                             | 22                                     | S.S. Greta Holme.              |
| Mullan, F. C., F.R.G.S. ... ..                     | 10                                     | S.S. Ramsay and S.S. Reynolds. |
| Pattman, R. ... ..                                 | 1                                      | Loch Torridon.                 |
| Robinson, J. C. ... ..                             | 3                                      | S.S. Walmer Castle.            |
| Schleman, H. A. ... ..                             | 2                                      | S.S. Sophocles.                |
| Simpson, A. ... ..                                 | 36                                     | S.S. Moravian.                 |
| Squares De Carteret, W. G. ... ..                  | 13                                     | S.S. Minia.                    |
| Turner, A. C., R.N.R. ... ..                       | 8                                      | S.S. Britannia.                |
| Walker, H., R.N.R. ... ..                          | 25                                     | S.S. Campania.                 |

## APPENDIX IV.

METEOROLOGICAL REGISTERS received during the Year 1902-03.

(1)—From the Royal Navy.—*Meteorological Logs* (9).

| H.M.S.          | Captain.  | Observers.  | No. of Registers received. | Duration of Observations. | Voyage.   |
|-----------------|---|---|----------------------------|---------------------------|---|
| "Dart" ...      | Commander C. E. Monro   | Surgeon Forrester; Lieutenants G. E. Nares; J. B. Miles; Ayles; Boatswain Beabey. | 1                          | Mths. Days.<br>5 -        | On N.E. Coast of Australia.                     |
| "Egeria" ...    | C. H. Simpson ...   | Lieutenant J. S. Harris; Sub-Lieutenant J. H. Knight.                             | 3                          | 12 -                      | At Esquimalt.                                   |
| "Goldfinch" ... | F. C. Learmonth ...   | Lieutenant C. D. Richardson; Assistant-Paymaster R. Sydney Smith.                 | 2                          | 7 26                      | To Mediterranean.                               |
| "Penguin" ...   | J. W. Combe ...   | Boatswain R. J. Dailey ...  | 1                          | 16 -                      | New Zealand Coasts.                             |
| "Rambler" ...   | Morris H. Smyth ...   | Sub-Lieutenant W. T. Randle Ford...   | 1                          | 8 -                       | From Mediterranean to Singapore, and Hong Kong. |
| "Waterwitch"    | Lieutenant and Commander W. O. Lyne.<br>Lieutenant and Commander E. C. Hardy. | { Surgeon K. H. Jones; Lieutenant H. D. Warburg; Sub-Lieutenant D. B. Le Mottee.  | 1                          | 14 3                      | China Seas.                                     |



## METEOROLOGICAL REGISTERS received during the Year 1902-03—continued.

## (2.)—From the Mercantile Marine.—Meteorological Logs (168).

| Ship.           | Captain.           | Observers.  | No. of<br>Registers<br>received. | Duration<br>of Obser-<br>vations. | Voyage.   |
|-----------------|--------------------|---|----------------------------------|-----------------------------------|---|
| "Alalama," S.S. | R. Götsche         | L. Egidiusen; N. Petersen   | 1                                | 3                                 | Between Denmark and United States.  |
| "Alcinous"      | A. R. C. MacCormac | C. H. Wood  | 1                                | 7 20                              | Between Hamburg and San Francisco.  |
| "Alliance"      | R. H. Potter       | A. P. Horridge; J. Thomas   | 1                                | 7                                 | To New Zealand, <i>via</i> Cape of Good Hope, returning <i>via</i> Cape Horn. |
| "Aorangi," S.S. | C. W. Hay          | S. Mortimer; E. C. Mason; A. Shipwright; G. Clayton.  | 2                                | 8                                 | Between Australia and British Columbia.                                       |
| "Arcadia," S.S. | J. D. S. Phillips  | Lieutenant A. Thompson, R.N.R.; S. P. Berridge; C. T. Smith, R.N.R.; W. H. G. Warren, R.N.R.; R. N. C. Nicholl, R.N.R.; A. C. B. Webb, R.N.R.; H. E. Smith, R.N.R.; F. W. Bowhill, R.N.R.; H. C. Morris; K. M. Grant; N. H. M. Hood, R.N.R. | 4                                | 11                                | To Australia, <i>via</i> Suez.  |
| "Assaye," S.S.  | G. W. F. Browne    | A. G. Larking; W. Flood; H. S. Cameron; C. Salmonson; C. G. Byron.  | 1                                | 2 5                               | To South Africa and India, re-<br>turning <i>via</i> Suez.                    |
| "Astoria," S.S. | J. Wilson, R.N.R.  | A. H. Kesson; H. Dean   | 2                                | 6 9                               | To United States.   |
| "Atrato," S.S.  | H. Rudge           | C. L. Coxwell; F. A. Bilton; W. Campbell; J. Band; S. F. East; J. H. Little; W. Gray; B. Shillilee.   | 3                                | 8 14                              | To West Indies, and in West Indian Waters.                                    |
| "Austral," S.S. | R. H. Stranger     | E. J. Taylor; W. J. Cullimore; E. A. Seager; F. St. George Wise; R. G. Reeves; J. Burn; P. P. Fladgate; C. M. Graves.   | 4                                | 11 17                             | To Australia, <i>via</i> Suez.  |

|                                |     |                          |     |  |   |    |    |  |
|--------------------------------|-----|--------------------------|-----|--|---|----|----|--|
| "Australia," S.S.<br>(P. & O.) | ... | Francis Cole             | ... | L. A. Davidson; D. Scrutton; R. Holland, R.N.R.; T. A. Bedwell.                          | 3 | 8  | 16 | To Australia, <i>via</i> Suez.                                     |
| "Australia" ...                | ... | L. J. J. Korff           | ... | ...  | 1 | 3  | 12 | From $5^{\circ}$ S. to Oregon (1 pass.)<br>$28^{\circ}$ W.         |
| "Austrian," S.S.               | ... | G. Caie                  | ... | Austin Mellsbye; D. Kinneir; A. G. Fyfe; — Allan.  | 2 | 2  | 22 | To United States and Argentina.                                    |
| "Ava," S.S.                    | ... | Duncan McAllister        | ... | D. McCullum  | 2 | 4  | 5  | To Burma, <i>via</i> Suez.   |
| "Britannia," S.S.              | ... | A. C. Turner, R.N.R.     | ... | T. A. Stirling   | 3 | 6  | —  | To India, <i>via</i> Suez.   |
| "Britannia" (Anchor Line.)     | ... | F. H. Seymour            | ... | W. A. Coteching; W. H. Davies; C. C. Dickenson; H. G. J. Finch; Leonard R. Gardner.      | 3 | 7  | 25 | To Australia, <i>via</i> Suez.                                     |
| "Britannic," S.S.              | ... | Bertram F. Hayes, R.N.R. | ... | H. T. Mostyn Watkins, R.N.R.; S. S. Richardson, R.N.R.; G. J. Wood, R.N.R.               | 1 | 3  | 28 | To South Africa and New Zealand, returning to South Africa.        |
| "Brooklyn City," S.S.          | ... | B. King                  | ... | J. Sage; C. Davidson   | 2 | 6  | 7  | To United States.  |
| "Campania," S.S.               | ... | H. Walker, R.N.R.        | ... | T. W. Hankinson; T. Affolter; — Hossack; Q. Rhodes; — Woodward; E. H. Pratt.             | 2 | 6  | 8  | " "  |
| "Carisbrook Castle," S.S.      | ... | J. Tyson                 | ... | J. MacMahon  | 1 | 3  | 10 | To South Africa.   |
| "Cevic," S.S.                  | ... | W. H. Clarke             | ... | E. Stokes-Smith; L. V. Davis; H. Learmouth; P. Doyle; E. Jones; P. R. Vaghan; W. Molloy. | 2 | 7  | 9  | To United States.  |
| "Ceylon," S.S.                 | ... | W. Hayward               | ... | C. E. D. Trelawny; G. H. S. Furlong; T. F. H. Roberts; R. S. Ward.                       | 1 | 2  | 25 | To China and Japan, <i>via</i> Suez.                               |
| "Chicago City," S.S.           | ... | William M. Hunter        | ... | J. J. Bailey; N. D. Kellock  | 1 | 3  | —  | To United States.  |
| "China," S.S.                  | ... | T. S. Angus              | ... | W. F. Cossey; A. V. Worthington; J. Macgregor.   | 3 | 8  | 4  | To India and Australia, <i>via</i> Suez.                           |
| "Clan Grant," S.S.             | ... | D. Alexander             | ... | J. Wilson; G. Shearer; E. Nosworthy.   | 1 | 2  | 14 | To India, <i>via</i> Suez.   |
| "Clan Urquhart," S.S.          | ... | J. A. McPherson          | ... | C. W. A. Stewart; D. McKinnon; W. Smith.   | 1 | 2  | 24 | To India, <i>via</i> Cape of Good Hope, returning <i>via</i> Suez. |
| "Conway" ...                   | ... | A. T. Miller, R.N.       | ... | The Cadets   | 1 | 2  | 6  | Off Birkenhead.  |
| "County of Kinross,"           | ... | J. F. Collins            | ... | ...  | 1 | 11 | 7  | To South Africa, New York, and Shanghai.                           |

## METEOROLOGICAL REGISTERS received during the Year 1902-03—continued.

## (2.)—From the Mercantile Marine.—Meteorological Logs—continued.

| Ship.                    | Captain.                 | Observers  | No. of Registers received. | Duration of Observations. | Voyage  |
|--------------------------|--------------------------|--|----------------------------|---------------------------|---|
| "Craigisla" ...          | David Jones ...          | ... ..   | 1                          | Mchs. Days.<br>8 13       | To Australia and Chile.                                     |
| "Danube," S.S.           | L. R. Dickinson ...      | F. A. Bilton; P. H. Miller; L. H. J. Tinney.                           | 2                          | 3 9                       | To Argentina.   |
| "Dominion," S.S.         | R. O. Jones ...          | H. Roberts; T. Hatton; S. W. Walshe                                    | 1                          | 3 23                      | To Canada, United States, and South Africa.                 |
| "Don" ...                | William Chamberlin ...   | ... ..   | 1                          | 3 10                      | To New Zealand (outward pass.).                             |
| "Dora," S.S.             | J. Goulding ...          | B. Maughan ...   | 1                          | 3 —                       | To Algiers and United States.                               |
| "Earl Derby" ...         | W. Campbell Jackson ...  | J. Kane; D. Macdonald ...  | 2                          | 6 7                       | From Australia to Coquitambo and Savannah (U.S.).           |
| "East Point," S.S.       | L. R. W. Beavis ...      | H. A. Daves; L. A. Firth; J. H. Jones; W. Low; A. Meston; T. Slade.    | 3                          | 9 21                      | To United States.   |
| "Egyptian Prince," S.S.  | H. M. Walker ...         | C. F. Davies; D. Palliser ...  | 1                          | 3 9                       | Between United States and Argentina.                        |
| "Elswick Grange," S.S.   | O. E. Anderson ...       | A. E. Bainbridge; W. Laing ...   | 2                          | 5 15                      | To United States; the Black Sea, and Denmark.               |
| "Empress of China," S.S. | R. Archibald, R.N.R. ... | W Dixon Hoyerhaft, R.N.R.; F. W. S. Peake; W. J. White; F. W. Wilsden. | 2                          | 7 26                      | Between British Columbia, Japan, and China.                 |
| "Empress of India," S.S. | O. P. Marshall ...       | ... ..   | 1                          | 3 20                      | " " "   |
| "Empress of Japan," S.S. | H. Pybus, R.N.R. ...     | A. Hailey; A. E. Bridge; O. C. L. Moskler.                             | 1                          | 7 29                      | " " "   |
| "Erne" ...               | G. T. Dann ...           | J. McCalmont ...   | 2                          | 15 17                     | From Demarara to India, Mauritius, West Indies, and Bremen. |
| "European," S.S.         | J. L. Bertie ...         | (J. Williams; W. Bolton; H. G. Hay; J. H. Callow.                      | 2                          | 11 9                      | Between United States and South Africa.                     |
|                          | D. Edwards ...           |  |                            |                           | To United States.   |



|                                   |                            |     |     |     |  |   |    |    |   |
|-----------------------------------|----------------------------|-----|-----|-----|--|---|----|----|---|
| "Falls of Halladale"              | — Fordyce                  | ... | ... | ... | ...  | 3 | 11 | 26 | To Oregon and San Francisco.  |
| "Goorkha," S.S.                   | T. Kerr, R.N.R.            | ... | ... | ... | J. A. Ross; A. Darling; A. Pitt  | 1 | 2  | 14 | To India, <i>via</i> Suez.  |
| "Goorkha," S.S.<br>(B.I.S.N. Co.) | F. J. Moseley, R.N.R.      | ... | ... | ... | A. Barron, R.N.R.; J. V. Black;<br>H. B. Hughes; H. L. Scholefield.  | 2 | 6  | 3  | To South Africa.  |
| "Greta Holme," S.S.               | J. W. Millican             | ... | ... | ... | James Roberts; James Tweedie   | 1 | 3  | 24 | Between Argentina and South Africa.   |
| "Harlech Castle," S.S.            | T. A. Clinock              | ... | ... | ... | E. Aingrisom; E. A. Conley; W. Day; — Duncan; — Harvey; — Watson.  | 2 | 3  | 25 | To West Indies and Nova Scotia. To South Africa.                            |
| "Hermione," S.S.                  | J. J. Alsop                | ... | ... | ... | ...  | 1 | 8  | 6  | To Valparaiso.  |
| "Hilarins," S.S.                  | C. K. Sergeant             | ... | ... | ... | ...  | 2 | 4  | 7  | To Argentina, United States, and South Africa.                              |
| "India," S.S.                     | W. D. G. Worcester, R.N.R. | ... | ... | ... | W. R. Le Mare; C. M. Redhead; A. D. Williamson; C. D. Forbes; L. M. Brandran; O. Siggers; A. E. Boyd; H. E. Smith; H. E. Taylor; R. Isgar; F. E. French. | 3 | 7  | 26 | To Australia, <i>via</i> Suez.  |
| "Jersey City," S.S.               | John Garlick               | ... | ... | ... | W. D. Williams; W. Newton  | 1 | 3  | 15 | To United States.   |
| "Kinfauns Castle," S.S.           | Robert Reynolds            | ... | ... | ... | D. Graham; W. Gilliam; L. Holmes; A. Martin.   | 1 | 3  | 13 | To South Africa.  |
| "La Plata," S.S.                  | R. T. Hernaman             | ... | ... | ... | J. A. Bilton; C. A. Moore  | 1 | 1  | 10 | To West Indies and Panama.  |
| "Lennox," S.S.                    | J. C. Williamson           | ... | ... | ... | ...  | 1 | 10 | 15 | Between China and Japan and the Pacific Coast of United States.             |
| "Loch Katrine"                    | William Anderson           | ... | ... | ... | Graham Litster   | 1 | 6  | 22 | To Australia, <i>via</i> Cape of Good Hope, returning <i>via</i> Cape Horn. |
| "Loch Tay"                        | T. C. Martin               | ... | ... | ... | ...  | 1 | 6  | 20 | "   |
| "Loch Torridon"                   | R. Pattman                 | ... | ... | ... | H. R. Bowers   | 1 | 6  | 18 | "   |
| "Lothian," S.S.                   | J. C. Williamson           | ... | ... | ... | W. Lusk  | 1 | 4  | 26 | To China, Japan, and United States, <i>via</i> Suez.                        |
| "Lucerna," S.S.                   | C. Dyer                    | ... | ... | ... | F. A. White  | 2 | 5  | 15 | To the Black Sea, Norway, United States, and N.W. Europe.                   |
|                                   | A. Murray                  | ... | ... | ... |  |   |    |    |   |
|                                   | A. L. French               | ... | ... | ... |  |   |    |    |   |

## METEOROLOGICAL REGISTERS received during the Year 1902-03—continued.

## (2.)—From the Mercantile Marine.—Meteorological Logs—continued.

| Ship.                  | Captain.             | Observers.   | No. of<br>Registers<br>received. | Duration<br>of Obser-<br>vations. | Voyage.  |
|------------------------|----------------------|--|----------------------------------|-----------------------------------|--|
| "Lutterworth"          | G. H. B. Wood        | — Reuton ; — Fish  | 1                                | Mths. Days<br>6 24                | To New Zealand, <i>via</i> Cape of<br>Good Hope, returning <i>via</i> Cape<br>Horn.          |
| "Lynton"               | E. Gates James       | S. J. E. Reed, R.N.R. ; H. L. Simmons  | 1                                | 7 28                              | To Chile.  |
| "Macduff," S.S.        | Robert Glegg         | D. Grant ; N. Macdonald ; J. Muir ;<br>A. Wright.                            | 2                                | 8 5                               | To China, Japan, and New York.<br><i>via</i> Suez.   |
| "Macquarie"            | F. W. Corner, R.N.R. | R. Ryall ; E. J. C. Gibson   | 1                                | 7 4                               | To Australia, <i>via</i> Cape of Good<br>Hope, returning <i>via</i> Cape<br>Horn.            |
| "Matatua," S.S.        | W. Burvill Holmes    | R. G. Cross ; R. Nellist   | 2                                | 7 24                              | To New Zealand, <i>via</i> Cape of Good<br>Hope, returning <i>via</i> Cape Horn.             |
| "Merionethshire," S.S. | C. H. Burch          | — Gibb ; — Duncan ; — Horne  | 1                                | 4 15                              | To China, Japan, and United<br>States, <i>via</i> Suez.                                      |
| "Minia," S.S.          | W. G. S. de Carteret | James Adams ; E. A. Hewardine  | 1                                | 4 -                               | To British North America.  |
| "Miwera," S.S.         | F. A. Henning        | H. C. Hamand ; W. Macfarlane ;<br>R. Bailey ; A. W. Newbury ; D.<br>Thebaud. | 1                                | 5 15                              | Between Australia and British<br>Columbia.   |
| "Mombassa," S.S.       | R. Fair              | J. Tasker ; D. W. Petrie ; T. W.<br>Biddlecombe.                             | 1                                | 7 -                               | From South Africa to Australia<br>New Zealand, India, and<br>United States, <i>via</i> Suez. |
| "Montrose," S.S.       | J. W. C. Martyr      | J. N. Griffiths ; — Highton  | 1                                | 7 7                               | To Durban, New Zealand, Dur-<br>ban, and Bombay.   |
| "Moravian," S.S.       | A. Simpson           | G. Elrick ; D. Ross ; A. Corbett   | 3                                | 9 6                               | To Melbourne, <i>via</i> Cape of Good<br>Hope.   |

