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THE CHICAGO METEOROLOGICAL CONGRESS.

OUR American friends are never content to do things on the scale of the Old World. They resolved that their Exhibition should be the locale for some Congresses, but we could never understand how the whole science of meteorology could be discussed in three days, and they have not accomplished the impossible. But they have done one remarkable thing, they have drawn from many of the most able meteorologists of the Old World and of the New, and from both hemispheres, nearly *one hundred and thirty memoirs*, and they, as will be seen below, purpose printing them in full. Judging by those that we have seen, we anticipate a publication of surpassing ability and interest. Dreadfully poor as was the exhibit (!) of British meteorological instruments, and indeed, if we have been correctly informed, of meteorological instruments by Europeans generally, the Chicago Congress will leave its mark upon meteorology if the Memoirs that we have seen are even approximately typical, and if all are printed.

As regards the Congress, it seems to have done its best with the overwhelming mass of material placed before it. Mr. Fassig has been kind enough to send us an account, whence the following has been abstracted:—

THE METEOROLOGICAL CONGRESS,
Held at Chicago, August 21st to 24th, 1893.

“Monday, August 21st, at 10 a.m., the Congresses of the Department of Science and Philosophy of the Congress Auxiliary of the Columbian Exposition were formally opened at the Memorial Art Institute of Chicago with an address of welcome by the President, Mr. C. C. Bonney, followed by responses from representatives of the various special congresses.

“At the close of this general session the different divisions met in rooms assigned to them, the Division of Meteorology, Climatology, and Terrestrial Magnetism meeting in Room xxxi., in which the regular sessions were held daily (from 10 a.m. to 2 p.m.) from August 21st to August 24th.

“The Chairman of the Congress not being able to be present in person on the first day, Prof. F. H. Bigelow, representing Prof.

Mark W. Harrington, opened the session at 11 a.m. of the 21st with a few words of welcome and a statement of the objects of the Congress.

"The Congress had no legislative authority. The main purpose, as previously announced, was to collect together a series of memoirs 'outlining the progress and summarizing the present state of our knowledge of the subjects treated,' prepared by writers of authority in their respective lines of research, and to print them in full in the English language.

"The meetings, while thus making the reading and discussion of papers a matter of secondary importance, were by no means lacking in interest or profit to those who were present. Few of the papers could be read in full, owing to their great number; about 130 were read by title, in abstract, or in full.

"Among so many papers of merit, a simple list of which would occupy several pages, individual mention cannot be fairly attempted.

"While the papers were read in general session, they were assigned, in the printed program, to various sections according to the subject, each section being placed in charge of a responsible chairman.

"Section A.—Prof. C. A. Schott, U.S. Coast Survey, and Mr. H. H. Clayton, U.S. Weather Bureau, Chairmen. *Instruments, their History and Relative Merits, and Methods of Observation, especially Methods of Observing in the Upper Air.*

"Section B.—Prof. Cleveland Abbe, U.S. Weather Bureau, Chairman. *Theoretical and Dynamic Meteorology; the Study of Thunderstorm Phenomena in Various Countries.*

"Section C.—Prof. F. E. Nipher, Washington University, Chairman. *Sketches of the Climate of Different Portions of the Globe.*

"Section D.—Major H. H. C. Dunwoody, U.S. Army, Chairman. *The Relation of the various Climatic Elements to Plant and Animal Life.*

"Section E.—Lieut. W. H. Beehler, U.S. Hydrographic Office, Chairman. *Marine Meteorology, Ocean Storms and their Prediction, Methods of Observation at Sea, and International Co-operation.* During the reading of a paper on the work of the Hydrographic Office of the Navy, Lieut. Beehler had on exhibition a fine bust of Lieut. Maury, by the sculptor Valentine, of Richmond, Va.

"Section F.—Prof. Charles Carpmæl, Director of the Canadian Meteorological Service, and Mr. A. Lawrence Rotch, Director of the Blue Hill Observatory, Chairmen. *The Improvement of Weather Services and the Progress of Weather Forecasting.*

"Section G.—Prof. F. H. Bigelow, U.S. Weather Bureau, Chairman. *Atmospheric Electricity and Terrestrial Magnetism and their Cosmical Relations.*

"Section H.—Prof. Thomas Russell, of the U.S. Lake Survey, Chairman. *Rivers, and the Prediction of floods.*

"Section I.—Oliver L. Fassig, Librarian U.S. Weather Bureau, Chairman. *Historical Papers and Bibliography, with Special Reference to the History of Meteorology in the United States.*

“ Prof. Mark W. Harrington, Prof. F. H. Bigelow, Capt. P. Pinheiro (of Rio Janeiro), and Lieut. W. H. Beehler, successively presided over the meetings.

“ At the close of the last session a resolution was offered calling for recommendations by the Congress relating to—(a) *International Co-operation in Observations of Auroræ*; (b) *Simultaneous Greenwich Noon Observations daily at all Stations on Land and Sea, in addition to Observations at other times*; (c) *Investigation of the Earth's Magnetic Polar Current and the Exact Determination of the Solar Rotation*. As the Congress had no legislative authority, it was agreed to hold a special session for the consideration of these questions, after adjournment, on the following day.

“ Preparations have been begun for the printing of the papers, and an effort will be made to complete the work at an early date.”

REVIEWS.

On Hail. By the Hon. ROLLO RUSSELL, F.R.Met.Soc. With two photographs of hailstones. London: Edward Stanford, 1893. 8vo. xvi.—224 pages, and two photographs.

OWING to a circumstance mentioned on page v. of this work, it would, we think, hardly be in good taste for us to allow either praise or censure of it to appear in this Magazine; but to a statement of its contents no one could object, and it would be absurdly punctilious, and unfair to the author, to the publisher, and to our readers, to omit to notice so important a work.

The book consists roughly of three equal portions: (1) Records of hailstorms from 1680 to 1893; (2) Theories as to the formation of hail and rain; (3) The author's own views.

The subjects of the several chapters are:—

1. Descriptions of hailstorms and hailstones.
 2. Temperature, cloud and wind at great altitudes.
 3. Electricity and hail.
 4. Theories of hail.
 5. Properties of vapour, water and ice, and conditions of the air which may be connected with the formation of hail.
 6. Summary of characteristics of hailstorms and hailstones.
 7. The development of a hailstorm.
 8. Conclusions.
- Appendices.

