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METEOROLOGICAL BIBLIOGRAPHY.

The receipt of a copy of the *Catalogue des ouvrages d'Astronomie et de Météorologie qui se trouvent dans les principales Bibliothèques de la Belgique* is of itself ample justification for our returning to the subject of Meteorological Bibliography, upon which we dwelt fully in our March number. But even without M. Houzeau's work we should not have hesitated to bring the subject again to the front. One thing after another comes forward and shows that there is far too little real serious thought given to meteorology. Just at present the question of anemometer constants is being really deeply considered by several able men, but why have tens of thousands of pounds been expended on the construction and erection of anemometers before definitely ascertaining what their indications meant? Moreover, why has no effort been made to secure uniformity in their exposure? We have seen perhaps from fifty to a hundred anemometers in different parts of the British Isles, but we cannot recollect *two* which are similarly erected. Now, if anything will lead people to think, it surely must be books, but indiscriminate reading is of little profit. The time has passed in which universal geniuses were possible, and now he who would aid in constructing the temple of science must be content to spend all his life in perfecting a single stone. The time of the universal genius has gone, and that of the specialist has come. Unfortunately, their number is far too small, but even in this country we may claim four or five men respected all over the world who have won their position solely by concentrating all their powers on a single subject, and while gaining honour for themselves have pushed those subjects, both as to modes of observation and accuracy of knowledge, far in advance of all others.

Whether a man aspires to becoming a colonel of the meteorological army, or merely a lieutenant, it is equally necessary that he be thoroughly acquainted with all the existing literature upon the branch to which he devotes himself; for this purpose classified catalogues are indispensable, and thus we are brought back to the consideration of the work before us.

We most heartily congratulate M. Houzeau, firstly upon the extremely happy design of his catalogue, and secondly upon its successful completion.

Belgium, as our readers are aware, is not a large country; it is much smaller than Ireland, and is well provided with railways. When making arrangements for issuing a new edition of the catalogue of the library of the Royal Observatory, he fortunately thought that it would be still better to issue a general catalogue of all the astronomical and meteorological works in all the public libraries in the country. The work before us is the realization of this happy thought. Each of the public libraries has initial letters assigned to it, such as A.M., Académie de Médecine; V.Y., Ville d'Ypres, &c.; and at the end of each title we find these letters, thereby indicating in which library the work is to be found—*e.g.*, the first title in meteorology is as follows:—

“3074 || Grellois, E. Plan d'une bibliographie météorologique. Paris, 1865; in 8vo.—A.R.”

the interpretation of which is, that 3074 is its reference number in this catalogue; || denotes that it is an extract from some periodical publication; then follows the title, &c.; and, finally, A.R., showing that only one copy existed in a public library in Belgium, and that that one was at the Académie Royale. We need not point out either the benefit of thus concentrating in a single volume a catalogue of the entire astronomical and meteorological resources of the country, or the difficulty of carrying such a scheme to a successful issue. However, it is done, and we congratulate M. Houzeau on its accomplishment, and are certain that he has earned the gratitude, not of Belgians alone, but of earnest workers of all nations.

We await with some anxiety Mr. Scott's communication to the Meteorological Society on June 18th, respecting the proceedings at the late Congress at Rome. The notice in *Nature* of May 15th is so worded as to be absurd. It says:—

“The preparation of a catalogue of existing meteorological literature, including papers in periodicals, was recommended, such catalogues having already appeared at Brussels and in London (for the library of the Meteorological Society).”

Here we have the whole subject in a fog again. It is perfectly clear that whoever wrote that paragraph had neither read Dr. Hellmann's article in the *Zeitschrift*, nor the translation of it, and the commentary upon it, which appeared in our March number. *That* would not be a serious matter, but it *is* serious if the assembled delegates have not discriminated between a “catalogue” and a “subject index,” between that which could easily be done, and that which, although we hope to see it, is so great an enterprise that Dr. Hellmann thinks it “must ever remain something to be wished for.”

The foregoing paragraph leads to a lot of questions. If the catalogue is to include “papers in periodicals,” it immediately becomes

the "subject index," for who is to define the length of a communication which will justify its insertion in the list—*e.g.*, the very article in *Nature*, whence this paragraph is quoted, is of at least equal interest with the following, which we find in the Brussels catalogue :—

"3343 || **Pöey, A., Le Verrier, U.J., et Faye, H.** Appel aux nations hispano-américaines. Paris, 1864 ; in 4to.—E.G."

If we may change the word "in" and write "papers from periodicals," the paragraph would at once become both true and reasonable. For then it would merely affirm the desirability of one general catalogue being compiled upon the model of Struve's, the Meteorological Society's, and M. Houzeau's. If, however, the Congress arrived no further than at recommending it as desirable, we do not think that any work will appear which will meet our expectations, or, rather, which will come up to our idea of what is desirable and possible.

For the purposes for which they were designed, we do not believe that better arranged catalogues could be prepared than the London and Brussels ones, but they are terribly incomplete ; we doubt if both together they contain one quarter of the existing works upon meteorology.