|  |     |                               |     |     |     |   |     |   |    |    |   |
|--|-----|-------------------------------|-----|-----|-----|---|-----|---|----|----|---|
| "Mount Stewart"                            | ... | C. Green                      | ... | ... | ... | ...   | ... | 2 | 9  | 29 | To Australia, <i>via</i> Cape of Good Hope, San Francisco, and home <i>via</i> Cape Horn. |
| "Numidian," S.S.                           | ... | W. S. Main                    | ... | ... | ... | V. Coombe   | ... | 2 | 6  | 16 | To British North America.   |
| "Omrah," S.S.                              | {   | J. F. Ruthven, R.N.R.         | ... | ... | ... | { P. N. Layton; E. J. Taylor, R.N.R.;<br>F. E. B. Owen; J. Withers; A.<br>V. Cowell, R.N.R.; T. Taylor;<br>P. Hancock; J. Bird; A. H.<br>Bird, R.N.R. | ... | 4 | 10 | 17 | To Australia, <i>via</i> Suez.  |
| "Ophir," S.S.                              | ... | F. W. Kershaw, R.N.R.         | ... | ... | ... | H. Trevor Jones; T. Hawes; R. de V.<br>Williams; H. Shrubsole, R.N.R.;<br>H. S. Seale.  | ... | 4 | 10 | 12 | "   |
| "Orient," S.S.                             | ... | A. J. Coad, R.N.R.            | ... | ... | ... | M. B. Sayer; J. Withers; J. Burn;<br>J. Avern.  | ... | 2 | 6  | 26 | To South Africa, Australia, and New Zealand, returning to South Africa.                   |
| "Orinoco," S.S.                            | ... | A. C. Farmer                  | ... | ... | ... | J. E. P. Matthews   | ... | 1 | 2  | 10 | To West Indies.   |
| "Ormuz," S.S.                              | ... | W. S. Shelford, R.N.R.        | ... | ... | ... | P. N. Layton; J. Hills; T. Taylor;<br>R. de V. Williams; R. Reeves;<br>J. Usborne.  | ... | 2 | 5  | 9  | To Australia, <i>via</i> Suez.  |
| "Orontes," S.S.                            | ... | J. F. Ruthven, R.N.R.         | ... | ... | ... | J. F. Heale, R.N.R.; J. Hills; A. V.<br>Cowell, R.N.R.; S. P. Berridge.   | ... | 1 | 2  | 21 | "   |
| "Persia," S.S.                             | ... | G. Mitchell                   | ... | ... | ... | G. K. Wilson; A. B. Rutherford;<br>— Parker.  | ... | 3 | 8  | 8  | To India, <i>via</i> Suez.  |
| "Port Antonio," S.S.                       | ... | H. F. Bartlett                | ... | ... | ... | R. B. Skellon; W. G. Forrester  | ... | 2 | 4  | 12 | To West Indies.   |
| "Ramsay," S.S.                             | ... | F. C. Mullan                  | ... | ... | ... | A. Callaghan; F. Glover; W. J. Evans  | ... | 1 | 3  | 2  | To Argentina.   |
| "Rangoon," S.S.                            | ... | William Duguid                | ... | ... | ... | W. Ross Weir; — Guthen; J. Reid;<br>E. H. McLeish.  | ... | 3 | 8  | 20 | To Burma, <i>via</i> Suez.  |
| "Reynolds," S.S.                           | ... | F. C. Mullan                  | ... | ... | ... | C. Ward; T. Harrison; C. McCarthy;<br>G. Warren; H. A. L. Bond; S. E.<br>Stubbs.  | ... | 3 | 6  | 26 | To Mediterranean and South America.   |
| "Richmond"                                 | ... | Commander F. J. Lobb,<br>R.N. | ... | ... | ... | F. W. Holden  | ... | 1 | 12 | 10 | At Bahamas (Lighthouse Tender).   |
| "Romney," S.S.<br>(L.B. & River Plate Co.) | ... | R. W. Trenaman                | ... | ... | ... | J. Stone; J. M. Chubb; J. H. Jones  | ... | 2 | 5  | 6  | To Argentina.   |
| "Romney," S.S.<br>(B.S.S. Co.)             | ... | R. Hurford                    | ... | ... | ... | T. A. French; M. Weeks; F. C.<br>Harris.  | ... | 2 | 5  | 16 | To Zanzibar, Burma, South Africa, India, and home <i>via</i> Suez.                        |



## METEOROLOGICAL REGISTERS received during the Year 1902-03—continued.

## (2.)—From the Mercantile Marine.—Meteorological Logs—continued.

| Ship.                 | Captain.                 | Observers.  | No. of<br>Registers<br>received. | Duration<br>of Obser-<br>vations. | Voyage.   |
|-----------------------|--------------------------|---|----------------------------------|-----------------------------------|---|
| "Saba," S.S. ...      | G. F. Golden ...         | H. Dewar ; J. De La Bere ; A. A. Thomson.   | 1                                | Mths. Days.<br>1 26               | To Madeira, West Indies, and United States.                         |
| "Sarmatian," S.S. ... | Edward Pitts, R.N.R. ... | C. S. Miller ; T. Lewis ...   | 1                                | 2 17                              | To Canada and United States.  |
| "Saxoleine," S.S. ... | J. R. Waters ...         | " " " " " " " " " " " "   | 1                                | 2 8                               | To Philadelphia.  |
| "Sekondi," S.S. ...   | H. G. Harrison ...       | A. E. Taylor ; H. Bennett ; G. Lloyd ; T. Shaw.   | 2                                | 3 8                               | To West Coast of Africa.  |
| "Sierra Lucena" ...   | E. Robinson ...          | A. Thompson ; W. J. Lowery ...  | 1                                | 9 25                              | To Australia, Valparaiso, and Iquique.                              |
| "Sophocles," S.S. ... | H. A. Schleman ...       | A. Thomson ; H. Clark ; R. R. Harrison ; J. H. Chilvers ; E. McLaren.   | 3                                | 8 27                              | To Australia, via Cape of Good Hope.                                |
| "Tinto Hill" ...      | Hugh Docherty ...        | J. Anderson ...   | 1                                | 7 15                              | To South Africa, Australia, and Chile.                              |
| "Verajean" ...        | C. Crowley ...           | W. S. Ballard ; K. Gough ...  | 1                                | 6 24                              | To South Australia, via Cape of Good Hope, returning via Cape Horn. |
| "Victoria," S.S. ...  | Edward Crewe ...         | E. E. C. Roberts, R.N.R. ; G. C. Holloway, R.N.R. ; E. C. Miller ; A. Bevan ; G. P. Shaw, R.N.R. ; C. W. Cliff ; G. L. Kennedy ; C. H. Druce ; A. L. MacIntosh ; E. E. N. Dawson ; C. C. Dickinson ; F. M. Moore. | 3                                | 6 19                              | To India and Australia, via Suez.                                   |
| "Waimate," S.S. ...   | J. J. Hamon ...          | J. F. de Brocq ; R. R. Neale ; J. Makepeace.  | 1                                | 3 12                              | To New Zealand, via Cape of Good Hope, returning via Cape Horn.     |

| Ship.   | J. C. Robinson ... | S. G. Turner ; R. D. Maxwell ; A. L. Parkinson. | 4   | 5   | 12  | To South Africa. |
|---|--------------------|---|-----|-----|-----|------------------|
|   |                    |   |     |     |     |                  |
| "Walmer Castle," S.S.                           | ...                | ...   | ... | ... | ... | ...              |
| "Wooda," S.S.                                   | ...                | ...   | ... | ... | ... | ...              |
| "Worcester" ...                                 | ...                | ...   | ... | ... | ... | ...              |
| (3.)—Abbreviated Meteorological Registers (20). |                    |   |     |     |     |                  |
| "Augustine," S.S.                               | ...                | ...   | ... | ... | ... | ...              |
| "Banca," S.S.                                   | ...                | ...   | ... | ... | ... | ...              |
| "Canton," S.S.                                  | ...                | ...   | ... | ... | ... | ...              |
| "Dora," S.S....                                 | ...                | ...   | ... | ... | ... | ...              |
| "Foylemore," S.S.                               | ...                | ...   | ... | ... | ... | ...              |
| "Gregory," S.S.                                 | ...                | ...   | ... | ... | ... | ...              |
| "Largo Law" ...                                 | ...                | ...   | ... | ... | ... | ...              |
| "Merion," S.S.                                  | ...                | ...   | ... | ... | ... | ...              |
| "Mount Royal," S.S.                             | ...                | ...   | ... | ... | ... | ...              |
| "Oro," S.S. ...                                 | ...                | ...   | ... | ... | ... | ...              |
| "Pelican" S.S.                                  | ...                | ...   | ... | ... | ... | ...              |
| "Saxoleine," S.S.                               | ...                | ...   | ... | ... | ... | ...              |
| "Virginia," S.S.                                | ...                | ...   | ... | ... | ... | ...              |

To the Brazils.  
To China and Japan, *via* Suez.  
To Shanghai, *via* Suez.  
To Quebec.  
To Black Sea.  
To Brazil (S.A.). New York,  
Para. and New York.  
36°S. (outward pass.).  
To 65°E.  
To Boston (U.S.A.).  
To Gulf of Mexico and Bremen.  
To River Plate, Cape Town, and  
to 3°S.  
to 62°E.  
To Labrador and Hudson's Bay.  
To Philadelphia.  
To United States and Canada.

## (3.)—Abbreviated Meteorological Registers (20).

H. Thompson ...  
E. P. Martin, R.N.R. ...  
C. F. Lockstone R.N.R. ...  
J. Goulding ...  
E. Ellis ...  
E. Stitch ...  
O. H. Henderson ...  
J. A. Broomhead ...  
G. S. Webster, R.N.R. ...  
W. Ransom Coleman ...  
Alexander Gray ...  
J. R. Waters ...  
F. Prentice ...  
J. Fanning ...  
J. Plumpton ...  
H. Pigou Comyn, R.N.R. ...  
B. Maugham ...  
J. Sallery ...  
F. G. Norton ...  
...  
E. Keane ...  
J. Gillies ...  
...  
G. F. Lovegrove ...  
F. L. Dransfield ...  
W. Lloyd-Jones ; G. H. Willis ; R. T. Kestell.

METEOROLOGICAL REGISTERS received during the year 1902-03  
—continued.

(4.)—NORTH ATLANTIC REGISTERS :—FORM NO. 51 (1665).

| Line.            | Ship.               | Captain.                 | No. of Registers. |
|------------------|---------------------|--------------------------|-------------------|
|                  | H.M.S. Research ... | A. Mostyn Field, R.N.... | 3                 |
| Aberdeen ...     | Damascus ...        | — McKilliam ...          | 1                 |
| African S.S. Co. | Mandingo ...        | R. S. Rothwell ...       | 1                 |
| Allan ...        | Austrian ...        | G. Caie ...              | 3                 |
|                  | Bavarian ...        | J. M. Wallace ...        | 3                 |
|                  | Brazilian ...       | J. Williams ...          | 13                |
|                  | Buenos Ayrean...    | B. T. Eastaway ...       | 4                 |
|                  |                     | S. Whitney ...           | 4                 |
|                  | Canadian ...        | H. Perry... ..           | 4                 |
|                  | Carthaginian ...    | H. Gunson ...            | 7                 |
|                  | Corean ...          | A. G. Stewart ...        | 8                 |
|                  |                     | J. A. Fairfull ...       | 1                 |
|                  | Livonian ...        | J. Hamilton ...          | 2                 |
|                  | Mongolian ...       | A. G. Stewart ...        | 4                 |
|                  | Monte Videan ...    | W. Wallace ...           | 19                |
|                  | Numidian ...        | W. S. Main ...           | 9                 |
|                  | Norwegian ...       | W. White ...             | 12                |
|                  | Orcadian ...        | H. Imrie... ..           | 6                 |
|                  | Peruvian ...        | G. Hamilton ...          | 10                |
|                  |                     | J. Harrison ...          | 9                 |
|                  | Pomeranian ...      | T. Pickering ...         | 4                 |
|                  |                     | B. Hendry ...            | 10                |
|                  | Pretorian ...       | J. M. Johnston ...       | 11                |
|                  | Rosarian... ..      | B. Hendry ...            | 2                 |
|                  | Sardinian ...       | T. Moar ...              | 4                 |
|                  |                     | E. Pitts, R.N.R... ..    | 11                |
|                  | Sarmatian ...       | T. Pickering ...         | 2                 |
|                  | Siberian ...        | E. Outram ...            | 4                 |
|                  | Sicilian ...        | J. A. Fairfull ...       | 20                |
|                  | Tunisian... ..      | A. H. Vipond ...         |                   |
| American ...     | Belgenland ...      | J. B. Hill ...           | 16                |
|                  |                     | S. Anfindsen ...         | 11                |
|                  | Haverford ...       | H. O. Nielsen ...        | 4                 |
|                  | Kensington ...      | J. B. Hill ...           | 16                |
|                  |                     | H. Doxrud ...            | 3                 |
|                  | Noordland ...       | G. Apfeld ...            | 16                |
|                  |                     | E. V. Roberts ...        | 3                 |
|                  | Philadelphia ...    | A. R. Mills ...          | 16                |
|                  |                     | C. J. Rogers ...         | 13                |
|                  | Rhynland ...        | G. Young ...             | 9                 |
|                  |                     | T. G. Barman ...         | 11                |
|                  | St. Louis ...       | F. M. Passow ...         | 21                |
|                  | St. Paul ...        | J. C. Jamison ...        |                   |
|                  |                     | F. Albrecht ...          |                   |
|                  | Vaderland ...       | J. A. Broomhead ...      |                   |
|                  |                     | C. K. Ehoff ...          |                   |
|                  |                     | H. Campbell ...          |                   |
|                  | Westernland ...     | J. Dann ...              |                   |
|                  |                     | M. H. Morle ...          |                   |



METEOROLOGICAL REGISTERS received during the year 1902-03  
—continued.

## (4.)—North Atlantic Registers (Form No. 51)—continued.

| Line.  | Ship.             | Captain.                | No. of Registers. |
|--|-------------------|-------------------------|-------------------|
| Anchor ...                                       | Astoria ...       | John Wilson, R.N.R. ... | 10                |
|  | Ethiopia ...      | J. Lumsdane ...         | 8                 |
| Anglo-Algerian...                                | Shahristan ...    | G. Finnis ...           | 2                 |
| "Arana" S.S. Co.                                 | Arana ...         | R. Walton ...           | 1                 |
| Atlantic Trans-<br>port.                         | Enrope ...        | E. O. Marshall ...      | 14                |
|  | Mackinaw ...      | F. W. Richardson ...    | 9                 |
|  | Manhattan ...     | A. T. Musselwhite ...   | 3                 |
|  | Manitou ...       | G. Goudie ...           | 11                |
|  | Maryland ...      | E. G. Cannons ...       | 13                |
|  | Menominee ...     | O. P. Clarke ...        | 13                |
|  | Mesaba ...        | L. T. Lucas ...         | 10                |
|  | Michigan ...      | P. G. Lowe ...          | 2                 |
|  | Minneapolis ...   | T. W. Tubb ...          | 14                |
|  | Minnehaha ...     | P. G. Lowe ...          | 12                |
|  | Minnesota ...     | F. T. Gates ...         | 10                |
|  | Minnetonka ...    | J. Robinson ...         | 15                |
|  | Montana ...       | F. C. Pike ...          | 6                 |
| "Balaena" Fish-<br>ing Co.                       | Balaena ...       | S. Layland ...          | 1                 |
| "Bellailsa" S.S.<br>Co.                          | Bellailsa ...     | P. Laverock ...         | 7                 |
| "Bellona" S.S.<br>Co.                            | Bellona ...       | O. O. Aagaard ...       | 4                 |
| Bibby ...  | Cheshire ...      | F. Rolls ...            | 2                 |
| Booth S.S. Co. ...                               | Dominic ...       | M. Beasley ...          | 4                 |
|  | Jerome ...        | G. C. Westray ...       | 5                 |
|  | Madeirense ...    | H. Forbes ...           | 6                 |
| Brightman C.E...                                 | Zero ...          | J. Kempthorne ...       | 1                 |
| Bristol "City" ...                               | Brooklyn City ... | J. Hutchison ...        | 5                 |
|  | Boston City ...   | B. King ...             | 3                 |
|  | Chicago City ...  | S. Watkins ...          | 1                 |
|  | Exeter City ...   | W. M. Hunter ...        | 6                 |
|  | Llandaff City ... | ? ...                   | 8                 |
| British and Bur-<br>mese Steam<br>Navigation Co. | Mandalay ...      | A. E. Andrews ...       | 8                 |
|  | Rangoon ...       | R. Leslie ...           | 5                 |
| British Maritime<br>Trust.                       | Alleghany ...     | W. Duguid ...           | 9                 |
| British Ship-<br>owners' Co.                     | British King ...  | E. Evans ...            | 2                 |

METEOROLOGICAL REGISTERS received during the year 1902-03  
—continued.

(4.)—North Atlantic Registers (Form No. 51)—continued.

| Line.                         | Ship.              | Captain.              | No. of Registers. |
|-------------------------------|--------------------|-----------------------|-------------------|
| Bucknall ...                  | Bloemfontein ...   | G. E. Roberts ...     | 2                 |
| City ...                      | City of Madrid ... | W. Greenhorn ...      | 6                 |
| Clan ...                      | Clan Murray ...    | S. Beer ...           | 5                 |
|                               | Clan Urquhart ...  | J. A. McPherson ...   | 3                 |
|                               | Clan MacLeod ...   | W. J. Lennox ...      | 6                 |
|                               | Clan Ogilvy ...    | W. M. Porterfield ... | 7                 |
|                               | Clan Farquhar ...  | W. J. Lennox ...      | 2                 |
| "Crown" S.S. Co.              | Torgorm ...        | R. Stirling ...       | 3                 |
| Canard ...                    | Aleppo ...         | A. S. Halliday ...    | 4                 |
|                               | Campania ...       | T. Hewitson ...       | 11                |
|                               | Cherbourg ...      | H. Walker, R.N.R. ... | 13                |
|                               | Cypria ...         | J. B. Watt ...        | 11                |
|                               | Ivernia ...        | J. S. Carbines ...    | 11                |
|                               | Lucania ...        | J. Barlow ...         | 11                |
|                               | Pavia ...          | J. Pritchard ...      | 10                |
|                               | Saragossa ...      | T. Stephens ...       | 19                |
|                               | Tyria ...          | A. McKay ...          | 9                 |
|                               | Umbria ...         | J. Pritchard ...      | 11                |
|                               | Veria ...          | G. F. Jeffries ...    | 10                |
|                               |                    | W. Williams ...       | 11                |
|                               |                    | W. H. Bacon ...       | 10                |
| Dixon, Sir Daniel             | Belfast ...        | T. C. Dutton ...      | 2                 |
| Dominion ...                  | Cambroman ...      | W. B. Cresser ...     | 1                 |
|                               | Commonwealth ...   | T. B. Boal ...        | 10                |
|                               | Dominion ...       | W. Mendus ...         | 5                 |
|                               | Irishman ...       | J. McAuley ...        | 12                |
|                               | Merion ...         | R. O. Jones ...       | 20                |
|                               | New England ...    | J. O. Williams ...    | 20                |
|                               | Norseman ...       | J. A. Broomhead ...   | 7                 |
|                               | Vancouver ...      | W. Thompson ...       | 12                |
| "Earl of Chester"<br>S.S. Co. | Rosehill ...       | J. James ...          | 1                 |
| Elder Dempster...             | Accra ...          | J. Evans ...          | 1                 |
|                               | Andoni ...         | D. McDonald ...       | 1                 |
|                               | Banana ...         | — Hughes ...          | 6                 |
|                               | Cameroon ...       | F. Sheldrake ...      | 1                 |
|                               | Lake Erie ...      | J. J. Painter ...     | 16                |
|                               | Lake Ontario ...   | E. Taylor ...         | 18                |
|                               | Lake Simcoe ...    | O. Jones ...          | 8                 |
|                               | Loanda ...         | F. Carey ...          | 4                 |
|                               | Loango ...         | G. C. Evans ...       | 2                 |
|                               | Monmouth ...       | F. Carey ...          | 4                 |
|                               |                    | W. D. Jones ...       |                   |
|                               |                    | H. A. Yardley ...     |                   |

METEOROLOGICAL REGISTERS received during the year 1902-03  
—continued.