To give some idea of the labour devoted to this work, we may mention that the “ List of authors quoted ” includes 178 names, from Julius Cæsar and Fromondus, down to those of the leading authorities of the present day in both hemispheres.

Certain Climatic Features of the two Dakotas. Illustrated with 163 tables, charts, and diagrams. By JOHN P. FINLEY. 4to, 204 pages, and about 96 plates. Washington : 1893.

MANY of the arrangements in the United States are puzzling to us. Here is a handsome quarto, nearly an inch thick, and as far as we can trace from the details given, it was written and delivered in *fifty-seven days*. On February 26th, 1892, by a joint resolution, Congress ordered it to be printed, and yet it contains observations up to the end of the previous December ! If that was not rushing the work, we do not know what is. No wonder that Lieutenant Finley in the introduction says : " In the time given me for the preparation of this report I have attempted to accomplish the work with as much care and thoroughness as circumstances would permit."

We have a high opinion of Lieutenant Finley's work upon "Tornadoes." He now comes forward in another branch of meteorology, and not only so, but, unless our memory is at fault, this is the first large work upon Climatology issued since the meteorological work of the United States was transferred to the Department of Agriculture ; it therefore becomes in some sort a type of what we may look for in the future. We do not forget the remark already quoted, but it seems to us that the MSS. must have been prepared before the resolution as to its printing was passed ; and in any case it is evident that what has happened once may occur again. We therefore accept it as a specimen.

First as to typography and maps ; both are very similar to what we have had from the Signal Office, but the numerals on both the temperature and rainfall maps are of so bad a form that, in spite of their great size, they are not more clear than they would have been if well formed and of half the size ; there is another point, but upon it opinions may differ—we should not have given the rainfall to the hundredth of an inch, but only to the nearest tenth ; the hundredths are all very well (when one is sure that they are correct) in tables, but rarely or never should go on maps, where distinctness is the first consideration ; on the map of total yearly rainfall we should have preferred to see the fractions entirely omitted.

The next subject for consideration is the material upon which the work is based ; obviously, the author is in no way responsible for paucity of data, but he is so for the use he makes of them. It seems to us that the bulk of this book has been produced by the original sheets being given out to subordinates with instructions to fill up certain forms, and that they have obeyed orders strictly—too strictly, and have thereby sometimes given some rather useless statements.

Appendix No. 2 resembles the well-known table in "Blodget," but the important column giving the period covered by the record is omitted ; it would have been a useful indication of the value to be attached to the various returns, and if, further, the names of the stations on the map had been printed in sizes of letters proportionate

to the duration of the observations, one would have had, without further thought, indication of the weight to be attached to the various values shown on the maps.

Dakota is, as most of our readers are aware, a vast country lying to the south of Winnipeg (known to the readers of this Magazine as one of the stations in our Climatological tables); it may not inaccurately be described as being in the very middle of the North American continent. Moreover, it has only very recently been taken from the Indians, and brought within the pale of civilization; consequently the observations consist of two kinds—of those made at the military forts which were established many years ago to keep the Indians in check, and of observations made by the new occupants of the country. To deal satisfactorily with such data requires much time and thought, and to rush it, is to produce work which cannot be free from error. We recognise fully the difficulty of impressing upon the non-scientific mind that it is not possible to turn out accurate meteorological values at the rate of so many pages a day; but the difficulty, if not boldly faced in the first instance, will, as the proverb says, “come home to roost.” Apparently some one ordered this paper to be got out with all speed. From Lieutenant Finley's remarks we gather that he had no option in the matter, and the result is that we have a big book, but that we might have had a better one.

We ought to give some illustrations: In Appendix 5, mean monthly rainfall, it will be seen that in N. Dakota, for January all stations but one have less than an inch; for Richardton, however, the mean is given as 2.25 in.; on turning back to p. 51 (where, by the bye, it is misprinted Richardson), the high mean seems to be chiefly due to the entry of 4.00 in. for January, 1888; on examining the records for that month at other stations we cannot find one within hundreds of miles with even one inch; and it therefore seems probable that either there was a new observer or that the decimal was misplaced. Further investigation has, however, landed us in further difficulty. Appendix No. 7 gives the monthly depth of unmelted snow at each station, and it is evident that it has not been included in the “annual precipitation,” because (to adhere to the same station), in January, 1885, the snow is given as 44.00 in. (which would yield probably quite three inches), and yet in the table of “total precipitation” we find for that month 1.90 in. ! We have always been uncertain as to the American practice in this matter, and hope that it may now be made quite clear. It is a startling surprise to us to find that our American friends *do not consider snow to be* “precipitation” *unless it melts at once*, but that seems to be the case. Of course it results therefrom that their maps of rainfall all show means less than would be quoted for stations in the Old World having the same precipitation, by amounts representing the fall of snow during cold periods. As far as we can make out, for Dakota this means an addition of about ten per cent. to the

precipitation; on this hypothesis the mean annual rainfall in N. Dakota is about 20 in., and in S. Dakota about 25 in.

We are very sorry to seem to do nothing but find fault with this book, which is undoubtedly a very storehouse of information; but it keeps irritating us. We wished to give some information as to extreme temperatures, and on turning to the list of appendices we found: "No. 47.—Annual maximum and minimum temperature, and mean annual range of temperature." But No. 47 is quite different, and the first and fifth words must be erased. There does not seem to be any table of extremes. We have therefore gone through Appendices No. 65 and 66, with the result that we find that most stations have maxima exceeding 100° , and some with 105° to 114° ; and as regards minimum, -40° (the freezing point of mercury) is by no means unusual, and we have seen several cases of -50° and one of -55° at Fort Stevenson in January, 1881.

Want of space, not lack of interesting matter, compels us to conclude our notice of this work. It would have been much better if the records of 1892 could have been added, and another year have been devoted to the higher branches of the work; but it is by far the best book upon the subject, and one which no future writer upon Dakota can ignore.

The Climate of Chicago. By HENRY A. HAZEN, Professor of Meteorology, U.S. Department of Agriculture. Weather Bureau, Bulletin No. 10. 8vo. Washington: 1893. 136 pages, 4 charts, and 23 engravings.