We have heard something of a proposal that every body which publishes a catalogue should send two copies to every other similar body, so that every body shall be able to cut them up and perfect its own catalogue by inserting cuttings from the others. That would be a terribly wasteful way of preparing a general catalogue—of course we do not mean wasteful in cutting up a few catalogues, but wasteful of labour, for each institute would have to do that which could be better done by some one body on behalf of all. Suppose there are twenty such bodies, it would cost each of them *in time* and materials at least £100 to make a complete concentration of the data given by the twenty catalogues which each would have to incorporate with its own. But twenty times £100, or £2000, would be ample to cover the cost of a perfect printed catalogue, of which there could be plenty of copies handy for reference, instead of the twenty bulky volumes of extracts which the same sum (not concentrated) would alone produce.

We adhere to the proposal in our previous number, and reprint it so as to secure its perusal.

We think that the first step should be to urge the Director of each Central Institute to print a catalogue of its own library. If they could be induced to do so in duplicate, *i.e.* both grouped in subjects and under authors, so much the better ; but at any rate under subjects. It is difficult to believe that this can be refused. It may also be hoped that the *Société Météorologique de France* and the *Scottish Meteorological Society* will follow the lead of the *Meteorological Society*. The Society of Telegraph Engineers have in the press the catalogue of the celebrated Ronalds Library (Electricity, Magnetism, and Meteorology). We should thus obtain about a score of catalogues, each very useful in its own country, and collectively containing probably 90 per cent. of the titles

of all meteorological works ever written. The compilation from these of one general catalogue of meteorological books and memoirs would be very easy, and the cost insignificant.

It is a legitimate subject for discussion whether this general bibliography should be grouped according to subjects or to authors, or to both. We believe, as we have already said, that for the use of persons consulting a specific library, or set of libraries, the subject grouping is best; but for the "general meteorological bibliography" we are inclined to recommend grouping under author's names, if we cannot get it in both forms.

Such a work could be prepared within six months after whoever was charged with its compilation received the whole of the separate catalogues, and whatever country might undertake it, it ought to be, and surely would be, cheerfully repaid the bulk of its outlay by the sale to other countries of copies of the work. We think that the work is so desirable that that country which was foremost in promoting it would show the highest appreciation of its mission. Certainly among the masses of meteorological literature hitherto published there is not a single work which is of half the utility which a general bibliography would be.

To epitomize—(1) We think that the compilation of the "subject index" should not be attempted yet; (2) We ask some country—and right gladly should we hear that our own Meteorological Council would do it—(a) to endeavour to induce all the Meteorological Institutes in the world to print catalogues of their own libraries; (b) to incorporate the whole of these, and any further titles which they can obtain, in one "General Meteorological Bibliography."

AN AMERICAN STORM.

"A terrific cyclone crossed Eastern Kansas on Friday evening, May 30th, killing more than 50 people, injuring over 100, and destroying much property. The storm moved from west toward east, the chief damage occurring in Marshall County, along the line of the Union Pacific Railway for a distance of 30 miles, beginning 90 miles west of the eastern boundary of Kansas. At Irving 12 people were killed and 40 were wounded, and nearly the entire town was destroyed; at Delphos, 15 people were killed; at Frankfort, 8 were killed and 13 wounded; at Blue Springs, 3 were killed; at Beloit, 3 were killed, and at Fulton 9 were killed. The iron railway bridge over the Blue River was blown to pieces, its rods and girders being twisted like wires. The cyclone is described as a dark, funnel-shaped cloud, moving about ten miles per hour just above the earth with a whirling motion, estimated at from 60 to 100 miles per hour. The path traversed varied from 300 to 700 yards wide, being distinctly marked, as every tree, house, fence or obstruction along it was destroyed."—*Telegraphed to the Times.*

TRINIDAD RAINFALL.

[Accurate rainfall observations from the West India Islands (except Barbados and Jamaica) are so rare, that having just received the following table from Mr. Prestoe, we reprint it, with much pleasure. The fluctuation in the annual total is very nearly of the usual amount, viz.—32 per cent., so that the maximum is very nearly double the minimum. There are slight errors either in the monthly or annual values in several years, but they are too small to affect the utility of the table or to justify us in delaying its publication. The most serious is 1871, of which the sum of the months is 75·58 in. We think that January, 1878, ought to be 4·43 in.—Ed.]

Annual Rainfall, 1862-1878—St. Ann's Observatory, County of St. George, Trinidad.