## (4.)—North Atlantic Registers (Form No. 51)—continued.

| Line.                         | Ship.              | Captain.                  | No. of Registers. |
|-------------------------------|--------------------|---------------------------|-------------------|
| Elder Dempster<br>—cont.      | Montauk ...        | H. Williams ...           | 2                 |
|                               | Montcalm ...       | A. E. Evans ...           | 13                |
|                               | Monteagle ...      | W. L. D. Chapman ...      | 1                 |
|                               | Montenegro ...     | J. Clare ...              | 5                 |
|                               | Monterey ...       | R. O. Williams ...        | 2                 |
|                               | Montreal ...       | J. A. Murray ...          | 10                |
|                               | Montrose ...       | J. W. C. Martyr ...       | 2                 |
|                               | Mount Royal ...    | G. S. Webster, R.N.R. ... | 4                 |
|                               | Port Antonio ...   | H. F. Bartlett ...        | 10                |
|                               | Port Morant ...    | H. F. Bartlett ...        | 8                 |
|                               |                    | W. R. Rowe ...            |                   |
|                               | Port Royal ...     | J. G. Parsons ...         | 9                 |
|                               | Prah ...           | H. E. Millson ...         | 1                 |
|                               | Roquelle ...       | W. E. Potter ...          | 4                 |
|                               | Sekondi ...        | H. G. Harrison ...        | 6                 |
|                               | Sokoto ...         | J. Windham ...            | 1                 |
|                               | Yoruba ...         | G. A. Cotterell ...       | 2                 |
| Elswick Steam<br>Shipping Co. | Elswick Grange ... | O. E. Andersen ...        | 2                 |
| Forwood... ..                 | Orotava ...        | H. C. Bennett, R.N.R. ... | 13                |
| Furness, Withy,<br>& Co.      | Carlisle City ...  | — Paterson ...            | 5                 |
|                               | Damara ...         | — Gorst... ..             | 6                 |
| Groves, J. ...                | Skerryvore ...     | R. C. Appleton ...        | 2                 |
| Gulf Transport...             | Ikbal ...          | A. Jennings ...           | 9                 |
|                               | Imani ...          | T. B. Peabody ...         | 9                 |
|                               | Indore ...         | A. W. Roberts, R.N.R. ... | 13                |
|                               |                    | C. Mytton ...             |                   |
|                               | Inkum ...          | E. S. Pearse ...          | 5                 |
|                               | Irada ...          | H. Delagy ...             | 12                |
|                               |                    | A. W. Roberts, R.N.R. ... |                   |
|                               | Irak ...           | A. Delagy ...             | 3                 |
| Harrison ...                  | Iran ...           | C. M. M. Jacob ...        | 13                |
|                               | Actor ...          | H. H. Pyle ...            | 2                 |
|                               | American ...       | W. H. Howell ...          | 3                 |
|                               | Astronomer ...     | D. G. Cownie ...          | 3                 |
|                               |                    | J. Marshall ...           |                   |
|                               | Capella ...        | H. McKee ...              | 6                 |
|                               | Cuban ...          | J. E. Bartlett ...        | 2                 |
|                               | Dictator ...       | D. G. Cownie ...          | 4                 |
|                               | Electrician ...    | H. Walton ...             | 1                 |
|                               | Historian ...      | J. Valiant ...            | 6                 |
|                               | Musician ...       | J. Edgar... ..            | 2                 |
|                               | Navigator ...      | C. S. Rhodes ...          | 9                 |
| Houston... ..                 | Orion ...          | J. Marshall ...           | 7                 |
|                               | Senator ...        | R. J. Thomson ...         | 3                 |
| Hudson's Bay Co.              |                    | C. K. Sergeant ...        | 6                 |
|                               | Hilarius ...       | W. H. Moore, R.N.R. ...   | 1                 |
|                               | Hippomenes ...     |                           |                   |
|                               | Lady Head ...      | J. G. Ford ...            | 1                 |

METEOROLOGICAL REGISTERS received during the year 1902-03  
—continued.

(4.)—North Atlantic Registers (Form No. 51)—continued.

| Line.                     | Ship.                   | Captain                    | No. of Registers. |
|---------------------------|-------------------------|----------------------------|-------------------|
| International ...         | Cambria ... ..          | —                          | 1                 |
| "Jacona" S.S. Co.         | Jacona ... ..           | W. Lindsay ... ..          | 2                 |
| "Jacob Bright" S.S. Co.   | Jacob Bright ... ..     | L. Anderson ... ..         | 3                 |
| Johnston ...              | Foylemore ... ..        | E. Ellis ... ..            | 6                 |
|                           | Rowanmore ... ..        | W. Thomas ... ..           | 13                |
|                           | Vedamore ... ..         | W. Henry ... ..            | 14                |
| Lamport & Holt            | Phidias ... ..          | A. Allen ... ..            | 5                 |
| Lancashire Shipping Co.   | Richmond Castle ... ..  | F. McDowell ... ..         | 1                 |
| Leyland ... ..            | American ... ..         | W. H. Howell ... ..        | 3                 |
|                           | Asian ... ..            | J. E. Bartlett ... ..      | 2                 |
|                           | Cestrian ... ..         | E. Thomas ... ..           | 1                 |
|                           | Colonian ... ..         | — Bullock ... ..           | 1                 |
|                           | Costa Rican ... ..      | — Woodward ... ..          | 3                 |
|                           | Devonian ... ..         | A. S. McConkey ... ..      | 16                |
|                           |                         | G. W. Muir ... ..          |                   |
|                           | European ... ..         | D. Edwards ... ..          | 1                 |
|                           | Hanoverian ... ..       | G. W. Muir ... ..          | 6                 |
|                           | Jamaican ... ..         | A. H. Highton ... ..       | 8                 |
|                           | Lancastrian ... ..      | R. Ridley ... ..           | 11                |
|                           | Philadelphian ... ..    | J. H. A. Thornton ... ..   | 7                 |
|                           |                         | A. W. V. Trant ... ..      |                   |
|                           | Victorian ... ..        | G. J. Caven, R.N.R. ... .. | 1                 |
|                           | Virginian ... ..        | Franklin Prentice ... ..   | 12                |
|                           | William Cliff ... ..    | T. Chadwick ... ..         | 6                 |
|                           |                         | — Robb ... ..              |                   |
|                           | Winifredian ... ..      | — Farrington ... ..        | 2                 |
|                           | Yucatan ... ..          | W. J. Dickinson ... ..     | 7                 |
| "Lobelia" S.S. Co.        | Lobelia ... ..          | F. H. Watson ... ..        | 6                 |
| MacIver ... ..            | Tartary ... ..          | T. Emery ... ..            | 5                 |
| Manchester ...            | Manchester Commerce {   | L. Morton ... ..           | 17                |
|                           |                         | J. G. Baxter ... ..        |                   |
|                           | Manchester Engineer ... | S. Lawlan ... ..           | 7                 |
|                           | Manchester Market {     | E. R. Blake ... ..         | 9                 |
|                           |                         | M. Hikings ... ..          |                   |
|                           | Manchester Trader {     | W. J. Parry ... ..         | 7                 |
|                           |                         | J. Morton ... ..           |                   |
|                           |                         | F. Mann ... ..             |                   |
| Moss S.S. Co. ...         | Amasis ... ..           | A. Woolfall ... ..         | 1                 |
| "North Atlantic" S.S. Co. | Manhanset ... ..        | E. W. White ... ..         | 2                 |
|                           | Masconomo ... ..        | S. Townley ... ..          | 1                 |
|                           | Mohawk ... ..           | H. Cook ... ..             | 1                 |
|                           | Mohican ... ..          | J. D. Jenkins ... ..       | 1                 |



METEOROLOGICAL REGISTERS received during the year 1902-03  
—continued.

## (4.)—North Atlantic Registers (Form No. 51)—continued.

| Line.  | Ship.                  | Captain.                 | No. of Registers. |
|--|------------------------|--------------------------|-------------------|
| New Zealand Shipping Co.                     | Waimate... ..          | J. J. Hamon ... ..       | 1                 |
| Orient ... ..                                | Austral ... ..         | C. Nicholson, R.N.R. ... | 2                 |
|  | Ophir ... ..           | F. W. Kershaw, R.N.R.    | 3                 |
|  | Ormuz ... ..           | F. S. Symons ... ..      | 2                 |
|  |                        | W. S. Shelford ... ..    |                   |
| Pacific Steam Navigation Co.                 | Orissa ... ..          | A. J. Cooper ... ..      | 1                 |
| Papayanni ... ..                             | Anatolia... ..         | D. Cruikshank ... ..     | 6                 |
| Peninsular and Oriental Steam Navigation Co. | Australia ... ..       | F. G. Cole ... ..        | 1                 |
|  | Banca ... ..           | E. P. Martin, R.N.R. ... | 4                 |
|  | Bombay ... ..          | H. S. Bradshaw ... ..    | 5                 |
|  | Borneo ... ..          | D. C. Gregor, R.N.R. ... | 5                 |
|  | Britannia ... ..       | F. H. Seymour ... ..     | 6                 |
|  | Caledonia ... ..       | E. H. Gordon ... ..      | 9                 |
|  | Canton ... ..          | C. F. Lockstone ... ..   | 1                 |
|  | Ceylon ... ..          | W. Hayward, R.N.R. ...   | 3                 |
|  | China ... ..           | T. S. Angus ... ..       | 11                |
|  | Himalaya ... ..        | W. L. Brown, R.N.R. ...  | 7                 |
|  | India ... ..           | C. Gadd ... ..           | 3                 |
|  | Massilia ... ..        | G. M. Montford ... ..    | 1                 |
|  | Sunda ... ..           | E. R. Dowell, R.N.R. ... | 7                 |
|  | Syria ... ..           | W. H. Haughton, R.N.R.   | 2                 |
|  | Victoria ... ..        | E. Crewe... ..           | 1                 |
| Philadelphia Transatlantic.                  | East Point ... ..      | L. R. W. Beavis ... ..   | 5                 |
|  | Montauk Point... ..    | B. H. Drake ... ..       | 2                 |
|  | North Point ... ..     | W. E. Robertson ... ..   | 9                 |
|  | Pinner's Point ... ..  | ?                        | 6                 |
|  | South Point ... ..     | W. E. Robertson ... ..   | 2                 |
| Prince ... ..                                | Egyptian Prince ... .. | H. M. Walker ... ..      | 4                 |
|  | Italian Prince ... ..  | C. B. Andersson ... ..   | 4                 |
|  | Moorish Prince... ..   | Wm. Barrett ... ..       | 7                 |
|  | Trojan Prince ... ..   | Henry Eagleton, R.N.R.   | 9                 |
| Pyman, Bell & Co.                            | Evelina ... ..         | — Burgess ... ..         | 3                 |
|  | Mab ... ..             | H. F. W. Rasmussen ...   | 7                 |
| Ropner ... ..                                | Kirkby ... ..          | O. N. Pettersson ... ..  | 1                 |
| Rover Shipping Co.                           | Inchkeith ... ..       | F. J. Major ... ..       | 2                 |
| Royal Mail Steam Packet Co.                  | Atrato ... ..          | R. H. Stranger ... ..    | 6                 |
|  | Danube ... ..          | L. R. Dickinson ... ..   | 4                 |
|  | La Plata ... ..        | R. T. Hernaman ... ..    | 3                 |
|  | Magdalena ... ..       | J. Pope ... ..           | 12                |
|  | Para ... ..            | H. E. Rudge ... ..       | 1                 |
|  | Severn ... ..          | J. Thomas ... ..         | 3                 |
|  | Trent ... ..           | W. A. G. Copp ... ..     | 1                 |
|  | Tyne ... ..            | W. H. B. Trigge, R.N.R.  | 5                 |

METEOROLOGICAL REGISTERS received during the year 1902-03  
—continued.

(4.)—North Atlantic Registers (Form No. 51)—continued.

| Line.                     | Ship.                    | Captain.                    | No. of Registers. |
|---------------------------|--------------------------|-----------------------------|-------------------|
| "Saba" S.S. Co.           | Saba ... ..              | G. Golden ... ..            | 2                 |
| "Saxoleine" S.S. Co.      | Saxoleine ... ..         | J. R. Waters ... ..         | 10                |
| Shaw, Savill & Albion Co. | Matatua ... ..           | W. B. Holmes, R.N.R....     | 3                 |
| Shire ... ..              | Merionethshire ... ..    | C. H. Burch ... ..          | 1                 |
| "Sibun" S.S. Co.          | Sibun ... ..             | J. Shekyls ... ..           | 4                 |
| Trafalgar S.S. Co.        | Rodney ... ..            | A. C. Airman ... ..         | 1                 |
| Turnbull, W. O....        | Alton ... ..             | M. Bell ... ..              | 1                 |
| Ulster S.S. Co. ...       | Carrigan Head ... ..     | S. Orr ... ..               | 5                 |
| Union-Castle ...          | Arundel Castle... ..     | T. Chope, R.N.R. ... ..     | 7                 |
|                           | Braemar Castle... ..     | D. Wallace ... ..           | 6                 |
|                           | Briton ... ..            | J. W. Creaghe ... ..        | 15                |
|                           | Carisbrook Castle ... .. | J. Tyson... ..              | 8                 |
|                           | Galeka ... ..            | S. H. Wilford ... ..        | 4                 |
|                           | Gaul ... ..              | J. V. Williams ... ..       | 1                 |
|                           | German ... ..            | E. A. Sylvester... ..       | 5                 |
|                           | Goorkha... ..            | F. J. Moseley, R.N.R. ...   | 4                 |
|                           | Guelph ... ..            | J. W. Hague ... ..          | 7                 |
|                           | Lismore Castle ... ..    | W. McWhinrie ... ..         | 1                 |
|                           | Pembroke Castle ... ..   | R. Walls... ..              | 9                 |
|                           | Walmer Castle ... ..     | J. C. Robinson ... ..       | 5                 |
| United S.S. Co....        | Alabama ... ..           | R. Götsche ... ..           | 5                 |
| Warren ... ..             | Kansas ... ..            | W. Waters ... ..            | 8                 |
| White Star ... ..         | Afric ... ..             | J. O. Carter, R.N.R. ... .. | 3                 |
|                           | Bovic ... ..             | T. J. Jones, R.N.R. ... ..  | 12                |
|                           | Cevic ... ..             | W. H. Clarke ... ..         | 20                |
|                           | Cymric ... ..            | T. P. Thompson ... ..       | 16                |
|                           |                          | J. B. Ranson, R.N.R. ... .. |                   |
|                           | Georgie ... ..           | R. Nicol ... ..             | 11                |
|                           |                          | G. J. Caven, R.N.R. ... ..  |                   |
|                           | Germanic ... ..          | E. J. Smith, R.N.R. ... ..  | 3                 |
|                           | Majestic... ..           | E. J. Smith, R.N.R. ... ..  | 10                |
|                           | Medic ... ..             | W. S. Atkin, R.N.R. ... ..  | 1                 |
|                           | Nomadic... ..            | W. S. Atkin, R.N.R. ... ..  | 3                 |
|                           | Oceanic ... ..           | J. G. Cameron, R.N.R....    | 9                 |
|                           | Runic ... ..             | D. Thomas ... ..            | 5                 |
|                           | Tauric ... ..            | G. J. Caven, R.N.R. ... ..  | 5                 |
|                           | Teutonic... ..           | E. R. McKinstry, R.N.R.     | 11                |
| Wilson & Furness-Leyland. | Anglian ... ..           | W. J. Tooze ... ..          | 3                 |
|                           | Cambrian ... ..          | E. B. Lee ... ..            | 11                |
|                           | Columbian ... ..         | R. F. Masters ... ..        | 11                |

For List of Registers received from Colonial Lighthouses, see p. 76.