AFTER explaining the position of Chicago, on a level plateau, slightly above, and at the southern end of, Lake Michigan, about 600 ft. above sea level, Prof. Hazen proceeds to describe the data upon which his work is based. There is a record of temperature at Fort Dearborn, near the shore, from July, 1832, till December, 1836; there are six months of 1844; there is the whole of 1857, and a continuous record from November, 1859, to the present time. After stating, this, Prof. Hazen writes:—

"It would be very interesting and of considerable value in discussing temperatures for an extended period, if we could obtain interpolated values for the time during which there are no records. This could be done with considerable accuracy if we had a long series of observations at a neighbouring station which lapped over those at Chicago. Unfortunately, there are no records of this description near Chicago, but we have a continuous series at two or more stations* which overlap each other; and by using these it has been possible to interpolate a series of values, and to make a complete record from 1830 to 1891. In Table XIX., wherever a record has been kept at Chicago, the temperature is given to the nearest tenth of a degree, but in all interpolated values only the nearest degree is given."

* We cannot trace any information as to which they were, or how far off.—Ed. M. M.

Reference to Table XIX. shows that out of the first 31 years—*i.e.*, 372 months—76 months were observed, and 296 were “interpolated.”

Table XXXIV., on page 57, monthly precipitation is even a worse case of theory. It gives monthly totals from 1843 to 1891. In the first 24 years—*i.e.*, 288 months—only 11 were observed, and 277 were “interpolated.”

We are glad to see that Prof. Hazen makes very little use of these portions of the tables, but we should have respected and trusted his work much more had he not given us these remarkable specimens of “interpolation”; we do not think that they could be matched in the whole literature of European meteorology.

Taking the records for the twenty years during which the observations seem to have been unexceptionable (save for the position of the thermometers, now *241 ft. above ground*—they have tall buildings in Chicago), we have the mean temperature as under. We add, for comparison, the latest figures that we have seen for Greenwich:—

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	YEAR.
Chicago ...	24 ^o ·5	27 ^o ·7	34 ^o ·8	46 ^o ·1	56 ^o ·3	66 ^o ·4	71 ^o ·9	71 ^o ·0	63 ^o ·8	52 ^o ·3	38 ^o ·6	29 ^o ·9	48 ^o ·7*
Greenwich.	38·5	39·5	41·7	47·2	53·1	59·4	62·5	61·6	57·2	50·0	43·2	39·7	49·5
Diff	+14·0	+11·8	+6·9	+1·1	-3·2	-7·0	-9·4	-9·4	-6·6	-2·3	+4·6	+9·8	+0·8
Rainfall } Chicago }	in. 2·12	in. 2·20	in. 2·52	in. 3 09	in. 3·72	in. 3·59	in. 3·57	in. 2·96	in. 2·77	in. 3·00	in. 2·66	in. 2·13	in. 34·40†

As regards extremes of temperature, we find that 100° in the shade was recorded on July 16th, 1887, and -20° on January 9th, 1875.

Greatest daily rainfall, 4·14 in., on July 26th, 1878. The observer says that he thinks that two-thirds of it fell in three hours, between 11.30 p.m. of 25th, and 2.30 a.m. of 26th—[*i.e.*, 2·36 in. in 3 hours]—much damage was done, and the sewers were choked, though their guaranteed capacity is one inch of rainfall per hour.

Prof. Hazen has spared no trouble in tabulating the data, and has, we think, brought out nearly all that there is to tell. He recognises the need of better observations; and now that meteorology in the U.S. is under the Department of Agriculture, we hope that the thermometers and rain gauges will not remain many more years among the chimney pots. Not, however, to be abandoned until a reasonable period has elapsed for comparison with others, in better homes on grass plots at the model farms and schools.

Sur la Prévision du temps et sur l'enchaînement des situations atmosphériques Par PAUL GARRIGOU-LAGRANGE. 8vo. Limoges, Ducourtieux, 1893. 35 pages and two plates.

M. GARRIGOU-LAGRANGE has two appointments, each of which is likely to lead the holder to take a deep interest in weather fore-

* Works out to 48°·61, but probably 48·7 is the mean when the months are given to a second place of decimals.

† Works out to 34·33 in. ; probably the 5's in the third place have all been thrown up.

casting; he is Secretary of the Société Gay Lussac (which gives its attention to matters aeronautical), and he is Secretary to the Meteorological Commission for the Department of la Haute-Vienne.

In the opening sections of his paper, the author points out that weather forecasting as at present carried on is largely a race between the telegraph and the storm, and he pleads for a broader mode of treatment, viz., the study of the general type of circulation prevailing on successive days, and storing these records for future study, so that the forecasts should be based chiefly on the hypothesis that because once a certain type was followed by certain weather, the same type will be followed by similar weather when the moon is in the same position. We are not sure about this, but, as we have often said in these pages, we wish success to every honest worker, and that we believe M. Garrigou Lagrange to be.

He has adopted a plan (very similar to that used, we believe, in New Zealand) of drawing a series of isobaric maps, with the "highs" and "lows" in different positions, and giving to each a number, so that, *e.g.*, Type 7 has a cyclone in mid-Atlantic, another in Northern Russia, and a "high" in Arctic Siberia. Then he tabulates the relative frequencies of the various types in months and seasons, and how frequently, *e.g.*, Type 7 is succeeded by Type 3, and the circumstances attending this succession. This has led him to think that the declination of the moon is a factor not to be neglected. There are other suggestions in the paper, but we have endeavoured to state its general aim, and now leave it to the study of those occupied with this class of work.

Sociedad Meteorologica Uruguaya. Revista mensual de meteorologia practica. Tomo II. Num. I. Enero de 1893. 8vo. Montevideo.

ALTHOUGH we have not had the pleasure of seeing the first volume of this work, we are glad to call attention to the number which we have received, and to find that although affairs in South America are at present rather disturbed, scientific work is going on. We know that it is not to be expected that in tropical countries things should be as prompt as in northern climes, and therefore we are not surprised that the returns in the January number are those for the previous July; we hope that by degrees they will be brought nearer up to date. But we are delighted to find that already there are as many as 30 stations at work in Uruguay; indeed, there seem to be 36, for the six principal stations, viz., Montevideo, Mercedes, Durazno, Isla de Flores, Salto, and Maldonado, do not appear upon page 7, which we think is a pity. It would be useless to offer any remarks upon the results of a single month; we therefore confine ourselves to wishing the Meteorological Society of Uruguay and its *Revista* a long and prosperous career.