YEAR.	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCTOBER.	NOV.	DEC.	Total Rainfall in each year.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1862	...	·66	·77	·25	1·41	8·47	10·36	9·57	11·97	6·60	10·06	3·08	63·23
1863	1·54	2·71	1·45	·85	1·26	9·12	10·12	10·53	12·11	6·24	4·30	6·57	66·83
1864	2·51	·53	·36	·04	8·15	4·96	7·17	12·06	8·04	6·53	5·94	6·61	62·90
1865	2·62	3·20	1·07	7·98	3·22	5·64	10·35	14·83	7·32	14·62	4·81	9·62	85·29
1866	2·24	3·91	1·44	1·09	1·45	6·59	7·83	12·34	5·87	10·11	8·17	6·82	67·86
1867	1·31	6·36	·83	1·32	2·33	5·30	12·20	15·21	10·45	7·87	·67	2·71	66·56
1868	2·06	·82	3·20	·64	4·17	7·78	11·35	6·73	5·46	4·66	8·31	1·03	56·21
1869	·08	·93	·74	·41	·69	5·52	10·17	8·74	8·86	5·15	6·30	5·87	53·46
1870	2·61	·56	1·46	1·51	4·65	8·81	11·91	9·00	10·63	3·98	5·94	8·29	69·35
1871	6·62	1·40	2·89	·92	3·97	8·84	11·73	12·97	7·87	4·37	10·73	3·27	74·09
1872	1·45	·07	·74	·39	3·14	7·09	5·45	10·82	3·07	4·80	9·89	3·04	49·95
1873	1·78	1·08	1·98	·53	0·00	4·31	5·04	8·37	5·80	10·34	3·48	1·31	44·02
1874	3·47	1·96	3·67	5·16	2·51	12·28	12·28	11·20	9·38	6·42	3·66	4·29	76·20
1875	3·39	·91	·56	·42	2·61	4·15	12·62	7·22	11·95	10·85	3·74	2·48	60·90
1876	3·26	1·03	1·78	1·67	6·65	11·17	12·23	15·18	12·63	7·04	5·95	3·96	81·95
1877	2·14	0·00	7·46	3·38	3·19	8·43	8·35	12·94	6·39	6·68	7·66	5·48	72·10
1878	3·44	·70	...	3·22	4·99	5·78	5·42	8·88	11·15	5·89	8·72	3·05	60·25
Average monthly Rainfall 1862 to 1878	2·52	1·53	1·78	1·75	3·17	7·30	9·62	10·97	8·72	7·19	6·37	5·20	

Average Annual Rainfall for 17 years—1862-78

... 65·36 in.

HY. PRESTOE, *Government Botanist.*

CANADIAN RAIN GAUGES.

To the Editor of the Meteorological Magazine.

SIR,—On page 42 of your Magazine for April, 1879, in the review of "Instructions to Observers in connection with the Meteorological Service of the Dominion of Canada," I notice the following:—"In one respect we cannot agree with Prof. Kingston. His staff of observers seem to have a very miscellaneous collection of rain gauges, and this has apparently induced Prof. Kingston to abandon as undesirable the usual course of supplying measuring jars adapted to the gauges, and instead of so doing to issue jars divided to cubic inches."

With reference to the above, I remark that the gauge in almost universal use at the Canadian stations has a circular mouth with an area of 10 square inches, so that the glass graduated to cubic inches is exactly adapted to the gauges; the gauge is described in articles 232 to 237 of the instructions, and is shown in the photograph No. 12.—Your obedient servant,

G. T. KINGSTON,

Superintendent of Meteorological Service,
Dominion of Canada.

Meteorological Office, Toronto, Canada, May 3rd, 1879.

[We are very glad to learn the fact stated by Prof. Kingston. But we really cannot blame ourselves for having assumed that the very full details and table given on pages 75, 76, and 77, were considered by the author to be necessary for the use of his observers. Those pages are almost useless where the gauges are 3·57 in. in diameter, and as we now learn that such gauges are "in almost universal use at the Canadian stations," we are rather at a loss to know why these pages were written. No other instructions dwell upon the question half so fully. We believe that any one who reads sections 226 to 230 would arrive at the same conclusion as we did. Space forbids our reprinting the three pages referred to, but we quote the last two paragraphs.

"229. The labour of performing the division by such a number as 50·2656, on every occasion of measuring the rain, may be got over in two ways. One of these methods is to graduate the measuring glass so that its divisions, instead of indicating the cubic inches, &c., contained in the glass, represent the *depth* on the surface, to which the contents correspond *when a gauge of those dimensions is employed*. Thus, if the diameter be 8 inches, as a depth of 1 inch of rain will cause an accumulation of 50·2656 cubic inches in the receiver, a tenth of an inch will give 5·02656 cubic inches nearly. Hence, if the glass be properly graduated, the volumes intervening between the lines of graduation which represent tenths of an inch in depth will be 5·02656 cubic inches.

"This method which is employed extensively in England, is subject to the grave inconvenience that the gauge and the glass must be made each one for the other, so that if either gauge or glass be damaged the observation is stopped until the damaged instrument is replaced by another precisely similar. Now, while a glass adapted for a particular gauge is probably not procurable except from the maker who furnished the gauge, a glass divided to cubic inches

can be procured with greater readiness, and it can moreover be used with any gauge whatever."*

"230. It is much better to avoid altogether the use of glasses which are so graduated as to be adapted exclusively for gauges of certain diameters, and to employ those only which are divided to *cubic inches*, and which can be used with gauges of any area whatever. Where the area of the gauge is expressed by a number which is not a convenient divisor, the labour of performing the division may be avoided by constructing a table giving the quotients which would be obtained by dividing the cubic inches of rain received in the gauge by the area of its mouth expressed in square inches."