## APPENDIX V.

## INSTRUMENTS supplied to the Royal Navy.

| Per Account.                | Baro-<br>meters. | Ane-<br>roids. | Thermometers. |      |      | Screens. | Hydro-<br>meters. |
|-----------------------------|------------------|----------------|---------------|------|------|----------|-------------------|
|                             |                  |                | Ordinary.     | Max. | Min. |          |                   |
| April 1st, 1902, afloat ... | 249              | 780            | 1,541         | 454  | 444  | 275      | 70                |
| Issued since ...            | 103              | 168            | 488           | 118  | 104  | 44       | 3                 |
| Returned since ...          | 352              | 948            | 2,029         | 572  | 548  | 319      | 73                |
|                             | 99               | 182            | 337           | 94   | 88   | 18       | 7                 |
| April 1st, 1903, afloat ... | 253              | 766            | 1,692         | 478  | 460  | 301      | 66                |

## INSTRUMENTS supplied for use at Naval Stations.

|                             |    |    |     |    |    |    |    |
|-----------------------------|----|----|-----|----|----|----|----|
| April 1st, 1902, in use ... | 77 | 92 | 266 | 40 | 58 | 10 | 14 |
| Issued since ...            | 5  | 4  | 40  | 4  | 6  | —  | —  |
| Returned since ...          | 82 | 96 | 306 | 44 | 64 | 10 | 14 |
|                             | 2  | 1  | 31  | —  | —  | —  | —  |
| April 1st, 1903, in use ... | 80 | 95 | 275 | 44 | 64 | 10 | 14 |

## DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1903.

|                                  |     |       |       |     |     |     |     |
|----------------------------------|-----|-------|-------|-----|-----|-----|-----|
| Afloat in Royal Navy ...         | 253 | 766   | 1,692 | 478 | 460 | 301 | 66  |
| In use at stations ...           | 80  | 95    | 275   | 44  | 64  | 10  | 14  |
| In store at M.O. ...             | 95  | 110   | 58    | 61  | 61  | 55  | 45  |
| " Portsmouth ...                 | 23  | 55    | 143   | 60  | 64  | 21  | 4   |
| " Devonport ...                  | 19  | 35    | 114   | 40  | 41  | 19  | 2   |
| " Chatham ...                    | 17  | 49    | 123   | 45  | 52  | 17  | 12  |
| " Sheerness ...                  | 5   | 14    | 29    | 10  | 10  | 10  | 6   |
| " Queenstown ...                 | 5   | 9     | 19    | 8   | 8   | 3   | —   |
| " Gibraltar ...                  | 2   | 2     | 8     | 2   | 2   | —   | 4   |
| " Malta ...                      | 9   | 24    | 55    | 10  | 11  | 2   | 6   |
| " Bombay ...                     | 2   | 1     | 4     | —   | 2   | 2   | 4   |
| " Halifax ...                    | 2   | 4     | 13    | 4   | 2   | 1   | 7   |
| " Bermuda ...                    | 4   | 6     | 20    | 4   | 5   | 1   | —   |
| " Jamaica ...                    | 2   | 5     | 10    | —   | 1   | 1   | 3   |
| " Cape of Good Hope ...          | 4   | 12    | 32    | 8   | 6   | 2   | 4   |
| " Trincomali ...                 | 2   | 4     | 14    | 5   | 4   | 1   | 4   |
| " Hong Kong ...                  | 10  | 20    | 60    | 17  | 22  | 11  | 9   |
| " Sydney ...                     | —   | 8     | 21    | 5   | 5   | 1   | 13  |
| " Esquimalt ...                  | 4   | 13    | 30    | 3   | 5   | 3   | 4   |
| Total April 1st, 1903 ...        | 538 | 1,232 | 2,720 | 804 | 825 | 461 | 207 |
| Lost, &c., since April 1st, 1902 | —   | —     | 146   | 24  | 8   | —   | —   |
| Under repair, April 1st, 1903    | 15  | 15    | 9     | 6   | 21  | —   | —   |

## APPENDIX VI.

## INSTRUMENTS supplied to the Mercantile Marine.

| Per Account.                   | Baro-<br>meters. | Thermometers. |      |      | Screens. | Hydro-<br>meters. |
|--------------------------------|------------------|---------------|------|------|----------|-------------------|
|                                |                  | Ordinary.     | Max. | Min. |          |                   |
| April 1st, 1902, afloat ... .. | 121              | 804           | —    | —    | 122      | 435               |
| Issued since ... ..            | 60               | 376           | —    | —    | 50       | 210               |
| Returned since ... ..          | 181              | 1,180         | —    | —    | 172      | 645               |
|                                | 45               | 351           | —    | —    | 25       | 154               |
| April 1st, 1903, afloat ... .. | 136              | 829           | —    | —    | 147      | 491               |

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

|                                |      |     |    |    |     |   |
|--------------------------------|------|-----|----|----|-----|---|
| April 1st, 1902, in use ... .. | 320  | 330 | 70 | 77 | 64  | 7 |
| Issued since ... ..            | 14   | 66  | 2  | 7  | 42  | — |
| Returned since ... ..          | 334  | 396 | 72 | 84 | 106 | 7 |
|                                | 7    | 23  | 3  | 3  | —   | — |
| April 1st, 1903, in use ... .. | 327* | 373 | 69 | 81 | 106 | 7 |

## DISPOSITION of MERCANTILE MARINE and other INSTRUMENTS on April 1st, 1903.

|                                      |     |       |    |    |     |     |
|--------------------------------------|-----|-------|----|----|-----|-----|
| In merchant ships ... ..             | 136 | 829   | —  | —  | 147 | 491 |
| „ use at stations ... ..             | 327 | 373   | 69 | 81 | 106 | 7   |
| „ store at M.O. ... ..               | 13  | 126   | 8  | 6  | 18  | 52  |
| At Liverpool Agency ... ..           | 7   | 27    | —  | —  | 6   | 18  |
| „ Glasgow „ ... ..                   | 5   | 40    | —  | —  | 6   | 24  |
| „ Dundee „ ... ..                    | 7   | 29    | —  | —  | 3   | 25  |
| „ Hull „ ... ..                      | 4   | 21    | —  | —  | 4   | 14  |
| „ Cardiff „ ... ..                   | 5   | 28    | —  | —  | 7   | 23  |
| „ Southampton „ ... ..               | 8   | 20    | —  | —  | 5   | 32  |
| „ Sunderland „ ... ..                | 4   | 24    | —  | —  | 4   | 16  |
| Total April 1st, 1903 ... ..         | 516 | 1,517 | 77 | 87 | 306 | 702 |
| Lost, &c., since April 1st, 1902 ... | 3   | 112   | —  | —  | 6   | 24  |
| Under repair, April 1st, 1903 ...    | 5   | 27    | —  | —  | —   | —   |

\* Of these barometers, 229 are lent for use of seafaring communities at fishing villages and ports.



## REPORT OF THE METEOROLOGICAL COUNCIL.

## APPENDIX VII.

REPORT OF INSPECTIONS OF STATIONS IN CONNEXION  
WITH THE OFFICE, 1902.

The Telegraphic Reporting Stations, a number of Climatological Stations, and the self-recording instruments at the Observatories and other stations have been inspected during the summer.

Dr. Buchan undertook the Scottish stations, Captain Hepworth those in the South and West of Ireland and South Wales, Mr. Gaster those in the South-east of England, Mr. R. H. Curtis those in the North-west of England, Mr. J. A. Curtis those in the North-eastern District, and Mr. Brodie the South-western District. The Secretary visited certain stations in the North of Ireland and in parts of the North-west and East of England, and in the Midlands.

The following notes taken from the Inspectors' reports, refer to new stations or call attention to changes in the observing staff or other points of importance.

## NOTES BY THE INSPECTORS.

## TELEGRAPHIC REPORTING STATIONS.

## ENGLAND AND WALES.

*Clacton-on-Sea*, July 21st.—The Barometer is unverified; it is suspended at door of Town Hall. The thermometers and rain gauge are very well exposed. Observer is most careful as to accuracy.

*Dungeness*, July 18th.—Tested all the instruments, and gave all necessary instruction to J. G. Williams, the new lightkeeper, who had already been instructed by his assistant (Mr. Smith) in the work generally.

*Holyhead*, September 18th.—The instruments here were in very good order. The rain gauge is in its old site, but during last winter some nine or ten trees which grew close to it were blown down, and in consequence the site has been much improved for rainfall observations.

For reports on anemometers, see page 117.

*Jersey (St. Aubin's)*, August 22nd.—All the instruments were in excellent order, but the dry bulb and spare thermometers still showed a large error—amounting in the former case to  $+1.0^{\circ}$ , and in the latter to  $+1.2^{\circ}$ . I advised last year that a new dry bulb thermometer should, at least, be sent, and would again urge the desirability of this action.

*North Shields*, September 3rd.—The outdoor instruments at this station are very old, and need renewal.

For report on anemometer, see page 118.

*Pembroke (St. Ann's Head)*, September 26th.—The position of the thermometer screen and rain gauge has been changed since last inspection.

*Scilly*, July 23rd.—The barometer had been shifted from its former site to the signal tower, where it stands in a room without windows, and only lit through the doorway.

For report on anemometers, see page 118.

#### SCOTLAND.

*Aberdeen*, August 5th.—The instruments continue to be kept in excellent order, and the observations are made with praiseworthy care and accuracy, but care is not taken to transmit the observations to London in proper time.

*Wick*, August 13th.—Mr. Sinclair is now all but invalided, but gives what help he can. Under Miss Sinclair's management the instruments were in excellent order, and her journal shows that the observations are made with intelligence and correctness.

*Stornoway*, August 19th.—The barometers were removed to Mr. Mackenzie's new house in Scotland Street in the spring, and, judging from the readings of the two barometers, and the monthly averages since, the removal has been made without accident. The rain gauge will be removed to the place selected for its new position when the present crops are off the ground.

#### IRELAND.

*Donaghadee*, September 18th.—The reports are noted in the Office as very good, and the inspection confirmed the note.

The station is in charge of five men, W. Keown, chief; as changes are frequent all five practise reading, and any one may take charge in the absence of the others. Keown's barometer setting was below mine, Easton's slightly above; the extreme difference between the two was  $\cdot 012$  inches.

As regards the reading of thermometers, I pointed out to one of the observers that the degree nearest to the reading should be entered if the decimal is not given, not the degree next below the reading.

*Malin Head*, September 24th.—The observer, Mr. Hailstone, was away, and the assistant, Mr. Doherty, was in charge. I left appropriate instructions with Mr. Doherty. I also ascertained that 8 a.m. (Greenwich) is the hour of morning attendance in winter, so that there ought to be no delay in the telegrams on that account.

*Roche's Point*, September 23rd.—The observer at this station, Mr. James Mountjoy, whose appointment to the Post Office was temporary, expects his relief shortly. He has become an efficient observer. The bearings used for determining the direction of the wind and considered by the observer to be true bearings, are in reality magnetic.

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### CLIMATOLOGICAL STATIONS.

#### NORMAL CLIMATOLOGICAL STATIONS\*—(SECOND ORDER STATIONS OF THE INTERNATIONAL CLASSIFICATION.)

##### ENGLAND AND WALES.

*Belvoir Castle*, September 17th.—Mr. Divers was from home at the time of my visit, but I saw the two assistant observers, who are both intelligent men, and who both read the instruments accurately. The instruments were all in good order, but the thermometer screen stood over bare earth. It was promised that grass should be laid down under it at once.

*Birmingham (Edgbaston)*, July 31st.—The instruments are in fair order and the observatory is a very useful one. The grass minimum seems to be inaccurate and should be replaced. The screen should be repainted. The observer takes intelligent interest in the work, and conducts the observations excellently. The daily cards, reporting 9 p.m. observations, have been sent to the Office for the past 18 months. The observer called the Inspector's attention to remarkable differences between the Jordan and Stokes recorders, which could not be attributed to the uncertainties of photographic paper, and will send both sets of cards to the Office for inspection in future.

*Blackpool*, July 18th.—The instruments had been moved to the site selected at the last inspection. The sunshine recorder had been removed from the North Pier, and was mounted on a wooden staging about 20 feet above the ground, near the other instruments.

A Negretti and Zambra self-recording rain gauge (which was formerly in use at Seathwaite) was placed along with the other instruments, but it required some re-adjustment. A Dines' self-recording pressure-tube anemometer had been erected on the pavilion of the North Pier.

*Buxton*, August 16th.—The substance used with the wet bulb thermometer was a piece of bandaging. I recommended that muslin and cotton be employed.

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\* 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.

*Cambridge*, August 6th.—Observations reported as very good. The thermometer corrections are rather beyond admissible limits, the daily range being increased by the extent of  $1.6^{\circ}$  F. by instrumental errors.

The sunshine recorder is losing some of its record on account of the growth of trees on the S.E.

There is a small anemometer in action, but its readings are not taken.

*Cromer*, November 10th (First Inspection).—The station occupies a very appropriate site at the top of a low hill, about half a mile to the west of Cromer Church. The horizon is hidden within the southern semi-circle by hills of about the same height; for the northern semi-circle the horizon is free to the sea. Mr. Archer is a very competent and trustworthy observer, and has carried out all the arrangements for the station, including the adjustment of the sun recorder, with skill and good judgment. The rain gauge is perhaps rather close to the hut erected for the use of the observer in the corner of the enclosure. The instruments were all in good order; there was a little spirit at the top of the minimum and grass minimum thermometers.

*Garforth*, September 3rd (First Inspection).—This promises to be an excellent station; its position is all that could be desired, and the instruments are very well placed. Mr. Smith, who is the observer, is much interested in the work, which is superintended by Mr. Ingles, of the college staff, and will, I think, prove a capable observer. The mercury of the maximum thermometer travelled up the tube before the instrument was placed in a horizontal position, and I therefore had it sent back to the Meteorological Office for exchange.

*Lowestoft*, September 2nd.—I recommended that the sunshine recorder be raised so as to be clear of any possible obstruction.

The direction of the wind is taken at the upper lighthouse, and the force of the wind at the lower lighthouse. I recommended Mr. Edwards to take the direction and the force of the wind himself, and to compare the results with those at the lighthouses.

*Prestwich*, September 6th.—The barometer had recently been broken and had been away for repair. At the time of my visit it had not yet arrived from Kew. All the other instruments were, as usual, in excellent order.

*Scarborough*, July 8th.—During the present year observations have also been made at the Manor Road Nursery. This is a much better site than the present one at the Peasholme Allotments. I recommended it be made the recognized station.

*Sheffield*, September 12th.—The grass minimum thermometer has been lowered as suggested on last inspection, and its exposure is now normal. All the other instruments were clean and in good order, and the observations are conducted in an admirable manner.



*Southampton*, August 21st.—A new observer, Mr. S. Vaughan, has been appointed since the last inspection in 1900. The instruments in his care were all clean and in good condition.

*Woburn*, July 25th.—Instruments all well exposed and observer excellent. The 9 p.m. observations can now be resumed.

#### SCOTLAND.

*Deerness*, August 14th.—The necessary repairs were ordered to be made forthwith.

*Gordon Castle*, August 8th.—It is proposed to add a sunshine recorder to this station shortly.

*Lairg*, August 11th.—After the Rev. Mr. Macraes' removal from Lairg to Edderton the observations were taken by the substitute, from whom I received the journal down to August 11th. The new observer, the Rev. Mr. Maclean, was instructed in handling the instruments, and generally in the methods of observing. A new rain gauge and a minimum thermometer have since been sent.

*Pinnore*, August 25th.—The new rain gauge, as well as the other instruments, were in excellent order. All were read correctly, except the barometer, which was set too low.

*Wolfelee*, August 29th.—On April 12th, 1902, the barometer was successfully removed to the observer's house by Captain Elliot Lockhart, the new position being, as ascertained by levelling, 50 feet lower. The instruments are well attended to and intelligently and carefully read.

#### IRELAND.

*Armagh*, September 19th.—The trees are growing up too high for the anemometer and the sun recorder.

*Belfast*, September 26th.—Observations are reported monthly to the Office, and weekly to the Registrar-General. They are sometimes referred to by engineers and for law cases.

The observations do not fully comply with the requirements of a normal climatological station. The irregularity in the hour of the evening observations, although less frequent than formerly, still exists. The Beaufort notation is used for reporting the weather instead of the international symbols. There are no observations of kind or amount of cloud, and the anemometer records are not to be relied upon without some periodical checking of the working of the instrument. A check of the direction could easily be made if the observer would note independently the direction at the hour of observation and compare his notes with the marks on the instruments. Some estimate of the performance of the instrument with regard to wind velocity could also be made by estimates of the force according to the

Beaufort scale made at the hour of observation. On glancing at the observation book I was surprised to note only one entry of thunder, and none of lightning, among the daily observations extending over a period of upwards of two years.

*Dublin (Phoenix Park)*, September 9th.—During the afternoon I visited Colonel Sims, R.E., who showed me the instruments under his charge. The observer here—a non-commissioned officer—is making a brass platform, with adjusting screws, for the sunshine recorder, which will overcome the difficulty he has experienced in keeping the instrument level.

*Markree*, September 22nd.—The instruments have become somewhat dilapidated. The mercury in the cistern of the barometer has become fouled; there seemed to be a piece of wire floating upon it. It is in consequence difficult or impossible to take accurate readings. The china mountings of the thermometers are broken in many places, and apparently are only held together by the screws that attach them to the wooden blocks in the screen. These require renewal. The funnel of the rain gauge dips into a glass, the bottom of which is too thick to allow the funnel to take up its proper place. The thermometer screen is of single louvres but quite serviceable. The observer, J. Armstrong, is much interested in the work, and will probably become in time quite competent to take charge of the instruments, including the sunshine recorder. He is at some disadvantage with the instruments in their present condition, especially with the barometer.

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#### AUXILIARY CLIMATOLOGICAL STATIONS.

##### ENGLAND AND WALES.

*Ackworth (The Friends' School)*, September 11th.—This is a proposed new station of the second order. The observer, Mr. E. B. Ludlam, B.Sc., is the science master at the school, and is very anxious to get a station established. The outfit of instruments is not quite normal, but may be accepted as satisfactory, and the exposure is good. As far as I could judge, the arrangements made, and proposed to be made, indicate that a useful station can be maintained here. The usual difficulty experienced in schools with regard to holidays will be met by the employment (and payment) of one of the resident officials during the vacations. The school is a large one, with some 300 boys and girls in residence, and it has extensive buildings and grounds.

*Alnwick Castle*, September 1st.—The instruments were clean and in good order, and the observations appear to be carefully and intelligently conducted.

For report on anemometer, *see* page 117.

*Bawtry (Hesley Hall)*, September 13th.—The instruments used for the observations sent to the Office were all in good order.

Mr. Whitaker has a Richard barograph, and a small dial anemometer, which is erected in an open position in the new gardens.

*Chatsworth*, November 19th (First Inspection).—The instruments in use at this station comprise a Richard barograph and thermograph, a rain gauge and sundry thermometers, exposed near the house and in the grounds. Various recommendations were made for the management of the instruments and the improvement of the exposure.

*Felixstowe*, July 22nd.—There is no barometer at this station. Thermometers are in a fairly good position in a Stevenson screen—somewhat sheltered on its eastern side. Rain gauge also fairly well exposed, but might be better. Sunshine recorder sheltered by vicarage on one hand and (less seriously) by schools in west; not at all a good position.

*Harrogate*, September 6th.—I visited the station with Mr. Paul. It has an excellent exposure in Bog's Field near to Harlow Moor, about three-quarters of a mile from the centre of Low Harrogate, on a high ridge. The exposure would be rural not urban, and it is perhaps 100 feet above the lower part of the town. The instruments are of the best kind and well looked after. Two thermometer screens, a Campbell-Stokes universal recorder and a Jordan recorder, on the roof of a small hut, all within a pale fence. Rain gauge, 5 in. Evaporation gauge and check rain gauge, 8 in. Earth thermometers at 1 ft., 3 ft., and 4 ft. A 6-inch exposure of earth thermometer was given up because it followed the air temperature so closely. The 1-ft. earth thermometer just penetrates the underlying rock; the others are well in the rock. Two solar radiation thermometers and a grass minimum.

*Hawarden Bridge*, September 12th.—A change of site has been made here since last year, and the observations are much improved thereby. A new 8-inch rain gauge has also been substituted for the inefficient recording gauge formerly in use.

*Littlestone-on-Sea*, July 19th.—A new observer (F. Simmonds) was at work. The solar and terrestrial radiation thermometers had not been replaced. Observer appears to be very capable and careful, and I explained to him the desirability of reading his thermometers to tenths of a degree, and he readily assented when instructed. Checked all "bearings," &c., and estimate of wind direction and force.

*Lytham*, September 11th.—The present observer was new to the work, and I found that delay in sending in returns had been due to this cause. The instruments were all in good order and are, I think, carefully read. I found in Dr. Fisher's house a Fortin barometer, which proved upon comparison with my standard to be a very good instrument, and in future, readings of this instrument are to be substituted for those of the fishery barometer hitherto used.

*Rauceby*, September 15th.—The rain gauge had been removed to the new position selected on last inspection. It is still somewhat sheltered by plants, and I requested that the high plants should be removed, and that in future only low crops should be planted around the gauge. Mr. Hope read the thermometers quickly and accurately, and I think he makes a good observer.



*Rhyl*, September 13th.—Since last year this station has had a complete outfit of new instruments, but at the time of my visit they had not been properly mounted. The station should prove a very good one indeed. The exposure of the instruments is excellent.

*Rothamsted*, July 23rd.—The station is well equipped for rainfall observations as the  $\frac{1}{1000}$ -acre gauge is available for comparison. The observations are made by Mr. Grey under Mr. Wilson's instructions, and he is very intelligent and a good observer. The barometer is old, and the screen is also of an ancient pattern and sheltered by a large cherry tree.

#### SCOTLAND.

None.