THE EXCESSIVE HEAT.

DR. FALB AND HIS FORECASTS OF WEATHER.

(FROM A SPECIAL CORRESPONDENT.)

WE rarely occupy these pages with what is irreverently called "paste and scissors work"—*i.e.*, with reprints—but the following article, which appeared in the *Newcastle Daily Journal* of August 23rd, seems to us one in favour of which the rule may well be relaxed.—ED.

"The accurate definition of that much-abused term meteorologist is a pressing need of to-day. It is at present applied indiscriminately to all sorts and conditions of men, provided that they are in some way interested in the weather. He who reads a barometer and thermometer regularly every day at certain hours, and enters the readings in a note-book, not infrequently dubs himself meteorologist. And this more especially if he have at any time totalled up these records of facts, obtained monthly averages, and read a depressingly practical paper thereon at a meeting of some Meteorological Society. Everyone seems to regard himself, or herself, as a born meteorologist, perish the term; and who is there to decide as to the exact signification of this loosely applied term? A thorough meteorologist must of necessity be fairly familiar with many branches of science; and, if we rightly narrow our definition in this manner, it might not be difficult to demonstrate that there are but a select few on our planet to whom the description is peculiarly appropriate. Weather work has unfortunately come under the domination of German methods, and the perception of laws is becoming a vanishing quantity owing to an undeviating attention to microscopic detail. It appears to be of more importance to be sure that the readings from standard instruments shall be true to the thousandth part of an inch than it is to know when similar readings will occur again. As a consequence the State supported weather offices of Europe are able to tell the exact error of a thermometer or barometer in use by every one of their observers, yet are quite unable to predict with certainty the weather twenty-four hours in advance.

"Dr. Falb of Berlin has been introduced to the British public as 'the German meteorologist,' but the result of his vapourings has proved up to the hilt that the American humourist was not far wrong when he advised fallible mortals never to prophesy unless they know. Dr. Falb was 'reluctant to make prophecies which are only guesses,' so that the inconveniently warm weather of the past few days over Europe is only so much the worse for his theory. We were to have in England heavy rainfall throughout July, August and September, especially in September, which is to be 'exceptionally, abnormally, thoroughly wet.' If adjectives stand for anything, then certainly September ought to be a most miserable month; but there is a great virtue in an *if*. We happen to remember another so called meteorologist, Wiggins of Canada, who was good enough to forecast that on a specified day the North Atlantic Ocean would be vexed by a hurricane of such awful intensity that of all the vessels along its path none but Cunarders could possibly survive. Passengers postponed their embarkation, ships in our docks were made fast over night with extra hawsers, and even ancient mariners awaited somewhat anxiously what the morrow would bring forth. We need scarcely say that a genial sun rose in a cloudless sky, climbed calmly to his maximum altitude, and sank below the horizon, on as fine a day as the most exacting could desire. As a matter of fact, reports

received subsequently from steamships crossing the North Atlantic in every direction conclusively proved that gentle breezes and fine weather prevailed all over the ocean on that day. The very name of Wiggins now acts upon navigators after the manner of the proverbial red rag upon a bull.

“Dr. Falb’s positive assertions as to the coming weather have received great attention, and some degree of credence, in various lands ; for both the ‘many-headed’ and the ‘classes’ are equally afflicted with an insatiable craving for weather foreknowledge. Nevertheless, the predictions of old-time seers may be not less deserving of credit, which, after all, is but faint praise. It is not improbable that men more nearly approached precision in local weather forecasting prior to the introduction of costly meteorological instruments and weather departments. That traveller’s tale of the shepherd who foretold rainy weather on the ground that he had noticed an old ram to be twitching his tail considerably, as he invariably did just previous to a downpour of rain, is merely a rude expression of the truth that personal observation lies at the root of weather forecasting. Christmas Day last year happened to fall on a Sunday, and in the Harleian Manuscripts is distinctly laid down what kind of weather may be looked forward to by dwellers in our islands during the ensuing year. It is just possible that the doggerel rhymes of our forefathers, there given, are as worthy of belief as the more pretentious predictions of the German fore-caster.

‘ If that Christmas day fall upon Sunday, know well all
That winter season shall be easy, save great winds aloft shall fly ;
The summer after also be dry, and right seasonable. I say,
Beasts and sheep shall thrive right well, but other victuals shall fail.’

Farmers may not quite agree to the truth of the last line, but perhaps he who penned it was a meteorologist among farmers, a farmer among meteorologists, and only both when in the company of those who are neither. We do not propose to holloa till out of the wood, and September, of course, may be sufficiently damp to afford Dr. Falb a grain of comfort. An Irishman, asked if the day were to be wet or fine, warily replied that it might rain or it might not, he could not say for certain, but, anyhow, it would be one or the other. Just so. If the forecaster happen to be correct, the whole world is girdled with the news ; should he, however, make an outer, policy demands that he shall lie low ; and, if he miss altogether, then he will wait for better luck. Aristotle calls meteorology the ‘sublime science,’ presumably because ignorance of its laws lends enchantment to the view, as with other things.