* In the event of an injury occurring to the gauge, there is no need to stop the observations while it is under repair, or until it has been replaced by another. Provided that the observer possesses a glass divided into cubic inches, he may employ, as a temporary substitute for his gauge, a common funnel, round which a band of tinned sheet iron is soldered, extending 3 inches above and 3 inches below the edge of the funnel. The funnel should be rested on a common tin pot, of such a size as will allow the lower part of the band above named to overlap it on the outside. The diameter of the mouth of this temporary gauge can be taken as half the sum of two measurements, at right angles to each other, and the area can then be calculated therefrom. Thus, if two measured diameters are 4.24 and 4.28, the area = $\frac{1}{4}(4.26)^2 \times 3.1416$ nearly = 14.2534 nearly.

—ED.]

THIRTY WINTERS.

To the Editor of the Meteorological Magazine.

SIR,—I find I made a most unaccountable mistake in my table of 30 winters. I put April, 1861, as being 39°, whereas it should have been 43°. Consequently, *April* as well as *January* was the coldest for 30 years, and there was only one winter within two degrees of the last six months.—Yours truly,

W. LUCAS.

The Firs, Hitchen, 20th May, 1879.

[Three other corrections are rendered necessary by this mistake; the mean for April should be 45°·5, the average for the winter 1860–61, should be 37°·6, and the mean of all the averages 39°·2 instead of 39°·1. The last remark in Mr. Lucas's letter though correct as a broad statement, is not rigorously accurate. In 1853–4 the excess was 1°·9; in 1854–5, 1°·6; in 1859–60, 1°·8; and in 1874–5, 1°·7. All other winters were more than 2° warmer.—ED.]

EXCESSIVE RAINFALL.

To the Editor of the Meteorological Magazine.

SIR,—It may probably not be uninteresting to you to be informed of the great rainfall here since the 23rd ult.—total 5·79 inches—as follows :—

	in.		in.
May 23rd.....	0·74	June 1st	1·30
„ 25th.....	0·38	„ 2nd and 3rd ...	0·75
„ 26th.....	0·10	„ 5th and 6th ...	0·55
„ 28th.....	0·03	„ 7th	0·73
„ 29th.....	0·43	„ 9th	0·02
„ 31st.....	0·02	„ 11th	0·74
Total.....	1·70	Total.....	4·09
Total Fall in May ...	...	...	3·13 in.

The largest quantity recorded since I have kept a register in so short a time. Our growing crops on heavy lands are taking much harm.—Yours truly,

S. TABOR.

Fennes, Braintree, 12th June, 1879.

REVIEWS.

Meteorological Observations, made at the Adelaide Observatory, during the years 1876 and 1877; under the direction of CHARLES TODD, C.M.G., F.R.A.S., published by the authority of the Government of South Australia. Adelaide: 1878, 246 pp.

THIS work contains very full tables and diagrams of the Meteorological Observations for each month of 1876 and 1877, at the Adelaide Observatory, the observations at 9 a.m., 3 p.m., and 9 p.m. each day, being printed *in extenso*. All through the tables for the two years there is a column for the readings of the minimum thermometer on grass, which is almost superfluous as no observations are entered in it. Next to it, however, is a column giving the radiation temperature on wool; we do not know whether this is because there is no grass, or because the wool is considered to give better results; there has recently been some discussion in this Magazine and elsewhere, as to the best material for this purpose, the objection to grass being that the least variation in its length has a considerable effect on the exposure of the thermometer.

The diagrams, of which there is one for each month, are in the usual form, and represent pressure, temperature, force and direction of wind, humidity, ozone, cloud, rain, and evaporation.

The tables of rainfall over the whole colony are particularly good, the total number of stations being about 100, many of them new ones; at all the old stations, the mean of previous years is given for comparison. The value and interest of these tables would be increased by the insertion of a map of the stations, more especially as the latitudes and longitudes are not given. The stations seem to be mostly in the south, the rest of the colony being represented by a chain of about fifteen stations along the line of the telegraph. The largest amount of rainfall recorded at any station during 1877 was 60·11 in. at Palmerston, on the north coast, and the smallest 5·22 in. at Arrowie.

Another good feature of the work is the very thorough description of the instruments used at the Observatory, going as far as to give the names of the makers and numbers of the thermometers.

The estimation of evaporation is a matter of great difficulty, and we know of no satisfactory instrument for the purpose. The one used by Mr. Todd is, as the following description shows, much the same as that employed by Mr. Griffith, at Strathfield Turgiss.

“The atmometer consists of a large box or tank, made of well

seasoned red gum, lined with zinc; the tank is 4 ft. square, and 3 ft. 6 in. deep; it is sunk in the ground to a depth of nearly 3 ft., and is kept filled with water to within 3 or 4 in. of the top.

"The observations are made in the following manner:—a stout brass bar is placed diagonally over one corner of the tank, resting horizontally on two iron plates; at right angles to this bar is a vertical rod moveable by rack and pinion, graduated to one-tenth of an inch, and read off by means of a fixed vernier to one-hundredth of an inch. The rod, which is pointed at its lower end, is carefully set to water level inside a glass tube of two-inch bore, reaching from the bottom of the tank, the lower end of the tube being perforated, by which means a perfectly smooth surface is secured, even in high winds. A rain gauge by the side of the atmometer measures the rainfall received in the tank."