#### IRELAND.

*Killarney*, September 22nd.—The instruments are in good order. The thermometer screen has not been changed.

*Kingstown*, August 23rd.—It has not yet been found possible to arrange for 9 p.m. observations of the thermometers in the Park Gardens.

*Limerick, Corbally*, September 19th.—The rain gauge is under partial shelter in driving rain from north-westward by a very high tree, but is in the best position available. Mr. Poole Gabbett has a new 5-inch Snowden, with which he will replace the old bottle pattern gauge in use.

*Limerick, Roxborough*, September 19th.—The exposure of the thermometer screen was impaired by growth on either side of it. There are two rain gauges, a 5-inch and an 8-inch; the former is a Snowden; the latter is made of iron and painted; it is of an old pattern. A wire-fence from 3 to  $3\frac{1}{2}$  feet high running N.E. and S.W.,  $2\frac{1}{2}$  feet distant from these gauges, affords them some shelter in driving rain from north-westward.

*Mallaranny*, September 13th.—The rain gauge was not so well placed as it might have been.

Miss Kilsby said she would have it moved to a position suggested by me.

*Newcastle, Co. Wicklow. Hospital for Consumption*, September 11th.—Since last inspection, in 1900, the distance between the rain gauge and the screen has been increased from 6 feet to 12 feet, so that the former now receives no shelter from the latter.

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## GENERAL REMARKS BY DR. BUCHAN.

## REPORT OF INSPECTION OF SCOTTISH STATIONS FOR 1902.

*Barometers.*

The barometers at the stations in Table I., from Dundee to Wick, were compared with inspector's standard barometer, No. 690, which I regret to say was broken in crossing the Pentland Firth to Orkney. From Deerness to Wolfelee all that was done was to see that the observers read their barometers correctly. The inter-comparison of the barometers at Stornoway, which had been moved to new positions during the year, indicated they had been removed without accident. The barometers at Leith and Ochtertyre, which were inspected after my return to Edinburgh, were compared with the standard barometer of the Scottish Meteorological Society, No. 938, and found correct. The Table on pp. 124, 125, gives the comparisons with No. 690 or No. 938, the readings of the station barometers not being corrected except for differences of readings of the attached thermometers.

*Thermometers.*

The thermometers were read twice, first by the observer as they hung in the thermometer screen, and then by the inspector after being in water along with the standard thermometer, for the required time. Special attention was given to the action of the maximum thermometers, and also to the state of the minimum thermometers. As regards the latter, about 1° of spirit was lodged near the top of the tube at the stations Nairn and Cally, and about 2° at Marchmont. These were rectified.

*Hygrometers.*

Special attention was given to the readings of the dry and wet bulbs, as they hung in the thermometer screens, immediately when the screen was opened, with the result that these thermometers, at all the stations, were in good order for hygrometric observations.

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STATIONS, CONTRIBUTING TO THE RETURNS ISSUED BY THE  
REGISTRAR-GENERAL OF BIRTHS, DEATHS AND  
MARRIAGES FOR ENGLAND.

*Barnstaple*, August 16th.—The observations are made at the North Devon Athenæum by Mr. Thos. Wainwright. When certain matters are attended to, the station will, I think, be an excellent one.

*Bristol*, August 18.—The station—Over Court—is about five miles (as the crow flies) from Bristol, and is essentially a rural one, the observations made there giving, in all probability, an incorrect representation of the meteorological conditions prevailing in the city itself. The proprietor, Mr. R. C. Cann Lippincott, was away

at the time of my visit, but I saw the gardener, Mr. Delbridge, who usually takes the observations. No barometrical observations are supplied. The station appears to be upon the whole an efficient one.

*Bradford*, September 4th.—This station is situate in the centre of Bradford, where there are insurmountable difficulties in securing a good site, and as the result the *locale* of the instruments cannot be described as satisfactory. Access to them all is difficult, and the rain gauge cannot be reached for examination in the usual way. The series of observations covers a period of several years, and Mr. Johnson's interest in them is shown by the trouble he has taken to do the best his difficult surroundings would admit of.

*Carlisle*, August 28th.—The station is at the Cemetery,  $1\frac{1}{2}$  miles south of Carlisle, well above the city, and about 114 feet above sea level. The Cemetery is liberally planted with flowers, shrubs, and trees, but they do not interfere with the rain gauge or thermometer screen, which are in a small railed enclosure. The screen is a small double-cased wooden hut or hood, open to the north. The boards are set so as to give access of air, and the depth from back to front is sufficient to keep the sun off the bulbs when it goes north of the east and west line.

Thermometers, dry and wet, about five feet above ground.

Rain gauge on a high column, rim about four feet above ground. Eight-inch tin plate gauge (with earthenware catch vessel) getting rather the worse for wear. Evaporation of the equivalent of one inch of rain measured from shallow eight-inch can.

Barometer (Fortin, by Negretti) in moderately good order.

Observer has read the instruments for 23 years; very good observer. Station has been in existence for upwards of 40 years and is in charge of the Burial Committee. The station is practically rural—not urban—and has satisfactory possibilities.

The rain gauge and screen should be replaced in course of time, if not immediately, particularly the latter. The position of the former is probably dictated by the consideration that the railings would interfere if the gauge were on the ground, as the enclosure is rather restricted. The general surroundings of trees and shrubs make it very likely that the added height above the ground does not interfere with the record as it would do in other situations.

*Coventry*, November 18th.—The station is under the direction of Dr. E. Hugh Snell, the Medical Officer of Health for the city. The barometer is a "Fortin"; the outdoor instruments are placed in the grounds of the City Hospital, about three-quarters of a mile distant, where, except for sunshine, they have an excellent exposure.

The outfit of instruments is complete, and includes solar, grass, and earth thermometers, a Negretti's self-registering rain-gauge, and a Jordan sunshine recorder, in addition to the usual thermometers and rain gauge. The instruments themselves are

satisfactory, and the thermometer screen though not of the standard pattern is yet on the Stevenson principle and may be accepted.

The observations will correctly represent the climate of Coventry.

Dr. Snell is much interested in the work and expresses himself as willing to do all in his power to meet the Office requirements.

*Halifax* ("Bermerside," Skircoat Green), September 5th.—This is a station which has for some years been reporting to Mr. Glaisher. Mr. Gledhill, F.R.A.S., the observer, has charge of Mr. Edward Crossley's Astronomical Observatory, and possesses some excellent instruments, which are exposed in an extensive demesne. He was quite ready to bring his practice respecting the observations to agree with that adopted by the Office, but said he would not be able to add to those which he at present made.

*Halifax* (Public Library), September 4th.—The equipment of instruments is good and the position very good, but some of the methods hitherto followed have not been in accordance with those desired by the Office. Mr. Whiteley expressed his willingness to fall into line with the Office requirements, and I think the station will then become a very useful one.

*Hull*, September 9th.—This station is situate in the Pearson Park, where observations have been conducted for many years past. The outfit of instruments is complete and good, and includes a Stokes sunshine recorder now well placed. The thermometer screen and the rain gauge were a good deal sheltered by trees and shrubs. I think the station will fairly represent the conditions of Hull. The observer, Mr. H. B. Witty, is anxious to make the station a thoroughly efficient one.

*Huddersfield* (Edgerton Cemetery), September 5th.—The observer here is Mr. J. Firth. The position of the station is excellent, but the necessity for making it as little obtrusive as possible detracts somewhat from its value. Mr. Firth's practice has not been quite that followed by the Office, but he is willing to conform as far as possible to the recognized rules. At present he has no dry and wet bulb of the ordinary pattern, but uses maximum and minimum thermometers for those observations. The barometer is a "Fishery" instrument, and is kept out of doors in a case erected for it near the thermometers. The record kept shows that great care is bestowed upon it, and Mr. Firth is evidently anxious that his observations shall be as good as possible.

*Leeds*, June 16th.—This is a roof station of a very pronounced type in connexion with the Museum of the Philosophical Hall, and does not compare with other exposures that I am acquainted with, nor do the hours of observation correspond with those of other stations. The observer is competent, and compiles a meteorological summary for Leeds and neighbourhood, giving sunshine records for a number of stations.

*Nottingham*, September 16th.—The instruments are at Nottingham Castle, which is now used as a public museum. The



thermometer screen and rain gauge are in a railed enclosure on the level plateau on which the castle stands. The position is satisfactory as far as temperature is concerned, but some rain must, I think, be lost. The outfit of instruments is excellent; but the screen, instead of being white, had been painted a dark green.

There is a second full set of instruments on the roof of the castle, about 76 feet above the ground, and these, too, are regularly observed. The barometer is a "Fortin," and hangs in the museum, while there is a spare instrument of the same make in Mr. Brown's office.

The present observations may, in my opinion, be taken without hesitation as representing Nottingham, except as to rainfall, which is probably somewhat deficient.

*Preston, September 9th.*—The position of the instruments is not at present satisfactory, but the instrumental outfit is good, with the exception of the barometer, which needs cleaning and repair. If a position were secured for the instruments in the Deepdale enclosure, the station would, I feel sure, become a very valuable one. Mr. Jackson's register of observations shows that he takes great care to record them accurately.

*Salisbury (Wilton House), August 19th.*—This station, on the estate of the Earl of Pembroke and Montgomery, is about  $2\frac{1}{2}$  miles (as the crow flies) from Salisbury, and is like that at Bristol, essentially a rural one. The observations are made by Mr. T. Challis, the head gardener, but four of the under gardeners have been trained to take observations in turn. The scale of the barometer was very much worn and indistinct, but observer promised to have the instrument renovated. The outdoor instruments are well exposed in the kitchen garden, and were in good condition, but the minimum thermometer showed a very large error, being  $2.0^{\circ}$  too low. I advised that it would be well to obtain a Stevenson screen, and Mr. Challis promised that if a specification could be sent from the Office he would have one constructed. Mr. Challis evidently takes much interest in the work.

*Truro, August 13th.*—This station belongs to the Royal Institution of Cornwall, and the observations are made by the Curator, Mr. G. Penrose. The barometer is an old one by Barrow, and, although fairly accurate, needs cleaning and repairing. The outdoor instruments are on the leaded roof of the Institution. The thermometer screen is a large wooden hexagonal structure, the upper part of which is louvred, while the lower half is pierced with a large number of holes an inch in diameter; the circulation of air round the thermometers must, I think, be good. The heights of the various instruments above the ground and above mean sea level were obtained many years ago, and are not quite accurate. There is a Jordan recorder here (twin pattern), but its exposure is not perfect; in the winter time, it must, I think, be interfered with by the Cathedral to the south-eastward, and only 150 feet distant.

In spite of the unorthodox exposure of the thermometers the station appears to be upon the whole a good one.



*Wrottesley Park*, September 19th.—The barometer is a "siphon," by Troughton & Sims, about 60 years old, and in need of cleaning. The thermometer screen is a good deal warped, and the minimum thermometer has not been kept in the screen, but at some distance away and quite close to the ground. Excellent sites could no doubt be found for the instruments, but at present the arrangements are not in accordance with the Office rules. Mr. Simpson said he was willing to continue the observations already made, but owing to pressure of other work could not undertake to add to them. I was shown a number of volumes of Anemograms, obtained from a pressure plate anemometer, and of other meteorological observations made at Wrottesley going back to 1843.

#### FISHERY BAROMETER STATIONS.

*Scarborough*, September 8th.—The instrument was clean, and I was informed it is much used by the fishermen of the port.

*Elly Bay*, September 16th.—I found the Fishery barometer there in perfect order. The fishing population is said to be small, but the barometer is found to be useful.

#### STATIONS WITH SELF-RECORDING INSTRUMENTS.

##### A.—OBSERVATORIES

(FIRST ORDER STATIONS OF THE INTERNATIONAL CLASSIFICATION).

##### ENGLAND AND WALES.

*Falmouth*, November 11th to 20th.—Here all the meteorological instruments were found working satisfactorily, and the photography as usual was very good. Wednesday morning (November 12th), Mr. W. Fox called, regarding the unsafe condition of the thermograph screen. I had to dismount the thermograph tubes as well as the other thermometers, and took the screen down entirely.

On examination I gave instructions for the work to be proceeded with at once. Advantage was taken on removal of the screen to returf the ground underneath and around the thermometers. The screen, having been thoroughly and strongly repaired and painted, was replaced November 18th, and in the course of the afternoon all the thermometers were fitted up again; the zero dots were shifted from the summer to the winter position and the instrument finally started at 5 p.m. The curves which came off on the following day were, after being developed, found to be good.

*Oxford (Radcliffe Observatory)*, September 11th-12th.—The self-recording meteorological instruments were all in excellent order and carefully looked after.

Since the last inspection the Newman standard barometer, No. 1220, has been cleaned, scale improved, mercury boiled, &c., but the index error was not known. I took down the Fortin standard barometer, No. 657, and a series of comparisons were made. The result of these gives the index correction of the Radcliffe barometer as + '003 in.

*Stonyhurst College*, August 29th–30th.—The curves from the self-recording instruments at this observatory appeared to be satisfactory.

The blades of the fan governors are becoming much worn, and new ones are wanted.

#### SCOTLAND.

*Aberdeen Observatory*, October 7th to 9th.—On examining the barograph I found that two of the screws which bind the upper metal plate to the lower plate of the cistern had given way, but as I was unable to remove the broken screws owing to corrosion, I got Mr. Munro to make two brass clamps, which have since been fitted to the cistern, so that the instrument is now quite secure.

*Fort William*, September 27th to 29th.—The photography was fairly good, but the sheets were more or less discoloured by stray light. In the case of the thermograph it was noticed that a portion of the black had flaked off the dry bulb tube, and in consequence I dismantled the thermometer and reblacked the stem. A cardboard shield was fitted up in the barograph box to keep out any reflected light from falling upon the paper.

*Glasgow Observatory*, September 24th to 26th.—All the instruments here were found working satisfactorily, excepting the anemometer clock.

At the end of June last a Dines' pressure tube anemometer was erected on a 3 inch iron pipe, which is secured by iron ties to the Robinson anemometer stand, and which is placed on the north-east side. The position was selected by Professor Becker so that the tube would have the least possible effect on the records of the cup anemometer, the winds being less prevalent from that quarter. The head of the pressure tube is about  $4\frac{1}{2}$  feet higher than the cups, whilst the latter revolve at a distance of one foot from the iron tube, but to what extent the records might be influenced can only be ascertained after trial.

#### IRELAND.

*Valencia*, August 19th–21st.—The self-recording instruments at this observatory appeared to be working satisfactorily.

The stays to the cup arms are becoming very thin in places, and will not last much longer. When new ones are supplied they should be of copper.

## B.—ANEMOGRAPH STATIONS.

## ENGLAND AND WALES.

*Alnwick Castle*, September 1st.—As the instrument appeared to be working well, I did not dismount it. I examined the exterior parts and found all in good order.

*Blackpool*, September 10th.—While at this station I was shown a pressure tube anemometer which has recently been erected upon the North Pier. I gave the observer some needed instructions as to the management of the pen, and for adjusting the float, which was a good deal out. The records from this instrument, which is not far from the cup anemometer at Fleetwood, may at times be valuable for comparison with the Fleetwood records.

*Fleetwood*, September 9th–10th.—Mr. Gaulter and his son, who, I was told, acted as his deputy, were both away on holiday. In their absence Miss Hall, daughter of the caretaker of the Mount, was in charge of the instrument.

The new kiosk is considerably larger than the former building, both in area and height, and in its construction regard has been had to the requirements of the anemometer, which is placed on the top of the small dome which surmounts it. I estimated the height of the cups above the ground level to be 40 feet, but, as the Mount itself rises considerably above the general level of Fleetwood, they dominate everything in the neighbourhood, and have as good an exposure as an instrument of its weight, and with its limitations, can be expected to have.

I opened the exterior part, but did not think it needful to dismount the cups, especially as the wind was rather strong and gusty. The bearings were all very deficient in oil, and the worm-wheel of the direction fans had been put together improperly, one end was grinding into the bearing, and causing a good deal of friction as well as undue wear upon the shoulder; this was taken down, the bearings properly arranged, and the fans reversed. Adjustments of the bearings of the bevelled wheels of the recording gear were also made, and the clock examined. After orientation the instrument worked very satisfactorily.

*Holyhead*, September 15th–18th.—*Cup Anemometer*.—The spindle carrying the cups had again worked loose, and I now had it brazed and again riveted before replacing it. I again tested, in a strong wind, the position of the vane relative to the direction of the wind, and the result was similar to that obtained last year.

In orienting the instrument allowance was made for the error of the vane.

*Pressure Tube Anemometer*.—This anemometer was in a more satisfactory condition than at any previous inspection.

Some years ago I fitted to this instrument an arrangement for feeding ink to the pen from a small reservoir by means of a thread or two of wick. The arrangement has been in use ever since, and the uniformly good traces which Mr. Davies gets are, I think, due in great degree to it.



*Pressure Plate Anemometer.*—The working of the chain is quite satisfactory, and the friction rollers, intended to prevent the plate from turning, act admirably. I found a serious corrosion was going on in the bolts and nuts which hold the wire stays to the mast, and it has already proceeded so far as to make them very insecure.

The spring was re-adjusted and instrument left in good working order.

*Bridled Anemometer.*—This was also dismantled and cleaned in every part. It is working satisfactorily, and the wheel-pen continues to give excellent traces.

*General.*—The instruments were all in very good working order. The whole of the masts and the woodwork again require painting.

*North Shields, September 3rd and 5th.*—I found the instrument well oiled and in general good order, but, as usual, much in need of cleaning. The instrument is an old one and shows signs of wear. Nothing has been done to improve the access to the vane and cups.

*Scilly, July 19th-24th.*—*Pressure-tube Anemometer.*—When I left it the instrument was working well, but, I think, better traces could be obtained.

*Robinson Anemometer.*—None of the parts show signs of undue wear, and notwithstanding its exposed position the instrument is still in very good condition. When put together again it worked very satisfactorily, and was yielding very good traces when I left.

*Yarmouth, September 2nd-4th.*—The anemometer at this station was in good order. The marking of the velocity pencil has not been quite satisfactory for some period, and I gave extra time to the recording apparatus and did the best I could with the old pencils.

The trace is improved, but I was unable to quite get rid of the horizontal line at the beginning of each revolution, but it is not so pronounced as before, and the marking is more distinct.

It would be a decided advantage if silver helices could be fitted to this instrument, as the traces in damp weather would be much better, and the curves generally would be improved.

There is no case or cover for the recording apparatus.

#### SCOTLAND.

*Deerness, October 2nd and 3rd.*—On examination I found that three out of the four corner posts required renewing.

Instructions were given to the observer to be more particular in future as to the agreement of the times as shown by the traces and clock. The anemometer was in good order; the instrument evidently receives careful attention.



## IRELAND.

*Armagh*, August 27th–28th.—The Robinson anemograph at this Observatory is evidently regularly attended to and lubricated.

The worm on the direction fan-spindle is worn, and one of the *lignum vitæ* bearings is cracked, but not sufficient to necessitate a new one at present.

The orientation was satisfactory.

On testing the action of the “Stonyhurst” discharger I found that the bottom copper disc had come right away from the cylinder, so that the discharger had not acted for some time. It was repaired and re-adjusted.