“The summer of 1893 will be remarkable for the excessively high air temperatures recorded over Europe on several successive days, and the inconvenience of pedestrians and others exposed to the rays of the sun. Having shivered to the northward of the Arctic circle, and to the southward of Cape Horn in the depth of a southern winter ; and gasped for breath under a vertical sun in the tropical regions of Atlantic, Pacific, and Indian Oceans, we unhesitatingly prefer the former. It is possible to become warmer by means of exercise, and the wearing of suitable clothing ; but almost useless to attempt to become cooler in the tropics. The heat recently in England has successfully rivalled that of far sunnier climes. Such high temperatures, however, are not altogether exceptional in these latitudes, although from fifteen to twenty degrees Fahrenheit above the mean daily maximum temperatures for August. In 1859, during August, the London river was most

mal-odorous, and a temperature of 92 degrees was reached. Nine years later the maximum air temperature in the shade exceeded 90 degrees for several consecutive days, and in 1886, from the 4th to the 6th of July, similar high readings were obtained over our islands. The average temperature of the air in the shade for August at eight o'clock in the morning at London is 61 degrees, yet at that hour on the 8th of last month the temperature was 80 degrees, and last Friday morning (18th) the thermometer in the open air, out of the direct rays of the sun, actually showed 84 degrees, or no less than 23 degrees above the average for August deduced from observations made during the twenty years 1871-90! The maximum temperature for the same day was 92 degrees, or 20 degrees above the highest temperature of the air in the shade likely to be experienced in August in London. The air temperature was 70 degrees, or 18 degrees above the average, at Shields, at 8 o'clock in the morning of the same day; and the maximum official temperature there for the twenty-four hours was 78 degrees, or 14 degrees above the average daily maximum for the month of August at Shields. Cambridge has had higher air temperature readings in the shade this month than any other place in England. The mean temperature there during the hot spell has been from four to six degrees above that of other parts of the country. France has had even a fiercer sun-bath than we on this side of the silver streak, and maximum temperatures of 102 and 106 degrees of the air in the shade have been registered at Rochefort.

"We are not troubled with such trying changes in air temperature as the United States, or ships making New York from the equator in winter. A sailing ship 200 miles south-east of that port may enjoy a temperature of 70 degrees, yet on arrival two days later be plunged into the rigours of winter, with snow squalls and the thermometer below freezing point. Many will doubtless be chronicling the maximum temperature this summer, and performing curious arithmetical operations therewith; yet very few will seriously endeavour to discover a plan whereby it would be possible to predict such another season, say six months in advance. The scaffolding at present conceals from view the structure being reared by weather workers; and it is high time that the finished temple of the struggling science should stand alone on a firm foundation like that of astronomy.

SUN SPOTS AND AIR TEMPERATURE.

To the Editor of the Meteorological Magazine.

SIR,—In the communication by A. B. M. on "Sun Spots and Air Temperature," contained in the September number of the Magazine, no mention is made of the years actually employed in forming the separate means. It is not enough to speak of minimum and maximum years of sun spots, or even to say (if he had said it), that Wolf's years were used. What is best of all in such cases is that it should be definitely stated what years were taken as minimum years, and what years as maximum years. Perhaps A. B. M. would be so kind as to supply this information. Others would then be better able to deal with or verify the figures he has obtained.

W. E.

September 28th, 1893.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, APRIL, 1893.

STATIONS. <i>(Those in italics are South of the Equator.)</i>	Absolute.				Average.				Absolute.		Total Rain.		Aver. Cloud.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
England, London	78·2	20	30·9	13	65·6	40·4	40·1	65	117·8	25·2	·24	3	3·2
Malta.....	77·7	28	47·2	17	66·9	53·1	52·7	81	134·1	41·9	·25	3	4·3
<i>Cape of Good Hope</i> ...	98·7	5	43·2	24	73·1	53·6	56·5	82	...	...	1·99	9	4·6
<i>Mauritius</i>	82·6	6	66·0	5	80·2	70·3	69·2	84	134·2	59·6	10·06	20	6·5
Calcutta.....	96·5	18	69·7	23	92·3	75·1	74·5	75	157·9	63·0	·17	1	3·4
Bombay.....	94·6	16	74·1	1	89·3	77·9	73·1	72	142·8	65·8	·02	2	2·8
Ceylon, Colombo	89·2	...	70·8	24	87·5	75·2	70·7	75	157·0	60·0	20·39	19	4·9
<i>Melbourne</i>	77·5	11	40·0	3	76·9	51·5	...	78	131·9	34·0	2·07	14	6·4
<i>Adelaide</i>	86·1	11	42·9	27	70·7	52·1	49·3	64	145·6	35·5	1·98	16	4·8
<i>Sydney</i>	73·6	1	47·4	3	67·9	56·0	56·0	87	135·3	40·6	5·68	23	4·8
<i>Wellington</i>	69·0	3	45·0	10a	62·9	53·1	51·7	79	130·0	34·0	3·91	16	5·2
<i>Auckland</i>	72·0	4	49·5	5	68·3	56·1	57·4	84	129·0	47·0	3·79	14	5·8
Jamaica, Kingston.....	87·3	7	67·2	1	84·7	69·4	68·2	80	...	...	1·29	6	5·5
Trinidad	92·0	7	64·0	10	88·9	67·5	70·6	84	153·0	58·0	3·61	14	...
Toronto	69·3	8	22·4	2	47·4	32·1	30·6	71	...	13·0	4·27	14	7·0
New Brunswick, } Fredericton } Manitoba, Winnipeg } British Columbia, } Esquimalt	56·3	29	6·1	3	45·0	24·6	23·0	59	...	...	2·30	12	6·0
	56·3	30	0·7	2	37·5	16·3	...	...	...	...	2·30	14	7·0
	58·6	28	31·4	19	50·5	39·5	40·2	85	...	...	5·40	21	8·0

a And 11th.

REMARKS.

MALTA.—Mean temp. 58°·8 ; mean hourly velocity of wind 9·1 miles. L was seen on 9th. J. SCOLES.

Mauritius.—Mean temp. of air 1°·6 below, dew point 0°·9 above and rainfall 4·11 in. above, their respective averages. Mean hourly velocity of wind 8·4 miles, or 2·2 below average ; extremes, 25·4 on 30th, and 1·7 on 4th ; prevailing direction, E.S.E. L on 11th and 15th ; T and L on 12th, 14th, 19th and 20th ; and T on 13th and 26th. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms occurred on 11 days, and lightning alone was seen on 2 other days. J. C. H. CLARKE, Lt.-Col. R.E.

Melbourne.—Thunderstorm on the 16th, and with heavy rain squalls on the 25th, and lightning on six other days. Dense fog at 11 p.m. on the 30th. R. L. J. ELLERY, F.R.S.

Adelaide.—Mean temp. 2°·8 below the average of 36 years. Good rains, general over the settled districts of the colony ; at Adelaide ·34 in. more than the average. Mean bar. the lowest on record, being ·168 in. below the average. C. TODD, F.R.S.