The result obtained from this instrument, showing that the mean yearly amount of evaporation for the six years—1870–75—was 67·309 in., while the mean annual rainfall is only 24·479 in.; proves how little agreement there is between the evaporation from a water surface, and that from the surrounding country.

Ministère de l'Instruction publique. Bureau central Météorologique de France. Instructions Météorologiques. Paris: Gauthier Villars, 1879. 8 vo., 80 pages.

THERE is a certain sense of appropriateness in the fact that the first publication which we receive from the newly-formed French Meteorological Office is a manual of instructions—to which, by the bye, in an excess of bashfulness, M. Mascart has not attached even his signature, although the work itself bears internal evidence of his supervision, and as Director of the Office he is of course responsible for all its publications.

The introduction is so short and to the point that we translate it entirely:—

"A decree of May 14th, 1878, created a Central Meteorological Office for France. This new Service embraces the study of the great movements of the atmosphere, storm warnings both to seaports and for agricultural purposes, the organization of meteorological observatories, and of regional or departmental commissions, the publication of their works, and all investigations into meteorology or climatology.

"By virtue of this decree all meteorological documents received by the Minister of Public Instruction are collated in this central office.

"Many inquiries having been made for information respecting the organization of stations, the selection and mode of using instruments, we believe that we are meeting a general wish by publishing these *Instructions*, in which we have endeavoured to give accurate and practical information respecting the principal instruments used by meteorologists."

The most original part of this pamphlet is the section of the chapter upon General Arrangements, which treats of the choice of a place of observation, and in which occur the following paragraphs :—

“Observations in large towns never represent accurately the true characteristics of the region which one desires to study. The presence of a number of houses artificially kept at a temperature different from that of the external air, leads to anomalies which may be considerable. Thus the temperature recorded at the Paris Observatory give for the annual mean of that city $50^{\circ}\cdot9$, although observations made in the country by M. Renou enable us to affirm that the real temperature of the region in which Paris is situated is a little less than 50° . However, the observatory is in a quarter well situated with regard to prevailing winds, and which was sparsely inhabited when the observations which yield the above value were made. Observations made with extreme care in the Isle Saint Louis by Commander Delcros gave an annual mean $1^{\circ}\cdot1$ higher than that at the observatory. Therefore, the mean temperature of Paris, deduced from accurate observations of relatively well-placed instruments in the heart of the city, would be at least $1^{\circ}\cdot8$ too high.

“If, instead of considering the mean temperatures, we examine individual observations, we shall find much greater differences, reaching to 7° and even much more. Thus, on December 9th, 1871, although the temperature fell to $-10^{\circ}\cdot3$ at Montsouris, and to $-11^{\circ}\cdot9$ at Aubervilliers, a minimum thermometer freely suspended at a window on the fourth floor in a court yard open to the North, and quite exposed on that side, in Paris, only fell to $6^{\circ}\cdot8$. There was therefore on that occasion a difference of more than 18° , resulting from the influence of the city and the position of the instruments. Differences of several degrees occur almost daily.”

M. Mascart is right in coupling the “position of the instrument” with “the influence of the city,” but even then 18° remains a previously unheard-of difference, and if the range of temperature in cities is so vastly less than in the open country, it must surely have an important bearing upon public health. More than twenty years ago we had the pleasure of assisting the Metropolitan Association of Medical Officers of Health in compiling weekly tables of London climate. The stations were St. Mary’s Hospital, Paddington; Fulham; Camden Town; Whitehall; St. Thomas’s Hospital, London Bridge; Hackney; and Greenwich; but the greatest difference in the individual minimum temperatures which we can find by running over the published tables is on March 26th, 1858, $8^{\circ}\cdot6$ against the above 18° .

These Instructions are intended for what we should call second order stations only, and no anemometers are therefore described, but there is one entirely new feature, viz., a series of definitions of wind force specially designed for observers on land. Our readers are doubtless familiar with the definitions given by Admiral Beaufort for use at sea, definitions which the alterations in the build and rig

of ships have rendered nearly obsolete. M. Mascart now gives the following table :—

No.	Designation.	Force of Wind.	Velocity.	
			Metres per second.	Miles per hour.
0	Calm	Smoke rises almost vertically and the leaves of trees are motionless	0 to $\frac{1}{2}$	0 to 1
1	Slight ...	Perceptible to the hands and face, makes a flag flutter and shakes small leaves	$\frac{1}{2}$,, 4	1 ,, 9
2	Moderate	Blows a flag fully out, shakes the leaves and small branches of trees	4 ,, 7	9 ,, 16
3	Fresh.....	Shakes the large branches of trees	7 ,, 11	16 ,, 25
4	Strong ...	Shakes the largest branches of trees and the trunks of small ones	11 ,, 17	25 ,, 38
5	Violent...	Shakes considerably all trees, breaks branches, and the trunks of small trees	17 ,, 28	38 ,, 63
6	Tempest..	Blows down chimneys, tears the roofs off houses, and uproots trees.	28*	63*

* and upwards.

Enclosed with the Instructions was an anonymous price list, of which we think a translation will be interesting to our readers :—

Price List of the Principal Instruments used at Meteorological Stations.

[illegible]

N.B.—Where two prices are given they are the limits between which they vary according to size of instrument or delicacy of graduation.