*Dublin (Phoenix Park)*, August 15th–16th.—The curves appeared to be satisfactory.

The base of each support of the stand has been faced for about three feet up to prevent further decay.

*Kingstown*, August 25th–26th.—This was my first examination of the Robinson anemometer here.

The recording part is modern, but the exterior portion is of an older type.

Owing mainly, no doubt, to the excellent cleaning, &c., it received last year, the instrument was on the whole in good condition, but the oil for the direction rollers was very thick and dirty. This was removed, all parts cleaned, and the sperin supplied by the Office employed, and it will be used for future lubrication.

The clock required attention, as it was dirty and had rusted in places. It was cleaned, and all left in good order, and as a substantial wood and glass case has been fitted over the recording apparatus, the clock, &c., should now keep in better condition.

Judging by the various flags and vanes in the harbour the vane seemed to be pointing well in the direction of the wind; the velocity, however, was rather low.

Full particulars as to the position and surroundings of the instrument have been given by Mr. R. Curtis, and I thoroughly endorse his opinion that the value of the records would be much increased if the cups, &c., could be fitted on a lattice iron stand, say another 12 to 15 feet above the ridge of the anemometer house.

The Dalkey and Killiney hills to the S. and S.E. must affect winds from those quarters.

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C.—SUNSHINE STATIONS.

## ENGLAND AND WALES.

*Blackpool*, September 10th.—The exposure of the recorder is very good, but I was told it is proposed to establish a new station a short distance away, which it is thought will prove more suitable for all the instruments.

*Broadstairs*, October 7th.—The exposure is perfect. It is under consideration to shift the instrument to a water tower close to the office of the Urban District Council, where the exposure would be quite as good and the instrument would be more directly under Mr. White's control.

*Margate*, October 6th.—The sunshine recorder here has, since it was last inspected, been removed to a new site, scarcely so good as the former one, but more readily accessible and affording a nearly perfect horizon. It is now placed on the parapet of a tower formerly used as a pumping station for the water supply, and is 40 feet above the ground. The instrument is of the "universal" pattern. The azimuth adjustment of the recorder was faulty and the lens was not central in the bowl; the latter was rectified, and the adjustment for meridian made as accurately as could be done by compass.

*Newquay*, August 14th.—The recorder here had been tampered with. The pedestal upon which the ball rests was loose, and the ball itself was badly scratched, and in some places dented. I screwed the pedestal firmly up, and afterwards tested the position of the lens as regarded concentricity, &c. The ball should, I think, be replaced by a new one. To prevent further mischief I strongly urged that the brick pillar upon which the recorder stands should be enclosed within a railing of sufficient strength and height to keep out all intruders.

*Ramsgate*, October 7th.—This is a new station and the instrument had not been permanently fixed in its position; some readjustment was needed before this could be done. The exposure of the instrument is most satisfactory, and an excellent stand has been erected for it upon the ridge of the roof of the Corporation Offices. The arrangements for the changing of the cards appeared to be quite satisfactory, and I think the station will yield a trustworthy record of sunshine.

*Rauceby*, September 16th.—A sunshine recorder had been obtained by Rev. V. F. Willson, M.A., to be set up at Rauceby Hall, and I was asked to select a position for it.

There was no site with an uninterrupted exposure, and I eventually decided that the top of the wall of the kitchen garden, on its south-east side, was the best available, and I accordingly placed the instrument there and carefully adjusted it in its position. I then securely bedded the slate slab on to the coping stone of the wall with neat Portland cement.

Some sunshine will be cut off by trees in the early summer mornings and in the evenings.

*Scarborough*, September 6th.—The instrument was out of proper adjustment, and I therefore dismounted it, and after carefully re-adjusting it both for meridian, latitude, and level, I firmly cemented it in its place.

*Sheffield (Attercliffe)*, September 12th.—There was no sunshine at the time of my visit, and I could not therefore test the

adjustments for meridian or latitude. The cards shown to me were satisfactory.

*Sheffield (High Hazel's Park)*, September 12th.—Having been informed by Mr. Howarth that he had recently placed a new sunshine recorder on the roof of the High Hazel's Museum, I called to see the instrument.

The Museum building is an old mansion, standing on relatively high ground in the park, which is about  $1\frac{1}{4}$  miles to the south of Attercliffe. The position is good. There is nothing near to obstruct the sun's rays, and the only loss of record will be when the sun is below the hills.

The instrument was not fixed in its place, but was simply resting on a small wooden platform which had been prepared for it. I adjusted it, and then secured it in its place by screwing fillets of wood on each side of it.

*Southampton*, August 21st.—Owing to the erection of a flagstaff, which interfered with the exposure of the instrument, the sunshine recorder has been moved from its old position on the edge to a place on the sloping side of the roof. It has been firmly and carefully fixed, and the position is a good one, though somewhat difficult of access.

#### SCOTLAND.

*Fort William*, August 20th.—The sunshine recorder was safely removed to its new position, as indicated in last report, in October, 1901. A new stand was provided at the time.

#### IRELAND.

*Dublin (Phoenix Park)*, August 16th and 23rd.—The adjustment of the sunshine recorder for level and latitude was slightly out; this was corrected. The recorder has been mounted on a wooden stand since the last inspection, but this has not proved altogether satisfactory, and I went again to this station on August 23rd, after Colonel Sims' return, and he agreed to have a metal bed made, with set screws at each angle, to replace the present wood stand. I fully explained the method of adjustment to Corporal Rose, and the new stand was made and recorder refixed early in September.

*Kingstown*, August 23rd.—The sunshine recorder was slightly altered for latitude, the level and meridian being satisfactory. Trouble is experienced with the birds, which—especially in spring and summer—peck and drag at the cards. To prevent this the slips had been fastened in with a kind of "bird-lime," but this made it difficult to get the Noon line set properly, and I had the mixture removed, especially as the sphere was coated with it.

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NOTE on the state of the SELF RECORDING METEOROLOGICAL INSTRUMENTS, in operation at KEW OBSERVATORY, for the year ending MARCH 31, 1903, by C. CHREE, SC.D., F.R.S., Superintendent.

The self-recording instruments are all in good order, and the tabulation of the photographic curves is kept up to date.

No change has been made in any of the instruments during the year, and they have received the annual cleaning and examination.

A new close-fitting wooden cover has been fitted to the recording portion of the Robinson anemograph, and the trouble caused by dampness of the curves has been considerably reduced.

The performance of the Dines pressure tube anemometer has been generally satisfactory.

The tabulation of the electrometer curves has been taken in hand, and values for each month in 1902 were published in the Report for 1902 of the National Physical Laboratory.

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REPORT of WORK done at the BEN NEVIS OBSERVATORIES during the year ending MARCH 31, 1903.

During the year the work at the two observatories has been carried on in the same manner as heretofore.

In the summer of last year, the Directors issued a memorandum stating that it was their intention to close the observatories in October, 1902, as they were not in possession of the necessary funds to carry them on after that date; and that they could not, in view of the large sums already subscribed, make further appeals to the public for this object. They also pointed out that the observatories had been in operation long enough to give the materials for much original study, and that the discussion of the results already arrived at had yielded conclusions of great value.

However, shortly thereafter, the Treasury appointed a Committee of Inquiry into the administration of the Parliamentary Grant for Meteorology, and the Directors were urged by Members of Parliament and others interested in the work of the observatories to continue the work there for two years longer until such new arrangements as the Committee of Inquiry might recommend came into operation. The necessary funds were soon obtained by subscription, and the observatories will continue in full working order till October, 1904.

The printing of the observations for the five years, 1893-97, which will form the third Ben Nevis Volume of the Transactions



of the Royal Society of Edinburgh is being proceeded with, and will be completed during the ensuing winter.

Dr. Buchan is continuing and extending the discussions of the inter-relations of pressure, temperature, humidity, sunshine, and rainfall at the two observatories as outlined in last year's Report to the Meteorological Council. The "constants" of the results already arrived at, more particularly those bearing on weather forecasting, have been completed for the  $12\frac{1}{2}$  years ending December, 1902. Some of the other "constants" deduced from the Ben Nevis Observations have also been completed for the same term of years.

The intermediate station at 2,190 feet high, was in use for three weeks in August, 1902, and a very valuable series of observations there, and also at other temporary stations on the Ben, above and below it, were taken by Mr. J. H. MacLagan-Wedderburn and Mr. R. Aitken. These observations are being discussed by Mr. Omond.

ALEXANDER BUCHAN.

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## COMPARISON OF INSTRUMENTS.

The following tables give the corrections required to be applied to the readings of the various instruments to make them agree with the Inspector's standards :—

## BAROMETERS.

## TELEGRAPHIC REPORTING STATIONS.

| STATION.                      | Inspector's<br>Standard<br>Corrected. | Reporting<br>Barometer. | Check<br>Barometer. | REMARKS.  |
|-------------------------------|---------------------------------------|-------------------------|---------------------|---|
| ENGLAND AND WALES.            |                                       |                         |                     |   |
| Bath .. .. .                  | Inches.<br>—                          | Inches<br>—             | Inches.<br>—        | Not visited.  |
| Dungeness .. ..               | 30.108                                | + .001                  | + .010              | { The large error in the<br>reporting bar. was<br>confirmed by several<br>readings. |
| Holyhead .. .. .              | 30.320                                | + .018                  | + .004              |   |
| Jersey .. .. .                | 30.240                                | - .024                  | - .020              |   |
| Liverpool (Bidston) ..        | —                                     | —                       | —                   | Not visited.  |
| London .. .. .                | 30.005                                | - .014                  | —                   | Not visited.  |
| Loughborough .. ..            | —                                     | —                       | —                   |   |
| Oxford .. .. .                | 29.622                                | + .003                  | —                   |   |
| Pembroke (St. Ann's<br>Head). | —                                     | —                       | —                   | Not visited.  |
| Portland Bill .. ..           | —                                     | —                       | —                   |   |
| Scilly .. .. .                | 30.054                                | .000                    | - .006              |   |
| Shields .. .. .               | 29.642                                | + .007                  | - .002              |   |
| Spurn Head .. ..              | —                                     | —                       | —                   |   |
| Yarmouth.. .. .               | 29.821                                | - .018                  | + .002              |   |
| SCOTLAND.                     |                                       |                         |                     |   |
| Aberdeen .. .. .              | 30.000                                | .000                    | .000                | Not visited.  |
| Leith .. .. .                 | 30.160                                | + .002                  | + .006              |   |
| Nairn .. .. .                 | 30.014                                | + .001                  | + .004              |   |
| Stornoway .. .. .             | —                                     | —                       | —                   |   |
| Sumburgh Head ..              | —                                     | —                       | —                   |   |
| Wick .. .. .                  | 29.950                                | + .008                  | .000                |   |
| IRELAND.                      |                                       |                         |                     |   |
| Blacksod Point .. .           | —                                     | —                       | —                   |   |
| Donaghadee .. ..              | 30.296                                | + .014                  | - .001              |   |
| Malin Head .. ..              | 29.842                                | + .006                  | + .012              |   |
| Parsonstown .. ..             | 29.762                                | + .014                  | —                   |   |
| Roche's Point .. ..           | —                                     | —                       | —                   |   |
| Valencia .. .. .              | 29.819                                | + .009                  | + .006              |   |

## BAROMETERS.

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

| STATION.                   | Inspector's<br>Standard<br>Corrected. | Reporting<br>Barometer. | Check<br>Barometer. | REMARKS.                              |
|----------------------------|---------------------------------------|-------------------------|---------------------|---------------------------------------|
| ENGLAND AND WALES.         | Inches.                               | Inches.                 | Inches.             |                                       |
| Belvoir Castle .. ..       | —                                     | —                       | —                   |                                       |
| Birmingham<br>(Edgbaston.) | 29·637                                | + ·002                  | —                   |                                       |
| Buxton .. ..               | —                                     | —                       | —                   |                                       |
| Cambridge .. ..            | 29·774                                | + ·008                  | —                   |                                       |
| Cheadle .. ..              | —                                     | —                       | —                   |                                       |
| Cockle Park, Morpeth..     | 29·456                                | - ·005                  | —                   |                                       |
| Darwen .. ..               | 29·529                                | + ·003                  | —                   | A Fortin barometer                    |
| Durham .. ..               | 29·755                                | + ·006                  | —                   |                                       |
| Fulbeck .. ..              | —                                     | —                       | —                   |                                       |
| Garforth .. ..             | 29·339                                | + ·009                  | —                   |                                       |
| Hillington .. ..           | —                                     | —                       | —                   |                                       |
| Hollesley Bay .. ..        | 29·090                                | - ·014                  | —                   |                                       |
| Lowestoft .. ..            | —                                     | —                       | —                   |                                       |
| Plymouth .. ..             | 29·996                                | - ·025                  | —                   |                                       |
| Prestwich .. ..            | —                                     | —                       | —                   | Barometer broken and<br>under repair. |
| Rounton .. ..              | —                                     | —                       | —                   |                                       |
| Scarborough .. ..          | —                                     | —                       | —                   |                                       |
| Seaham .. ..               | 29·676                                | - ·002                  | —                   |                                       |
| Sheffield .. ..            | —                                     | —                       | —                   |                                       |
| Southampton .. ..          | 30·142                                | - ·012                  | —                   |                                       |
| Stonyhurst .. ..           | 29·448                                | + ·007                  | —                   |                                       |
| Wakefield .. ..            | —                                     | —                       | —                   |                                       |
| Woburn .. ..               | 29·750                                | ·000                    | —                   |                                       |
| York .. ..                 | —                                     | —                       | —                   |                                       |
| SCOTLAND.                  |                                       |                         |                     |                                       |
| Cally .. ..                | —                                     | —                       | —                   |                                       |
| Cargen .. ..               | —                                     | —                       | —                   |                                       |
| Deerness .. ..             | —                                     | —                       | —                   |                                       |
| Dundee .. ..               | 29·773                                | + ·003                  | —                   |                                       |
| Dunrobin .. ..             | 30·095                                | + ·001                  | —                   |                                       |
| Fort William .. ..         | —                                     | —                       | —                   |                                       |
| Gordon Castle .. ..        | 29·902                                | + ·006                  | —                   |                                       |
| Lairg .. ..                | 29·576                                | + ·016                  | —                   |                                       |
| Marchmont .. ..            | —                                     | —                       | —                   |                                       |
| Ochtertyre .. ..           | 30·134                                | + ·014                  | —                   |                                       |

## BAROMETERS.

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

| STATION.               | Inspector's<br>Standard<br>Corrected. | Reporting<br>Barometer. | Check<br>Barometer | REMARKS. |
|------------------------|---------------------------------------|-------------------------|--------------------|----------|
| SCOTLAND— <i>cont.</i> |                                       |                         |                    |          |
|                        | Inches.                               | Inches.                 | Inches.            |          |
| Pinmore .. .. .        | —                                     | —                       | —                  |          |
| Poltalloch .. .. .     | —                                     | —                       | —                  |          |
| Rothsay .. .. .        | —                                     | —                       | —                  |          |
| Wolfelee .. .. .       | —                                     | —                       | —                  |          |
| IRELAND.               |                                       |                         |                    |          |
| Armagh .. .. .         | 29.588                                | + .003                  | —                  |          |
| Belfast .. .. .        | 30.470                                | + .007                  | —                  |          |
| Dublin, Glasnevin ..   | 30.112                                | + .007                  | —                  |          |
| Phoenix Park           | 29.804                                | + .001                  | —                  |          |
| Markree .. .. .        | —                                     | —                       | —                  |          |
| Newcastle, Co. Wicklow | 29.702                                | .000                    | —                  |          |
| Parsonstown .. .. .    | 29.762                                | + .014                  | —                  |          |

## BAROMETERS.

## OTHER CLIMATOLOGICAL STATIONS.

| STATION.               | Inspector's<br>Standard<br>Corrected. | Reporting<br>Barometer. | Check<br>Barometer. | REMARKS.                                   |
|------------------------|---------------------------------------|-------------------------|---------------------|--|
| ENGLAND AND WALES.     |                                       |                         |                     |  |
|                        | Inches.                               | Inches.                 | Inches.             |  |
| Barnstaple .. .. .     | 29.779                                | + .005                  | —                   |  |
| Bradford .. .. .       | 29.451                                | + .011                  | —                   | A Fortin barometer.                        |
| Carlisle .. .. .       | —                                     | —                       | —                   | Not compared.                              |
| Halifax, Bermerside .. | —                                     | —                       | —                   |  |
| .. Public Library      | 29.209                                | - .011                  | —                   | A Fortin barometer.                        |
| Hull .. .. .           | —                                     | —                       | —                   | Not compared.                              |
| Huddersfield .. .. .   | —                                     | —                       | —                   | A Fishery barometer,<br>not compared.      |
| Leeds .. .. .          | 29.723                                | + .017                  | —                   |  |
| Littlestone-on-Sea ..  | 30.114                                | + .004                  | —                   |  |
| Lytham .. .. .         | 30.003                                | - .001                  | —                   |  |
| Nottingham .. .. .     | —                                     | —                       | —                   | Not compared.                              |
| Preston .. .. .        | —                                     | —                       | —                   | Vernier out of order.                      |
| Rothamsted .. .. .     | 29.629                                | + .010                  | —                   |  |
| Salisbury .. .. .      | —                                     | —                       | —                   | Not compared.                              |
| Truro .. .. .          | 30.080                                | .000                    | —                   |  |
| Wrottesley Park ..     | 29.960                                | + .052                  | —                   | A siphon barometer<br>very old instrument. |
| IRELAND.               |                                       |                         |                     |  |
| Kingstown .. .. .      | 29.789                                | - .001                  | —                   |  |



## APPENDIX VIII.

## STORM WARNING CHECKING.

COMPARISON between the WARNINGS and the subsequent WEATHER in 1902.

| 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. ...   | 51                     | 34   | 8  | 5   | 1  | 3   | —   | April, 1.                               |
| „ E. ...             | 32                     | 11   | 16   | 4   | —  | 1   | —   |   |
| „ N.W. ...           | 47                     | 30   | 14   | 3   | —  | —   | —   | Mar. 13.                                |
| „ W. ...             | 47                     | 19   | 22   | 5   | —  | —   | 1   |   |
| Ireland, S.W. ...    | 47                     | 26   | 14   | 6   | —  | —   | 1   |   |
| „ N.W. ...           | 51                     | 35   | 9  | 3   | 1  | 3   | —   | Mar. 13.                                |
| Irish Sea ...        | 42                     | 33   | 3  | 2   | 2  | 2   | —   | Oct. 22.                                |
| St. George's Channel | 34                     | 16   | 14   | 3   | —  | 1   | —   |   |
| Bristol Channel ...  | 32                     | 20   | 10   | 1   | —  | 1   | —   |   |
| England, S.W. ...    | 33                     | 20   | 11   | 2   | —  | —   | —   |   |
| „ S. ...             | 29                     | 14   | 11   | 4   | —  | —   | —   |   |
| „ S.E. ...           | 27                     | 12   | 11   | 4   | —  | —   | —   | Nov. 8.                                 |
| „ E. ...             | 26                     | 8  | 14   | 3   | —  | 1   | —   |   |
| „ N.E. ...           | 37                     | 19   | 14   | 3   | —  | 1   | —   |   |
| Totals ...           | 535                    | 297  | 171  | 48  | 4  | 13  | 2   |   |
| Percentages...       | —                      | 55·5   | 32·0   | 9·0   | 0·7  | 2·4   | 0·4   |   |

GALES EXPERIENCED in 1902 for which no WARNINGS were issued.