Sydney.—Temp. 2°·7 lower than, humidity 9 above, and rainfall ·35 in. less than, the average. Thunder and lightning on 10 days. H. C. RUSSELL, F.R.S.

Wellington.—The first part of the month was generally fine, with occasional showers and prevailing N.W. winds, strong on 5th. From the 17th to the end of the month very showery, rain falling every day ; wind chiefly light from S., and very unpleasant weather. Fogs on 3 days. Slight earthquake on 21st, at 10.29 a.m. Mean temp. 1°·0, and rainfall ·39 in., above the average. R. B. GORE.

Auckland.—Commencement and close of the month fine, the remainder showery and unsettled. Rainfall about half an inch, and mean temp. slightly, above the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Fair, with a little B. Mean wind 92 miles per diem, or 24 more than the average. R. JOHNSTONE.

SUPPLEMENTARY TABLE OF RAINFALL,
SEPTEMBER, 1893.

[For the Counties, Latitudes, and Longitudes of most of these Stations,
see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			
II.	Dorking, Abinger Hall.	1·30	XI.	Builth, Abergwessin Vic.	4·53
„	Birchington, Thor	2·56	„	Rhayader, Nantgwillt..	4·26
„	Brighton, Prestonville Rd	...	„	Corwen, Rhug	3·34
„	Hailsham	4·70	„	Carnarvon, Cocksidia ...	2·91
„	Ryde, Thornbrough	2·97	„	I. of Man, Douglas	2·67
„	Alton, Ashdell	2·26	XII.	Stoneykirk, Ardwell Ho.	2·44
III.	Oxford, Magdalen Col...	·52	„	New Galloway, Glenlee	2·32
„	Banbury, Bloxham	·68	„	Melrose, Abbey Gate...	1·13
„	Northampton, Sedgbrook	·77	XIII.	N. Esk Res. [Penicuick]	2·25
„	Alconbury	·65	„	Edinburgh, Blacket Pl..	1·67
„	Wisbech, Bank House..	·70	XIV.	Glasgow, Queen's Park.	3·25
IV.	Southend	1·49	XV.	Islay, Gruinart School..	4·95
„	Harlow, Sheering	·75	XVI.	Dollar	1·24
„	Colchester, Lexden	1·08	„	Balquhider, Stronvar..	4·54
„	Rendlesham Hall	1·24	„	Coupar Angus Station..	1·10
„	Diss	·87	„	Dunkeld, Inver Braan..	1·39
„	Swaffham	·78	„	Dalnaspidal H.R.S. ...	4·48
V.	Salisbury, Alderbury ...	1·89	XVII.	Keith H.R.S.	6·96
„	Bishop's Cannings	1·35	„	Forres H.R.S.	4·03
„	Blandford, Whatcombe ..	2·41	XVIII.	Fearn, Lower Pitkerrie.	2·80
„	Ashburton, Holne Vic. ...	3·85	„	Loch Shiel, Glenaladale	13·03
„	Okehampton, Oaklands.	2·96	„	N. Uist. Loch Maddy ...	7·00
„	Hartland Abbey	3·48	„	Invergarry	6·56
„	Lymouth, Glenthorne.	3·90	„	Aviemore H.R.S.	3·72
„	Probus, Lamellyn	2·49	„	Loch Ness, Drumnadrochit	3·39
„	Wincanton, Stowell Rec.	2·27	XIX.	Invershin	3·34
„	Weston-super-Mare .....	...	„	Scourie	8·14
VI.	Clifton, Pembroke Road	1·81	„	Watten H.R.S.	4·96
„	Ross, The Braig	·89	XX.	Dunmanway, Coolkelure	4·10
„	Wem, Clive Vicarage ...	1·84	„	Fermoy, Gas Works ...	1·21
„	Cheadle, The Heath Ho.	2·76	„	Killarney, Woodlawn ...	...
„	Worcester, Diglis Lock	...	„	Tipperary, Henry Street	2·52
„	Coventry, Coundon	1·35	„	Limerick, Kilcornan ...	2·97
VII.	Ketton Hall [Stamford]	1·20	„	Ennis	3·50
„	Grantham, Stainby	1·10	„	Miltown Malbay	4·36
„	Horncastle, Bucknall ...	·97	XXI.	Gorey, Courtown House	·70
„	Worksop, Hodsck Priory	·85	„	Mullingar, Belvedere ...	1·54
VIII.	Neston, Hinderton	2·68	„	Athlone, Twyford	2·08
„	Knutsford, Heathside ...	2·64	„	Longford, Currygrane ...	1·67
„	Lancaster, Rose Bank ...	4·88	XXII.	Galway, Queen's Coll...	1·83
„	Broughton-in-Furness..	7·65	„	Crossmolina, Enniscoe..	3·84
IX.	Ripon, Mickley	1·38	„	Collooney, Markree Obs.	3·61
„	Scarborough, South Cliff	1·52	„	Ballinamore, Lawderdale	2·42
„	East Layton [Darlington]	1·29	XXIII.	Lough Sheelin, Arley ..	1·55
„	Middleton, Mickleton..	2·99	„	Warrenpoint	1·41
X.	Haltwhistle, Unthank..	3·07	„	Seaforde	1·48
„	Bamburgh	2·12	„	Belfast, Springfield	2·54
„	Newton Reigny	3·07	„	Bushmills, Dundarave...	4·53
XI.	Llanfrechfa Grange	1·98	„	Stewartstown	2·01
„	Llandovery	3·69	„	Buncrana	3·92
„	Castle Malgwyn	2·07	„	Lough Swilly, Carrablagh	5·46