THE WEATHER IN MAY.

On the 1st of the month an anti-cyclone was formed over Scotland, which spreading gradually southward extended over the whole of the United Kingdom by the 3rd, bringing bright very fine weather with light airs. On the night of the 2nd there occurred an exceedingly sharp frost over Central England. During the next two days (4th and 5th) the weather was governed

by the anti-cyclone, and light breezes from W. in the N. and from E. in the S. were reported, with very fine weather. On the night of the 5th, however, a brisk decrease of pressure took place in the N. ; a deep depression passed eastward over Scandinavia, while small subsidiary disturbances passed south-eastward over the North Sea. Behind, these N. winds and gales with cold weather, and showers of snow, hail, and sleet were experienced. From the 6th to the 10th pressure remained highest off our western coasts, and N. winds with cold inclement weather prevailed. On the 10th a brisk fall of the barometer began in the W. ; the wind there, backed to S.W., and the temperature rose. Rain fell very generally and heavy snow on some days.

During the next week (11th-17th) the weather continued cold and unsettled. On the 11th and 12th light W. to W.N.W. breezes prevailed with moderately mild weather, the sky, though at first cloudy, subsequently clearing a good deal ; but on the 13th a large area of low pressure advanced over these islands and gradually became deeper as it travelled slowly in a south-easterly direction. The wind circulated round this disturbance ; at first it was light to moderate in force, and on the 14th thunderstorms were experienced in many localities, but afterwards increasing in strength and blowing a gale from N. on our N.E. coast. By the 16th the disturbance was disappearing over the Netherlands, and the barometer rose briskly in the S.E., while a N. breeze blew over the greater part of this Kingdom. In the W., however, a fresh fall had set in, and the wind had shifted to S. over Ireland. This new decrease was caused by the advance of a fresh disturbance, which was shewn over Ireland on the morning of the 17th, and moved south-eastwards to the British Channel in the course of the day. Rain fell on most days of this week.

No change of any importance occurred during the week succeeding. The weather throughout was rather unsettled, but no serious disturbance reached our shores. On the 18th, 19th, 21st, 22nd, and 23rd depressions crossed these islands, and S.W., W., and N.W. breezes prevailed in succession, the fall on the 23rd causing the wind to rise to a gale in the Hebrides.

Exceedingly unsettled weather prevailed during the remainder of the month, numerous depressions having passed over, accompanied by large quantities of cloud and rain. At first these disturbances passed from W. to E., and cool W. breezes, with weather varying from rainy to fair, prevailed, but on the 27th an area of low readings was formed in the S.W., and hovering over the western part of the English Channel, caused N.E. winds over these islands, thunderstorms, and on the nights of the 27th and 28th great falls of rain in some places. On the 29th the depression was apparently filling up and moving westward ; and on the 30th S. winds, with fair warm weather, prevailed for a time in the S.E., though rain and N.E. winds continued in the W. and N. On the morning of the 31st a shallow subsidiary depression was shown in the S., with a deeper disturbance over Norway, the weather being showery and unsettled, but by the afternoon the depression was moving away eastwards, and fine weather was experienced.

Temperature during the first three weeks of the month was below the average generally, sometimes much. It was very uniform during the last week, ranging mostly from 50° to 60°. H. E. M.

SWISS FLOODS.

GENEVA, JUNE 1.

"Alternate rain, snow, and sunshine are rendering the Alpine passes very dangerous, causing numerous avalanches, filling the lakes, and making the rivers overflow. On Tuesday, May 27th, the lower part of St. Gall was flooded. The river Steinach rose to a greater height than has been known for 20 years, and traffic on the line from Rohrbach to St. Gall had to be suspended. On the same day two Italian workmen were killed by an avalanche at Bals, in the Grisons."—*The Times*.

SUPPLEMENTARY TABLE OF RAINFALL IN MAY, 1879.