These were unusually few in number, and were, as a rule, of no great severity. They occurred on the following dates, and in the following districts :—

*March 13th*, in Scotland N.W. and Ireland N.W. At 6 p.m. on 12th a depression of moderate depth was moving north eastwards

along our extreme north west coasts, and in its rear the barometer was rising again in the north of Ireland. In the course of the night however a new and deeper disturbance followed rapidly in the same course, and occasioned a strong gale from S. and S.W. in the districts mentioned. The gale commenced quite early in the morning, and on the receipt of the 8 a.m. reports it was too late to warn.

*April 1st*, in Scotland N.E. This gale blew from the N.W., and was due to a rapid recovery of pressure which occurred in the rear of a depression moving south eastwards across the Shetlands. At 8 a.m. on the 1st there were no indications that such a change would take place. By 2 p.m. the gale had already commenced.

*October 22nd*, in the Irish Sea. This gale was also from W. and N.W., and was caused by a small secondary depression which was apparently formed on the night of the 21st off the north east coasts of Great Britain. At 6 p.m. on the 21st there were no signs whatever of any such development.

*November 8th*, in England S.E. The gale was in this case due to a complex depression, the centre of which appeared off the north west of Ireland on the morning of the 8th. The disturbance afterwards moved northwards, but also spread laterally in an easterly direction and caused an unexpected extension of Southerly and South Westerly gales from our western coasts (which had previously been warned) to the south east of England.

## APPENDIX IX.

REPORT ON THE COMPARISON OF THE FORECASTS ISSUED AT  
Sh. 30m. p.m., WITH THE WEATHER SUBSEQUENTLY  
EXPERIENCED, for the 12 months April, 1902, to March, 1903.  
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 .

| Months.   |   | Percentages. |          |          |        | Months.         |   | Percentages. |          |          |        |
|-----------|---|--------------|----------|----------|--------|-----------------|---|--------------|----------|----------|--------|
|           |   | Wind.        | Weather. | Average. | a + b. |                 |   | Wind.        | Weather. | Average. | a + b. |
| April     | a | 56           | 69       | 63       | 87     | November        | a | 44           | 57       | 51       | 88     |
|           | b | 25           | 23       | 24       |        |                 | b | 38           | 37       | 37       |        |
|           | c | 11           | 6        | 8        |        |                 | c | 16           | 6        | 11       |        |
|           | d | 8            | 2        | 5        |        |                 | d | 2            | 0        | 1        |        |
| May       | a | 52           | 64       | 58       | 89     | December        | a | 47           | 50       | 49       | 88     |
|           | b | 34           | 27       | 31       |        |                 | b | 41           | 37       | 39       |        |
|           | c | 9            | 9        | 9        |        |                 | c | 10           | 12       | 11       |        |
|           | d | 5            | 0        | 2        |        |                 | d | 2            | 1        | 1        |        |
| June      | a | 53           | 67       | 60       | 89     | January         | a | 54           | 48       | 51       | 86     |
|           | b | 32           | 25       | 29       |        |                 | b | 35           | 35       | 35       |        |
|           | c | 13           | 7        | 10       |        |                 | c | 9            | 17       | 13       |        |
|           | d | 2            | 1        | 1        |        |                 | d | 2            | 0        | 1        |        |
| July      | a | 46           | 52       | 49       | 84     | February        | a | 55           | 65       | 60       | 93     |
|           | b | 33           | 37       | 35       |        |                 | b | 36           | 30       | 33       |        |
|           | c | 17           | 10       | 14       |        |                 | c | 7            | 5        | 6        |        |
|           | d | 4            | 1        | 2        |        |                 | d | 2            | 0        | 1        |        |
| August    | a | 46           | 50       | 48       | 86     | March           | a | 57           | 51       | 54       | 88     |
|           | b | 34           | 41       | 38       |        |                 | b | 31           | 36       | 34       |        |
|           | c | 16           | 8        | 12       |        |                 | c | 11           | 13       | 12       |        |
|           | d | 4            | 1        | 2        |        |                 | d | 1            | 0        | 0        |        |
| September | a | 45           | 62       | 53       | 93     | The entire year | a | 49           | 57       | 53       | 88     |
|           | b | 46           | 33       | 40       |        |                 | b | 36           | 33       | 35       |        |
|           | c | 8            | 5        | 6        |        |                 | c | 12           | 9        | 10       |        |
|           | d | 1            | 0        | 1        |        |                 | d | 3            | 1        | 2        |        |
| October   | a | 39           | 51       | 45       | 87     |                 |   |              |          |          |        |
|           | b | 46           | 37       | 42       |        |                 |   |              |          |          |        |
|           | c | 13           | 12       | 12       |        |                 |   |              |          |          |        |
|           | d | 2            | 0        | 1        |        |                 |   |              |          |          |        |

## APPENDIX X.

## CONSPICUOUS METEOROLOGICAL OCCURRENCES IN 1902.

The following were the more striking features in the weather of 1902, noticed in connexion with the issue of daily and weekly reports.

1. *Gales*.—The number of gales reported was equal to the average of previous years, but the storms were seldom of much severity, and in many instances they affected only a limited portion of our coasts. December was the stormiest month, with a total of nine gales, five of which were general, and in places rather severe. In the spring, summer, and early autumn there was an unusual absence of stormy weather. The principal gales occurred :—

- (a.) On January 25th–26th, when a gale from North and North-West, blowing on all coasts, attained great severity in the extreme North and North-West.
- (b.) On October 15th–16th, when a gale from between South and West swept over the whole kingdom, and blew with considerable violence on our Western coasts.
- (c.) On November 8th–9th, a storm in which the cyclonic circulation was fairly complete, and which attained great severity from the Westward on exposed parts of our Western and Southern coasts.
- (d.) A series of three gales which occurred between December 14th and 18th, the first two being from the South-Westward, and the third from the North-Westward. Each of these gales was severe at most places in the West.
- (e.) On December 25th, when a gale from the Westward blew with great severity in Scotland and the North-East of England.
- (f.) On December 27th–28th, the gale being again from West, and severe at many places in the West and North.

A record of the extreme wind velocities recorded during these gales and others of less importance will be found in the following table :—



READINGS OF ANEMOMETERS amounting to, or exceeding a VELOCITY OF 44 MILES per hour, as recorded on the "Dines" Pressure-tube anemometer, or upon the "Robinson" anemometer with the factor adjusted to give the corresponding result equivalent to an Estimated Force of 9 by Beaufort's Scale.

| Date.                  | Station.           | Duration of Severe Gale,<br>44 miles per hour,<br>or above.   | Wind<br>Direction.                     | Maximum                         |                       |
|------------------------|--------------------|---|--|---------------------------------|-----------------------|
|                        |                    |   |  | Hourly<br>Velocity<br>(Actual). | Rate<br>in a<br>Gust. |
| 1902.                  |                    |   |  |                                 |                       |
| Jan. 1, 2 ..           | Scilly ..          | 9.30 p.m. to 10.30 p.m. 1st ;<br>1 a.m. to 4.30 a.m. 2nd.   | W. by S. to W.                         | 46                              | 57                    |
|                        | Kingstown          | 11.30 a.m. to 1.30 p.m. 2nd.  | W.                                     | 44                              | —                     |
| " 3 ..                 | Alnwick..          | 8.30 p.m. to 9.30 p.m. ..   | W. by S.                               | 44                              | —                     |
| " 5, 6, & 7            | Deerness           | 11.30 p.m. 5th to 1.30 a.m.<br>6th : 8 a.m. to 0.30 p.m.<br>7th.  | W.S.W. to W.N.W.<br>and back to W.S.W. | 49                              | —                     |
| " 15 ..                | Deerness           | 9.30 a.m. to 1 p.m. : and<br>8.30 to 9.30 p.m.  | W. by S. to W.                         | 50                              | —                     |
| " 25, 26               | Scilly ..          | 11 a.m. to 7.30 p.m. 25th ..  | W.N.W. to N.W.                         | 61                              | 77                    |
|                        | Deerness           | 11.30 a.m. to midnight<br>25th ; and 10.30 a.m. to<br>0.30 p.m. 26th.   | N.N.W. to N.W.,<br>and N.N.W.          | 55                              | —                     |
| " 28 ..                | Scilly ..          | 4.30 a.m. to 1.30 p.m. ..   | W. by S. to N.W.<br>by N.              | 49                              | 64                    |
| " 31 and<br>Feb. 1, 2. | Yarmouth           | 8.30 p.m. to 9.30 p.m. 31st ;<br>0.30 a.m. to 1.30 a.m., 3.30<br>p.m. to 5.30 p.m., 9.30<br>p.m. to 10.30 p.m. 1st ;<br>1.30 a.m. to 8.30 a.m. 2nd. | E.N.E.                                 | 48                              | —                     |
|                        | Kingstown          | 4.30 a.m. to 5.30 a.m. 1st ..   | E.                                     | 44                              | —                     |
| " 8 ..                 | Scilly ..          | 5.15 p.m. to 6.15 p.m. ..   | W.N.W.                                 | 44                              | 54                    |
| Mar. 24 ..             | Scilly ..          | 2.30 p.m. to 11.30 p.m. ..  | W. by N.                               | 51                              | 62                    |
| April 21 ..            | Scilly ..          | 6.30 p.m. to 7.30 p.m. ..   | S.S.E.                                 | 46                              | 56                    |
| " 22 ..                | Deerness           | 3.30 p.m. to 7.30 p.m. ..   | S.E. by E.                             | 46                              | —                     |
| May 16 ..              | Kingstown          | 9.30 p.m. to 11.30 p.m. ..  | W. by S.                               | 46                              | —                     |
| " 17, 18               | Scilly ..          | 3.30 p.m. to 11.30 p.m., 17th ;<br>1.30 a.m. to 2.30 a.m. ; and<br>9.30 p.m. to 10.30 p.m.,<br>18th.  | W. by N. to N.W.<br>by N.              | 55                              | 71                    |
| July 26 ..             | Falmouth           | 1.30 to 2.30 a.m., and 10<br>a.m. to 3.30 p.m.  | N.N.W.                                 | 49                              | 63                    |
| Sept. 3 ..             | Kingstown          | 6.30 a.m. to 7.30 a.m. ..   | W.                                     | 44                              | —                     |
|                        | Holyhead           | 7.40 a.m. to 8.30 a.m. ..   | S. to S.W.                             | 45                              | 67                    |
|                        | Alnwick..          | 1.30 p.m. to 2.30 p.m. ..   | S.W.                                   | 48                              | —                     |
|                        | Falmouth           | 1 a.m. to 2.30 a.m. ..  | S. by W. to W.<br>by N.                | 58                              | 77                    |
| Oct. 15 ..             | Falmouth           | 7 a.m. to 0.30 p.m. ..  | S.W. by S.                             | 52                              | 67                    |
| " 16 ..                | Fleetwood          | 5.30 p.m. to 7.30 p.m. ..   | W.N.W.                                 | 48                              | —                     |
| " 22 ..                | Fleetwood          | 7.30 a.m. to 8.30 a.m. ..   | N.W. by W.                             | 47                              | —                     |
| Nov. 1 ..              | Deerness           | 1.30 a.m. to 2.30 a.m. ..   | W.S.W.                                 | 45                              | —                     |
| " 6, 7..               | Scilly ..          | 9.30 p.m., 6th, to 0.30 a.m.,<br>7th.   | W.N.W.                                 | 55                              | —                     |
|                        | Falmouth           | 10.50 p.m. to 11.40 p.m., 6th   | S.W.                                   | 47                              | 62                    |
| " 8 ..                 | Falmouth           | 7.30 a.m. to 8 a.m. ..  | S. to W.                               | 63                              | 75                    |
|                        | Shoebury-<br>ness. | 1 p.m. to 2 p.m. ..   | S.S.E.                                 | 44                              | 57                    |
| " 18 ..                | Yarmouth           | 5.30 p.m. to 6.30 p.m., and<br>8.30 to 9.30 p.m.  | E. by N.                               | 45                              | —                     |

READINGS OF ANEMOMETERS, &c.—*continued.*

| Date.      | Station.   | Duration of Severe Gale,<br>44 miles per hour,<br>or above. | Wind<br>Direction. | Maximum                         |                       |
|------------|------------|---|--------------------|---------------------------------|-----------------------|
|            |            |   |                    | Hourly<br>Velocity<br>(Actual). | Rate<br>in a<br>Gust. |
| 1902.      |            |   |                    |                                 |                       |
| Nov. 21 .. | Scilly ..  | 8.30 a.m. to 5.30 p.m. ..                                   | S.E.               | 48                              | —                     |
|            | Falmouth   | 6 a.m. to 3 p.m. .. ..                                      | S.E. by S.         | 44                              | 53                    |
| .. 24, 25  | Falmouth   | 6 p.m., 24th, to 1 a.m., 25th                               | S. by E.           | 48                              | 60                    |
| .. 27 ..   | Falmouth   | 10.30 p.m. to 11.30 p.m. ..                                 | S.                 | 44                              | 55                    |
| Dec. 1 ..  | Deerness.. | 2.30 p.m. to 4.30 p.m., and<br>5.30 p.m. to 8.30 p.m.       | S.E.               | 45                              | —                     |
|            | Falmouth   | 10.30 a.m. to 1.30 p.m. ..                                  | S. by E. to S.W.   | 45                              | 55                    |
| .. 2 ..    | Scilly ..  | 0.30 a.m. to 1.30 a.m. ..                                   | N.W. by W.         | 47                              | 59                    |
| .. 11 ..   | Falmouth   | 9.45 a.m. to 11.15 a.m., and<br>10.15 p.m. to Midnight.     | E.                 | 46                              | 55                    |
| .. 14 ..   | Falmouth   | 9.30 a.m. to 10.30 p.m.                                     | S.S.W. to S.W.     | 60                              | 72                    |
| .. 15 ..   | Scilly ..  | 6.30 a.m. to 8.30 a.m. ..                                   | W.N.W.             | 47                              | 61                    |
|            | Holyhead   | 9.15 a.m. to 10.15 a.m. ..                                  | W.N.W.             | 46                              | 61                    |
| .. 16 ..   | Falmouth   | 0.30 a.m. to 6 a.m., and 8<br>a.m. to 1 p.m.                | S. by W. to S.W.   | 44                              | 58                    |
|            | Deerness.. | 5.30 a.m. to 8.30 a.m.                                      | S.S.E.             | 48                              | —                     |
| .. 18 ..   | Kingstown  | 0.30 a.m. to 1.30 a.m. ..                                   | W. by S.           | 48                              | —                     |
|            | Holyhead   | 2.30 a.m. to 3.30 a.m. ..                                   | W.                 | 45                              | 61                    |
| .. 25 ..   | Deerness   | 9.30 a.m. to 4.30 p.m. ..                                   | W.S.W. to W.       | 57                              | —                     |
|            | Kingstown  | 3.30 p.m. to 4.30 p.m. ..                                   | W. by S.           | 44                              | —                     |
| .. 27 ..   | Alnwick    | 7.30 p.m. to 9.30 p.m. ..                                   | W.S.W.             | 45                              | —                     |
| .. 28 ..   | Falmouth   | 0.0 a.m. to 1.0 a.m. ..                                     | S.W.               | 45                              | 54                    |
|            | Holyhead   | 10.30 a.m. to 11.30 a.m.,<br>and 0.30 p.m. to 1.30 p.m.     | W.S.W.             | 44                              | 65                    |
|            | Fleetwood  | 8.30 a.m. to 3.30 p.m. ..                                   | W.S.W.             | 49                              | —                     |
| .. 29 ..   | Kingstown  | 9.30 a.m. to 10.30 a.m. ..                                  | S.W. by W.         | 45                              | —                     |

NOTE.—The Falmouth records for velocity are from the Pressure-tube Anemometer at Pendennis Castle. At Falmouth Observatory, Kew, North Shields, Aberdeen, Armagh, Valencia, Dublin (Phoenix Park), a mean hourly velocity of 44 miles was not recorded during the year.

*Heavy Rains.*—In the summer months heavy falls of rain were somewhat frequent, the phenomena being accompanied in many cases by thunderstorms of greater or less severity. The principal and most general falls occurred :—

(a.) On June 13th, in the South and South-East of England. More than an inch was recorded in several places, and as much as 1.2 inch in London and at Arlington, and 1.4 inch at Felixstowe and Swarraton.

(b.) On July 25th in the Western, and on July 26th in the Northern parts of the United Kingdom. On the former day more than an inch fell in several places, the downpour being heaviest in and around Dublin, where the amount ranged from 1.8 inch at Dundrum to 2.4 inches at Fassaroe (Bray). On the latter day amounts slightly exceeding an inch were recorded in the South of Scotland and the extreme Northern parts of England and Ireland.

- (c.) On August 6th and 7th, in many parts of England and Ireland, the falls being attended in most cases by thunderstorms. On the 6th more than an inch was registered at some of the Irish stations and as much as 1·6 inch at Hillington (Norfolk). On the following day heavy falls were more general, the largest reported being 1·5 inch at Yarmouth.
- (d.) On September 2nd in the Western, and on September 3rd in the Northern parts of the Kingdom. On the former day the fall was heaviest in Ireland, more than two inches being recorded at many stations (the neighbourhood of Dublin being again seriously affected, as on July 25th). At Kingstown the amount registered was as much as 2·8 inches, and at Greystones (co. Wicklow) 2·9 inches, while at Carrick-on-Suir it was no less than 3·6 inches. On September 3rd considerably more than an inch fell in many parts of Scotland, and as much as 2·3 inches at Glencarron.
- (e.) On September 10th over the Eastern, Central and Southern parts of England, when 1·8 inch fell at Felixstowe and 1·0 inch at Hereford (the newspapers reported a fall of 3·5 inches at Hampton, Middlesex). A disastrous hailstorm occurred on the same day in Mid-Kent and caused an immense amount of damage in the orchards and hop-gardens.

The *Winter* rains were often heavy in the West and North, but in the earlier months individual large amounts were experienced only in localities in which such occurrences are too common to excite any serious notice. During the concluding quarter of the year heavy falls were recorded over a wider area, the most important cases being :—

- (a.) On October 9th, and again on October 13th, when many parts of England were affected. On the former date 1·3 inch was registered at Hereford, while on the latter date a similarly large quantity was collected at Llandovery and Arlington.
- (b.) On October 14th and 15th in the West and North of Scotland, the aggregate for the two days being as large as 3·8 inches at Glencarron and 2·4 inches at Stornoway.
- (c.) On November 27th in the South-West of England, and on the following day in the Northern and Central parts of Great Britain, the fall on the latter occasion amounting to 1·4 inch at Cally (Gatehouse).
- (d.) On December 1st and 2nd over the Northern parts of the Kingdom generally, the aggregate for the two days being as much as 2·3 inches at Ochertyre and 2·0 inches at Alnwick Castle.
- (e.) On December 14th and 15th in the West and North. On the latter day the amount at Laudale was 2·0 inches.
- (f.) Between December 25th and 27th, chiefly in Scotland. At Glencarron 2·5 inches fell on Christmas Day, and 1·7 inch on December 27th.