SEPTEMBER, 1893.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						TEMPERATURE.				No. of Nights below 32°	
		Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours		Days on which '01 or more fell.	Max.		Min.				
				Dpth	Date		Deg.	Date	Deg.	Date	In shade.	On Grass.	
		inches.	inches.	in.									
I.	London (Camden Square) ...	1.07	- 1.44	.22	26	10	81.6	6	35.3	24	0	1	
II.	Maidstone (Hunton Court)...	2.57	- .02	.98	29	12	...	...	...	...	...	...	...
III.	Strathfield Turgiss	1.43	- 1.02	.37	8	...	75.4	..	34.2	24	0	2	
IV.	Hitchin	1.10	- 1.40	.52	8	11	77.0	6	37.0	12	0	..	
V.	Windsor (Addington) .....	.75	- 1.92	.19	28	10	80.0	6	33.0	24	0	4	
VI.	Bury St. Edmunds (Westley)	1.18	- 1.52	.45	8	9	71.0	7	40.0	24	0	0	
VII.	Norwich (Cossey)	1.34	- 1.32	.50	27	12	78.0	6	39.0	3	0	...	
VIII.	Weymouth (Langton Herring)	2.04	- .38	.74	28	13	71.0	7	40.0	24	0	..	
IX.	Torquay (Cary Green)	1.27	...	.58	28	12	74.5	6	39.0	24	0	0	
X.	Bodmin (Fore Street)	3.62	- .85	.82	28	18	...	...	...	...	...	...	...
XI.	Stroud (Upfield) .....	.90	- 2.01	.26	28	13	78.0	15	41.0	21	c	0	...
XII.	Church Stretton (Woolstaston)	2.09	- .41	.36	8, 28	16	73.5	5	38.0	21	0	2	
XIII.	Tenbury (Orleton)	1.32	- 1.29	.32	28	15	77.3	6	31.7	21	1	3	
XIV.	Leicester (Barkby)	1.74	- .90	.53	8	11	78.0	6	30.0	11	d	4	7
XV.	Boston .....	.54	- 2.23	.17	8	9	77.0	4	36.0	22	0	0	...
XVI.	Hesley Hall [Tickhill].....	1.22	- .94	.24	7	14	77.0	4	30.0	12	1	...	...
XVII.	Manchester (Plymouth Grove)	3.86	+ .39	.85	8	18	80.0	5	37.0	20	d	0	0
XVIII.	Wetherby (Ribston Hall) ..	1.85	- .61	1.02	26	11	...	...	...	...	...	...	...
XIX.	Skipton (Arncliffe)	4.98	+ .22	.96	28	17	...	...	...	...	...	...	...
XX.	Hull (Pearson Park)	1.81	- .63	.42	26	15	77.0	4, 5	33.0	12	0	3	
XXI.	Newcastle (Town Moor)	1.80	- .98	.31	25	13	...	...	...	...	...	...	...
XXII.	Borrowdale (Seathwaite).....	13.91	+ 2.18	2.26	28	22	...	...	...	...	...	...	...
XXIII.	Cardiff (Ely).....	2.64	- 1.10	.91	28	15	...	...	...	...	...	...	...
XXIV.	Haverfordwest	1.96	- 2.44	.52	29	13	71.9	6	28.5	21	2	4	
XXV.	Aberystwith, Gogerddan.....	5.01	+ .74	.76	28	16	74.0	3	30.0	10	...	...	...
XXVI.	Llandudno	2.88	+ .66	.65	20	23	71.5	4	44.0	23	0	...	...
XXVII.	Cargen [Dumfries]	2.64	- .92	.46	25	15	71.6	14	32.0	11	1	...	...
XXVIII.	Jedburgh (Sunnyside).....	1.94	- .75	.48	8	12	74.0	1	29.0	12	4	...	...
XXIX.	Old Cumnock	3.64	- .19	.48	28	20	...	...	...	...	...	...	...
XXX.	Lochgilhead (Kilmory).....	5.15	+ .02	.50	25	20	...	...	28.0	9	4	...	...
XXXI.	Oban (Craigvarren) .....	...	...	...	...	...	...	...	...	...	...	...	...
XXXII.	Mull (Quinish)	4.85	- .18	.47	6, 28	19	...	...	...	...	...	...	...
XXXIII.	Loch Leven Sluices	1.60	- 1.19	.60	30	7	...	...	...	...	...	...	...
XXXIV.	Dundee (Eastern Necropolis)	1.60	- .91	.50	21	15	75.8	4	32.2	23	0	...	...
XXXV.	Braemar	3.46	+ .60	1.26	21	22	72.2	4	28.8	11	3	11	
XXXVI.	Aberdeen (Cranford)	3.40	...	.88	21	21	73.0	5	31.0	25	1	...	...
XXXVII.	Strome Ferry.....	8.46	+ 3.59	1.10	12	23	...	...	...	...	...	...	...
XXXVIII.	Cawdor [Nairn]	4.03	+ 1.28	1.01	20	22	...	...	...	...	...	...	...
XXXIX.	Dunrobin	4.55	+ 1.96	.75	7	20	68.0	5	32.0	23	1	...	...
XL.	S. Ronaldsay (Roeberry).....	4.88	+ 2.22	.97	12	23	66.0	5	34.0	22	0	...	...
XLI.	Darrynane Abbey.....	3.67	...	.71	6	20	...	...	...	...	...	...	...
XLII.	Waterford (Brook Lodge) ...	1.21	- 1.71	.25	27	14	73.0	2	30.0	21	1	...	...
XLIII.	O'Briensbridge (Ross)	2.77	...	.63	29	14	70.0	3, 4	32.0	21	1	...	...
XLIV.	Carlow (Browne's Hill)	1.27	- 1.55	.20	6a	14	...	...	...	...	...	...	...
XLV.	Dublin (Fitz William Square)	.73	- 1.24	.17	6	14	72.0	5	38.2	21	0	2	
XLVI.	Ballinasloe	1.60	- 1.19	.27	7	17	68.0	3, 4, f	33.0	12	0	...	...
XLVII.	Clifden (Kylemore)	4.82	...	.53	25	19	...	...	...	...	...	...	...
XLVIII.	Waringstown	1.87	- 1.29	.44	6	14	76.0	4	34.0	10	e	0	2
XLIX.	Londonderry (Creggan Res.) ..	4.69	+ .91	.60	20b	24	...	...	...	...	...	...	...
L.	Omagh (Edenfel)	2.77	- .61	.35	22	21	73.0	...	36.0	...	...	0	0

a And 28 & 29. b And 25. c And 24. d And 21. e And 11. f And 14.

+Shows that the fall was above the average ; -that it was below it.

METEOROLOGICAL NOTES ON SEPTEMBER, 1893.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—This month kept up the peculiarity of the season, being warm, bright, and dry. The flower world all passed and gone in earlier months, but the insects and birds flourished amazingly. TL and H on the 8th.