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

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Margate, Acol	2·90	XI.	Port Madoc	3·54
„	Littlehampton	2·99	„	Douglas	2·13
„	Horsham, Swallowfield. ...	...	XII.	Carsphairn	2·18
„	Hastings, Manor House	3·08	„	Melrose, Abbey Gate... ..	1·75
„	Hailsham	2·69	XIV.	Lanark, Baronald .....	...
„	I. of W., St. Lawrence. 1·97	1·97	XV.	Islay, Gruinart School... ..	2·13
„	Strathfield Turgiss	3·46	XVI.	St. Andrew's, Cambo... ..	·65
III.	Great Missenden	3·80	„	Aberfeldy H.R.S. ....	...
„	Winslow, Addington ...	2·39	XVII.	Tomintoul	2·54
„	Oxford, Magdalen Col... ..	2·77	„	Keith H.R.S.	4·12
„	Northampton	2·90	„	Forres H.R.S.	3·03
„	Cambridge, Merton Vil. 3·34	3·34	XVIII.	Strome Ferry H.R.S. ...	3·31
IV.	Harlow, Sheering	3·11	„	Lochbroom	2·30
„	Diss	2·28	„	Auchnasheen H.R.S. ...	2·74
„	Swaffham	3·30	„	Tain, Springfield	2·60
„	Hindringham	2·78	„	Loch Shiel, Glenfinnan. 5·20	5·20
V.	Salisbury, Alderbury ...	2·42	„	Dalwhinnie H.R.S. ....	...
„	Calne, Compton Bassett 3·53	3·53	XIX.	Lairg H.R.S. ....	...
„	Beaminster Vicarage ...	2·95	„	Altnabreac H.R.S.	1·40
„	Dartmoor Prison	4·73	„	Watten H.R.S.	1·86
„	Langtree Wick	3·34	XX.	Fermoy, Glenville	2·78
„	Lynmouth, Glenthorne. 2·73	2·73	„	Tralee, Godfrey Place... ..	2·94
„	St. Austell, Cosgarne... ..	2·15	„	Cahir, Tubrid	1·61
„	Taunton	3·23	„	Tipperary, Henry St.	2·01
VI.	Bristol, Ashleydown ...	3·33	„	Newcastle West	2·04
„	Wem, Sansaw Hall.....	1·88	„	Kilrush	2·22
„	Cheadle, The Heath Ho. 2·49	2·49	„	Corofin	2·38
„	Bickenhill Vicarage ...	2·82	XXI.	Kilkenny, Butler House 1·76	1·76
VII.	Melton Mowbray	3·90	„	Ballymore, Eustace ...	...
„	Horncastle, Bucknall ...	4·00	„	Kilsallaghan.....	2·52
VIII.	Walton-on-the-Hill.....	2·18	„	Navan, Balrath	2·18
„	Broughton-in-Furness ..	2·42	„	Athlone, Twyford	2·87
IX.	Wakefield, Stanley Vic. 1·78	1·78	„	Mullingar, Belvedere ...	3·05
„	Ripon, Mickley	1·56	XXII.	Ballinasloe	1·76
X.	Gainford	1·35	„	Clifden, Kylemore	4·01
„	Haltwhistle, Unthank.. 2·28	2·28	„	Crossmolina, Enniscoe.. 2·78	2·78
„	Shap, Copy Hill	·97	„	Carrick-on-Shannon ...	3·14
XI.	Llanfrechfa Grange	3·56	„	Dowra	2·85
„	Llandovery	3·39	XXIII.	Rockcorry.....	2·87
„	Solva	2·74	„	Warrenpoint	4·40
„	Castle Malgwyn	3·09	„	Newtownards	3·80
„	Rhayader, Nantgwillt.. 3·48	3·48	„	Larne, Carnlough	3·12
„	Carno, Tybrittle	2·07	„	Bushmills	3·49
„	Corwen, Rhug	2·73	„	Buncrana, Rockfort ...	3·08

MAY, 1879.