*Snowstorms.*—Although snow showers were frequent in the earlier months, and were observed in many of the Northern and Eastern districts even as late as the middle of May, the actual quantity was seldom large, the depth to which the country was covered at some stations in the North being due simply to the cumulative effect of frequent slight falls. Between February 3rd and 8th, however, some rather heavy storms occurred, especially over the Northern half of the Kingdom. At Armagh the fall on the 7th was sufficiently heavy to yield 1·0 inch of water in the rain gauge, and at Donaghadee on the same day 0·9 inch was measured. On December 4th some of our Eastern and South-Eastern districts were similarly visited, the fall at Dungeness being one foot deep, and yielding 0·7 inch of water in the gauge.

*Thunderstorms.*—In a changeable summer such as that of 1902, thunderstorms were naturally very frequent. The most general cases occurred :—

- (a.) Between June 14th and 16th, and again on the 29th of that month, when the greater part of England was affected.
- (b.) On July 10th, again over nearly the whole of England.
- (c.) On August 6th and on August 16th and 17th in most parts of England and Wales, and on August 20th at very many places in nearly all parts of Great Britain.

Apart from the summer months sharp storms were experienced over the Eastern, Central, and Southern parts of England on October 14th (an earthquake shock being reported on the same day at Laudale); while thunder and lightning were observed in many parts of the United Kingdom on December 28th.

*Droughts.*—Although the year was essentially a dry one it was distinguished by an almost entire absence of long periods of rainless weather. In London the longest did not last for more than 10 days, and occurred in each of the two winter months January and November. In only one other year of the past 31 (viz. 1897) was the absence of drought in the metropolis so marked. Over the United Kingdom generally the only drought worthy of mention occurred between the end of September and the middle of October, when a few isolated stations in Ireland and Scotland recorded no rain for periods varying between 16 and 18 days.

*Temperature.*—The *highest* temperatures of the year occurred generally towards the close of June during a week's interval of brilliant weather in the midst of a cool, wet summer. Maxima of 80° and upwards were registered at a large number of stations. In Scotland 83° was reached at Nairn on the 27th, and at Laudale on the 28th; and 84° at Fort Augustus on the 25th. In Ireland the 28th and 29th were the warmest days, 82° being registered at Foynes and Killarney on the latter date. Along the shores of Scotland and Ireland unusually high temperatures of the sea water were recorded by the coastguard about this time, Kirkwall rising to 60°, Stornoway to 66°, Liscannor to 68°, Teelin to 70°, and Blacksod Point to 72°. Over England the air temperatures



were  $80^{\circ}$  and upwards at a large number of stations, and on the 28th Bawtry recorded  $86^{\circ}$ , Cambridge  $87^{\circ}$ , and Hereford  $90^{\circ}$ . During July and August there were very few eighties, and all of them in England. On July 14th Cambridge reported a maximum of  $86^{\circ}$ , and London  $87^{\circ}$ ; and on August 29th Bramley touched  $80^{\circ}$ , and Cambridge and London  $81^{\circ}$ . There were, however, many cold days in the summer months, with the thermometer failing to reach  $70^{\circ}$  in any part of the Kingdom, while maxima below  $55^{\circ}$  were rather numerous, and in the first half of June, and on a few occasions in July and August, they were as low as  $47^{\circ}$  to  $49^{\circ}$  at various stations in Scotland and the North of England. As a rule the five months, April to August, were cold.

The *lowest* temperatures of the year occurred at the end of January and in February, which was an extremely cold period. In Scotland, Braemar indicated  $3^{\circ}$  on January 27th, and Lairg  $2^{\circ}$  on the 31st, but on February 14th the former station touched zero and Lairg  $2^{\circ}$  below zero. In Ireland, Dublin (Phoenix Park) registered  $21^{\circ}$  on January 30th, and Edenfel the same value next morning, when Armagh went down to  $20^{\circ}$ . On February 12th Edenfel touched  $4^{\circ}$ , and Markree Castle  $12^{\circ}$ , the latter reading being also the minimum at Birr Castle on the 15th. Over England there were very few temperatures below  $20^{\circ}$  during January, but between February 12th and 14th Loughborough, Prestwich and Stonyhurst recorded a minimum of  $9^{\circ}$ , Chester  $8^{\circ}$ , and Newton Reigny  $4^{\circ}$ .

The months of March, November and December were, in the main, very mild, and frosts of any great severity were almost wholly absent, but about December 7th temperature fell to  $16^{\circ}$  at Cambridge, Churchstoke, and Ochertyre, and to  $14^{\circ}$  at Loughborough and Braemar. In many places the minima recorded during December were not lower than  $30^{\circ}$ ; at Sumburgh Head, and Deerness only  $32^{\circ}$ .

*Fog.*—The principal fog of the year occurred at a somewhat unusual period—the first week of March—when most parts of England and Ireland, the adjacent seas, and the neighbouring parts of the Continent, from the Bay of Biscay to Denmark, were affected. At times it was very dense on the lower portion of the Irish Sea, and the navigation of the Mersey was suspended, while about the Thames Estuary and round to the Eastern half of the English Channel it was so exceptionally persistent, as well as dense, that vessels had to anchor for three or four days. Several shipping casualties resulted. As a rule the fogs experienced in other months were of a more local character, and not of any great density.

*High Barometer Readings.*—In the month of January two anticyclones of unusual intensity visited our Islands. On the 12th an area of high pressure began to spread over from the North Westward, the evening values in Ireland and the West of Scotland exceeding 30.1 inches. By the morning of the 14th nearly the whole country had come within the central space of the system, which now covered the Western half of Europe, with barometric values above 30.6 inches at the centre. Continuing to increase in intensity, the centre was found on the

15th to occupy the Western portion of the English Channel and the North-West of France, where the barometer had risen above 30.9 inches, the highest reading recorded at our own stations being 30.94 inches at Falmouth and Jersey, but there were higher values at the neighbouring French stations—30.96 inches at Lorient and 30.98 inches at Brest. On the morning of the 16th there were still readings at a few of the North-Western French stations a little above 30.9 inches, but the barometer was now falling slowly, the centre of the system remaining all but stationary until the evening of the 22nd. It moved away rapidly to South-Eastern Europe next day.

This system did not produce any remarkable degree of cold during its passage from North to South across our Islands.

Towards the close of the month there was an unusually rapid change in the disposition of pressure over the country. On the morning of the 28th the central space of a depression, in which the barometer was at about 29 inches, occupied the greater part of Ireland, the North of England and the South of Scotland. Travelling quickly Eastwards it disappeared over Russia on the 30th, an anticyclone appearing off our South Western coasts on the 29th, and developing at such a phenomenal rate, that by the morning of the 31st its centre was found extending from Scotland across to Norway, with the barometer above 31 inches, or 2 inches higher than it was in the same locality on the 28th. Throughout the day the centre remained stationary, but the barometer rose still higher, the area within which the readings were above 31 inches embracing the whole of Scotland, Northumberland, the Northern half of Denmark and the South-West of Norway. At Aberdeen it had reached 31.10 inches at 11 a.m., and, the increase continuing, the record at 10 p.m. was 31.12 inches, the reading at Nairn at this hour being 31.10 inches. At 2 p.m. Skudesnaes (Norway), at 8.25 p.m. Fort William, and at 9 p.m. Strathpeffer registered 31.11 inches. Having attained its maximum intensity at 10 p.m. pressure began to decrease slowly, and by midnight it was back to 31.10 inches at Aberdeen. The weather chart for 8 a.m. February 1st showed readings slightly in excess of 31 inches over Scotland and South-West Norway, 31.05 inches at Christiansund being the highest. After this the decline was maintained, the region of greatest pressure remaining over the British Isles until the evening of February 14th, when the barometric values were all below 30.2 inches. Next day the anticyclone was moving quickly Eastwards, and on the 7th disappeared across Southern Russia.

The Aberdeen maximum of 31.119 inches on January 31st proves to be slightly above the previous highest barometer value recorded in our Islands, 31.108 inches having been registered at Ochtertyre at 9 a.m. January 9th, 1896, a month in which, it is interesting to recall, there were also two anticyclones of abnormal intensity.

Unlike the anticyclone of the middle of January, 1902, the one of a fortnight later was characterised by very severe weather over our Islands, as will be gathered from the note on the year's temperature.

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# APPENDIX XI.

## ACCESSIONS TO THE LIBRARY DURING THE YEAR ENDING 31ST MARCH, 1903.

**Aachen, Meteorologisches Observatorium.**—Das meteorologische Observatorium Aachen auf der Industrie- und Gewerbe-Ausstellung Düsseldorf, 1902. 1a. 8°. Aachen, 1902.

———— Ergebnisse der Beobachtungen am Observatorium und dessen Nebenstationen. Jahrg. vii., 1901. 1a. 4°. Karlsruhe, 1902.

———— Wetterkarte und Wetterbericht. Jahrg. 1., 1902, April 30-Dec. 31. f°. Aachen, 1902.

———— Uebersicht der Witterung. 1902. Jan.-Dec. Slips.

**Aburi, Gold Coast.**—Meteorological observations recorded at the Aburi Observatory during the year 1901, with yearly averages for 1895-1901. sm. f°. Sheet.

———— Rainfall and number of days on which rain fell during the last 11 years (1891-1901) at Aburi. sm. f°. Sheet.

**[Adelaide Observatory].**—Rainfall in South Australia and the northern territory, during 1899, with weather characteristics of each month. By Sir C. Todd. f°. Adelaide, 1902.

**Agram, Meteorologisches Observatorium.**—Jahrbuch, 1901. Jahrg. 1. f°. Zagreb, 1902.

**Alexander, W. H.**—Hurricanes: especially those of Porto Rico and St. Kitts.

See WASHINGTON, DEPARTMENT OF AGRICULTURE, WEATHER BUREAU.

**[Algiers, Service Météorologique du Gouvernement Général de l'Algérie.]**—Bulletin météorologique de l'Algérie. 1902, Jan. 1-Dec. 31. sm. f°. Sheets.

**Algué, José.**—Ground temperature observations at Manila. 1896-1902. 1a. 8°. Manila, 1902.

**[Allahabad, Meteorological Office.]**—Administration report of the Meteorological Reporter to Government, United Provinces of Agra and Oudh, for the year 1901-1902. sm. f°. Allahabad, 1902.

———— Annual statement of rainfall in the North-Western Provinces and Oudh, for the year 1901. sm. f°. s.l.e.a.

———— Brief sketch of the meteorology of the United Provinces of Agra and Oudh, and adjacent parts of Rajputana and the Punjab, for the year 1901. sm. f°. Allahabad, 1902.

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In the Russian language.

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— — — — — W. B., No. 273. Studies on the statics and kinematics of the atmosphere in the United States. By Frank H. Bigelow. 1a. 4°. Washington, 1902. (*Month. Weather Rev.*, 30, 1902, Jan. to July.)

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— — — **Smithsonian Institution.**—Annual report of the Board of Regents . . . for the year ending June 30, 1901. 8°. Washington, 1902.

— — — — — Smithsonian miscellaneous collections. Vol. 41. 1a. 8°. Washington, 1902.

— **Treasury Department, U. S. Coast and Geodetic Survey.**—United States magnetic declination tables and isogonic charts for 1902 and principal facts relating to the earth's magnetism, by L. A. Bauer. sm. f°. Washington, 1902.



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**Wilson-Barker, D.**—Clouds and weather signs. 8°. London, s.a. (*Reprinted from "Knowledge."*)

|| **Woeikof, A.**—Klima von Lukschun, Centralasien. sm. 8°. (*Meteor. Zeitschr.*, 1900, p. 193.)

|| ——— Der Luftdruck und die atmosphärische Cirkulation in Asien. sm. f°. (*Meteor. Zeitschr.*, 1900, p. 202.)

|| ——— Platzregen und grosse tägliche Regenmengen. sm. f°. (*Meteor. Zeitschr.*, 1901, p. 53.)

|| ——— Die Seespiegelschwankung zwischen Aralsee und Baraba und die Brücknersche Hypothese. 4°. (*Petermanns geogr. Mitteil.*, 1901, Heft 9, p. 199.)

——— Travaux du Cabinet de Géographie physique de l'Université Impériale de St. Pétersbourg.

See ST. PETERSBURG, UNIVERSITÉ IMPERIALE.

|| ——— Wo ist der höchste Luftdruck der Erde, mit und ohne Reduktion auf das Meeresniveau. sm. f°. (*Meteor. Zeitschr.*, 1900, p. 207.)

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**Wragge, C. L.**—Report on the Mount Kosciusko Observatory and allied stations. 1898. sm. f°. Brisbane, 1902.

**Zanzibar, Agricultural Department.**—Annual report, 1901. sm. 4°. Zanzibar, s.a.

**Zi-ka-wei, Observatoire Magnétique et Météorologique.**—Bulletin mensuel. Tome 26, année 1900. sm. f°. Chang-hai, 1902.

[——— **Observatory.**].—Instructions for keeping the meteorological log. 1a. 4°. s.l.e.a.

——— ——— Instructions in the use of meteorological instruments, compiled by R. F. Marc Dechevrens. sm. 8°. Zi-ka-wei, 1880.

[**Zomba, Scientific Department.**].—Barograph hourly values. 1901, Jan.-Dec. sm. f°. Sheets.

[——— ———] Comparative statement of temperature and rainfall at different stations of the Protectorate, 1901. oblong 18<sup>mo</sup>. Sheet.

[Zomba, Scientific Department].—Meteorological observations, 1902, Jan.-Dec. sm. f°. Sheets.

[———] Meteorology for the year 1901. Table of monthly mean values for Zomba and Fort Johnston. 2 sheets. sm. f°.

[———] Rainfall at Zomba, B.C.A., from 1st November 1897, to December, 1901. oblong la. 8°. Sheet.

[———] Rainfall, 1901-1902, British Central Africa Protectorate, showing amount for the year 1901, and up to 31st March, 1902. oblong 8°. Sheet.

Zürich, Schweizerische Meteorologische Central-Anstalt.—Annalen, 1900. "Der Schweiz. meteor. Beob." 37. Jahrg. 4°. Zürich, s.a.

——— Wetterbericht. 1902, Jan. 1-Dec. 31. sm. f°. Sheet.

In the French language also.

## 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<br>(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.  |
| 1902  | [1-9] | Summaries of Rainfall and Mean Temperature for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the 37 years, 1866-1902.<br>[The separate Yearly Values for 1866-90 are contained in the Report for 1890, and those for 1891-1902, in the Report for 1902.] |

## 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  | [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.  |
| 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.    |

## 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.   |
| 1880-81 | 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.  |
| 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. |

| Year.         | Page. | —  |
|---------------|-------|--|
| 1887-88       | 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       | 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       | 27    | Report on the Comparisons made between two Pressure Tube Anemometers on the roof of the Meteorological Office, 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.                                      |
| 1899-<br>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.  |
| 1901-02       | 105   | Remarks on the Recording of Sunshine and Atmospheric Electricity, by Dr. Chree, F.R.S.   |

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, 1903.—

| RECEIPTS.  |          |             | PAYMENTS.  |            |             |
|--|----------|-------------|--|------------|-------------|
|  | £ s. d.  | £ s. d.     |  | £ s. d.    | £ s. d.     |
| Balance from year 1901-1902 .. .. .                            | —        | 2,464 19 7  | ADMINISTRATION:  |            |             |
| Parliamentary vote ..  | —        | 15,300 0 0  | Council .. .. .  | 850 16 8   |             |
| Repayment of expenses charged under—                           |          |             | Secretary .. .. .  | 625 0 0    |             |
| (1.) Incidental expenses .. ..                                 | 31 13 0  |             | Salaries and wages ..  | 1,053 9 11 |             |
| (2.) Observatories .. ..                                       | 23 4 0   |             | Rent, fuel, and lighting   | 725 9 8    |             |
| (3.) Telegraphic Reports .. ..                                 | 2 0 0    |             | Incidental and contingent expenses ..  | 296 18 10  |             |
| (4.) Special Researches ..                                     | 234 18 0 | 291 15 0    | Furniture and fittings ..  | 394 3 11   | 3,945 19 0  |
| SUPPLY OF INFORMATION:   |          |             | SPECIAL RESEARCHES:  |            |             |
| Weather Forecasts, Reports, &c.                                | 666 15 5 |             | Salaries and other charges .. .. .   | —          | 1,038 13 2  |
| Telegrams sent abroad ..                                       | 552 15 1 | 1,219 10 6  | LAND METEOROLOGY:  |            |             |
| SALE OF INSTRUMENTS, &c.:                                      |          |             | Observatories and stations, including remuneration of observers..                | 2,279 8 8  |             |
| Repayment of cost of M.O. instruments purchased by observers.. | 91 16 0  |             | Salaries:— Discussion and reduction of observations, &c. .. ..                   | 1,540 0 8  | 3,819 9 4   |
| Repayment of cost of other commissions ..                      | 187 4 1  | 279 0 1     | WEATHER INFORMATION AND FORECASTS:   |            |             |
| CHARGES FOR COMMISSION:  |          |             | Telegraphic reports and storm warnings, remuneration of observers, &c. .. ..     | 3,111 18 9 |             |
| On supply of instruments, &c. .. ..                            | —        | 6 1 1       | Salaries:— Preparation and issue of reports and forecasts .. ..                  | 1,522 11 4 | 4,634 10 1  |
| SUPERANNUATION ACCOUNT .. .. .                                 | —        | 191 13 11   | INSPECTIONS:   |            |             |
|  |          |             | Salaries and travelling expenses .. .. .   | —          | 429 8 5     |
|  |          |             | OCEAN METEOROLOGY:   |            |             |
|  |          |             | Salaries:— Discussion and reduction of observations .. ..                        | 1,370 7 4  |             |
|  |          |             | Expenses incidental to the supply of instruments:—                               |            |             |
|  |          |             | Proportion for care and issue of instruments .. ..                               | 160 0 0    |             |
|  |          |             | Royal Navy .. ..   | 469 8 2    |             |
|  |          |             | Mercantile Marine and Stations .. ..   | 460 4 5    | 2,465 19 11 |
|  |          |             | Miscellaneous commissions executed for Colonial and Foreign Institutions, &c. .. | —          | 208 2 1     |
|  |          |             | SUPERANNUATION:  |            |             |
|  |          |             | Pensions and Allowances  | 684 15 9   |             |
|  |          |             | Provision for Annuities  | 750 0 0    | 1,434 15 9  |
|  |          |             | BALANCE:   |            |             |
|  |          |             | Cash at Bank .. ..   | 1,730 9 1  |             |
|  |          |             | .. at Office .. ..   | 45 13 4    | 1,776 2 5   |
|  |          | £19,753 0 2 |  |            | £19,753 0 2 |

NOTES.—On March 31st the amount of 2½ per cent. Annuities held by the Council for the provision of Superannuation Annuities was £1,368 6s. 5d.  
In the year 1902-3 the sum of £2,217 0s. 9d. was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

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