HITCHIN.—S on the 23rd.

ADDINGTON.—Another month of dry weather. From 1st to 24th not quite one-quarter of an inch fell; after the 24th a little R each day to the 29th. Total fall the least registered in September since the observations commenced in 1871. The 5th, 6th, 7th, and 14th very fine, hot days; nights of 13th, 21st, 24th, and 25th, very cold, tender plants being cut down on 24th. Total R from January 1st 30 in. more than in the corresponding period of 1892.

BURY ST. EDMUNDS.—A hot, dry month, and rain much wanted. Many complaints of want of water from heavy land parishes, wells and ponds being dry. Distant T on 27th.

LANGTON HERRING.—The first half of the month was fine and dry, and up to the 19th the drought was as severely felt as at any time of the year, but in the last three days 1.14 in. of R fell. Mean temp. at 9 a.m. ($58^{\circ}3$) $0^{\circ}3$ above the average. T on the 8th and 22nd.

BODMIN, FORE STREET.—Dry and hot for the first five days, then showers to the 10th, followed by a dry week, and then R again to the end. Cold from the 18th to the 26th, and H, more than half an inch deep, on the 21st.

STROUD, UPFIELD.—T and L at night on 8th. L and T in afternoon on 22nd.

WOOLSTASTON.—The early part of the month was very hot and dry. A sharp storm of T and L occurred on the 8th, after which it became much colder, and for some days after the 20th very cold. Mean temp. $55^{\circ}4$.

TENBURY, ORLETON.—Very fine and warm till the 20th, with many hot days and practically no R. From the 20th to the end much colder. Mean temp. of the month about $0^{\circ}7$ above the average. Slight frosts on the 12th, 13th, and 21st. Fog on 11th, 16th, and 21st. T on 22nd.

LEICESTER, BARKBY.—Still very dry; great scarcity of water. Mean temp. of the month 55° . L and T on 8th, 23rd, and 27th.

MANCHESTER.—From the 2nd to the 5th summer weather prevailed. On the 8th a heavy TS occurred, and damage was done to a building in Market Street. Fine autumn weather on 7th, 9th, 10th, and 11th. Thick fog till 10 a.m. on 12th. Mean temp. $55^{\circ}3$.

HULL, PEARSON PARK.—TSS, with H, S, and R on 8th and 23rd, and with R only on 27th.

WALES.

HAVERFORDWEST.—During the first seven days very fine bright weather prevailed, the temp. on four days rising to 70° . Some R fell in the second week, and the weather, though fine and bright, was much cooler. It was again very fine and warm to the 20th, the temp. rising to $69^{\circ}2$ on 16th, but on 21st the max. was only $58^{\circ}9$, and frost on that and the following night killed dahlias, &c. During the remainder of the month broken weather prevailed, with a falling bar. Prevailing winds N.W., W., and S.E.

GOGERDDAN.—Very changeable throughout, with H storms and T about the 22nd.

SCOTLAND.

CARGEN.—The weather during the month was exceedingly variable. In the first week the temp. was considerably above the average, while in the second week it was much below it. A considerable fall of S took place on the 23rd, and heavy H showers occurred on 21st. Mean temp. $1^{\circ}5$ below the average. T on 18th, 21st, and 30th. L on 29th and 30th. Ripe strawberries were gathered, and rhododendrons, azaleas, honeysuckle, laburnum, and wild roses flowered.

JEDBURGH.—The temp. fell considerably after the 10th, though the prevailing wind was S.W. Cereals all got in in good order, and fully average crops.

OLD CUMNOCK.—T on the 8th and 29th. H on 22nd.

CAWDOR.—S at night on 22nd, and H on 25th.

ROEBERRY.—The first ten days fine, afterwards wet and cold. Mean temp. 47°·8.

IRELAND.

DARRYNANE ABBEY.—A fairly good month, with rainfall below the average. Strong N.W. gale, with T and vivid L at night on 7th. Strong N.W. gale and heavy sea on 29th.

WATERFORD, BROOK LODGE.—Snow on Knockmealdown mountains on 20th. Heliotropes, begonias, and dahlias damaged by frost on 21st.

O'BRIENSBRIDGE, ROSS.—More than half the month very fine; light showers on three days, and copious rains on 11 days. Much variation of temp., the first frost occurring on 21st.

DUBLIN.—Favourable throughout. A month of average temp., with fresh W. and N.W. winds and frequent showers, but no heavy rains. At times the nights were very sharp and even frosty, but there was much bright sunshine by day. Mean temp. 55°·9. High winds were recorded on 14 days, but there were no gales. Aurora on 1st; L on 8th and 21st.

OMAGH, EDENFEL.—The month commenced with fine summer-like weather, which, with a short break, continued for a fortnight. Thenceforward it was generally raw, rainy, and unsettled, with low night temp., but no frost. There was a considerable second display of rhododendron and apple blossom, with some excellent ripe strawberries.

NEWSPAPER METEOROLOGY.

To the Editor of the Meteorological Magazine.

SIR,—With reference to the returns of maximum temperatures, August 13th to 19th, in your Magazine of this month, and your remark as to the desirability of verified instruments being used, and placed in a similar position, I hope that this most important suggestion will induce all observers who send their results to you to state specifically the kind of stand or "screen" they use, and the maker of their instruments. I presume it is hopeless to expect similar information to be sent to the public press generally by the numerous contributors of meteorological data. My thermometers have been for some years in a Stevenson screen, and my maximum in the hot week last month, viz., 86°·0, entirely corroborates your remark as to readings above 90° being confined to the eastern parts of England; but an observer residing within five miles (in a direct line) of this place, and at a very similar altitude, reported to a local paper of considerable circulation a maximum of over 90° in the same week, without, of course, giving any particulars as to his thermometer or its position. It is much to be regretted that such confusing data should be published, as tending to most misleading and fallacious records of meteorological phenomena being circulated and *preserved* in the public press, for many people make a practice of cutting out these paragraphs and keeping them as a record of a very hot or a very cold season, as the case may be.—Yours very faithfully,

B. T. GRIFFITH-BOSCAWEN.

Trevalyn Hall, Rossett, North Wales, Sept. 30th, 1893.