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 1860-5	Greatest Fall in 24 hours.		Days on which $\frac{1}{16}$ or more fell.	Max.		Min.				
				Dpth.	Date.		Deg.	Date.	Deg.	Date.			
		inches.	inches.	in.								In shade.	On grass.
I.	Camden Square.....	3·46	+ 1·06	1·30	28	19	6·90	20	30·6	10	2	8	
II.	Maidstone (Hunton Court)...	2·95	+ ·71	1·40	28	16	...	...	...	...	...	...
	Selborne (The Wakes).....	...	...	...	...	...	...	...	...	...	...	...
III.	Hitchen.....	2·77	+ ·84	·70	28	18	63·0	21+	26·0	9	7	...	
	Banbury.....	2·91	+ ·69	·68	28	21	66·5	21	25·0	10	8	...	
IV.	Bury St. Edmunds (Culford)...	2·86	+ ·70	·51	15	20	72·0	20+	24·0	9	6	9	
	Norwich (Sprowston).....	...	...	...	...	...	...	...	...	...	...	...
V.	Bridport.....	2·40	+ ·37	·79	27	15	...	...	...	...	...	...
	Barnstaple.....	2·49	+ ·05	·53	27	19	...	...	...	...	...	...
	Bodmin.....	2·05	- ·41	·56	17	21	66·0	12	34·0	2	0	6	
VI.	Cirencester.....	2·72	+ ·44	·82	28	16	...	...	...	...	...	...
	Shifnal (Houghton Hall) ...	2·55	+ ·29	·59	28	19	67·0	21	26·5	3	5	8	
	Tenbury (Orleton).....	2·88	+ ·00	·84	14	21	68·5	21	25·7	3	6	8	
VII.	Leicester (Town Museum) ...	3·22	...	·79	14	22	67·3	21	26·8	10	3	16	
	Boston.....	3·32	+ 1·38	...	...	20	70·0	5	28·0	3	4	...	
	Grimsby (Killingholme).....	3·11	...	1·00	14	17	63·0	31	30·0	10	1	...	
	Mansfield.....	3·64	...	·76	15	17	66·4	5	25·8	10	3	8	
VIII.	Manchester (Ardwick).....	1·73	- ·65	·35	30	18	66·0	17	33·0	2, 10	...	...
IX.	York.....	2·09	+ ·14	·36	29	18	69·0	6	27·0	10	4	8	
	Skipton (Arncliffe).....	2·08	- 1·27	·47	25	17	...	...	...	...	...	...
X.	North Shields.....	2·28	- ·36	·37	22	21	62·4	5	31·0	10	2	3	
	Borrowdale (Seathwaite).....	4·67	- 4·87	·93	24	15	...	...	...	...	...	...
XI.	Cardiff (Crockherbtown).....	2·86	...	·88	28	15	66·0	21	31·4	3	2	...	
	Haverfordwest.....	3·60	+ ·88	·74	28	18	64·5	20	28·5	2	4	8	
	Aberdovey.....	...	...	...	...	...	...	...	...	...	...	...
	Llandudno.....	1·88	- ·50	·27	31	12	59·8	3	32·6	2	...	...
XII.	Cargen.....	1·57	- 1·37	·42	24	13	66·0	29	27·8	2	4	...	
	Hawick (Silverbut Hall).....	2·05	...	·29	22*	14	...	...	...	...	...	...
XIV.	Annanhill.....	...	...	...	...	...	...	...	...	...	...	...
XVI.	Kilmory.....	2·72	...	·91	14	14	...	...	28·0	2, 3, 4	8	...	
	Mull (Quinish).....	3·02	...	·53	16	13	...	...	...	...	...	...
	Loch Leven.....	1·90	- ·30	·50	31	10	...	...	...	...	...	...
	Tyndrum (Ewick).....	...	...	...	...	...	...	...	...	...	...	...
XVII.	Arbroath.....	2·44	+ ·46	·71	30	12	62·0	12	32·0	2	1	...	
	Braemar.....	2·12	+ ·32	·53	29	15	60·1	4	25·0	2	11	20	
XVIII.	Aberdeen.....	2·93	...	·54	29	21	63·2	5	32·1	2	0	10	
	Portree.....	2·94	- 2·71	·56	10	23	...	...	...	...	...	...
	Inverness (Culloden).....	2·68	+ 1·12	·84	30	10	61·2	3	29·0	1	1	14	
XIX.	Dunrobin.....	2·63	+ 1·18	·79	12	20	61·5	3	31·0	1	3	...	
	Sandwick.....	2·50	+ ·24	·60	26	20	55·2	24	30·7	9	2	6	
XX.	Cork.....	1·45	...	·52	17	10	...	...	...	...	...	...
	Caherciveen Darrynane Abbey	2·64	...	·60	16	16	...	...	...	...	...	...
	Waterford.....	1·77	- ·48	·37	17	18	63·0	5, 20	30·5	3	2	...	
	Killaloe.....	3·03	- ·15	·98	16	14	74·0	31	26·0	3	3	...	
XXI.	Portarlinton.....	2·03	- 1·17	·50	16	21	63·0	...	31·0	1	3	...	
	Monkstown, Dublin.....	...	...	...	...	...	...	...	...	...	...	...
XXII.	Galway.....	1·89	...	·38	16	15	60·0	16	32·0	2	1	...	
XXIII.	Waringstown.....	3·96	...	·93	16	20	61·0	2	27·0	2	7	11	
	Edenfel (Omagh).....	3·35	...	1·00	16	18	62·0	21	27·0	1	5	...	
	Ballyshannon.....	...	...	...	...	...	...	...	...	...	...	...

* And 15.

+ And 24.

‡ And 30.

|| And 29.

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

METEOROLOGICAL NOTES ON MAY.

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.

HITCHEN.—A tremendous TS occurred in the valley of the Lee on the 28th, causing floods almost equal to those of June 30th, 1878.

BANBURY.—S and H on the 1st and 5th; high wind on the 15th; T on 22nd; TS on 28th.

CULFORD.—Mean temp. of the month, 49°·5; N. or E. winds prevailed on thirteen days. A very severe TS occurred on the night of the 28th, accompanied by ·25 in. of R; S on the 6th and 7th; H on 6th, 7th, and 9th; high wind on 14th.

BODMIN.—Mean temp. of the month 53°·8, 1°·9 below the average.

CIRENCESTER.—A cold, and rather sunless, month.

SHIFNAL.—The month opened with cold E. wind and sleet, followed by frost at night, which was repeated with one exception till the 12th; R almost daily from the 8th till the close, ·59 in. falling on the 28th; pitch dark at noon on 14th, with distant T in S.E., followed by violent R; it was also extremely dark at 5 p.m. on 19th. Winds, with few exceptions, from N.N.W. and N.E. Vegetation still about three weeks backward. Violent N.W. gale on 15th. Asparagus first cut on 4th. Young rooks out on 6th; wild cherry and damson blossoms, 16th; turtle doves and swifts arrived on 17th; martins arrived on apple in blossom on 26th; oaks only in tender yellow leaf by 29th.

ORLETON.—Many fine and pleasant, but cold, days occurred at the beginning of the month, with frequent frosts at night. On the 14th a TS set in at 10 a.m. with heavy R, followed by great darkness at 2.15 p.m. The remainder of the month was variable, but generally cold, with frequent falls of R. Mean temp. of the month nearly 4° below the average, making the seventh month in succession with a temp. below the average. Cherry trees came into full bloom about the 3rd, damsons about the 7th, pear trees about the 23rd, and apple trees about the 27th.

LEICESTER.—H on the 1st, S on the 7th and 8th, TS 11 a.m. to noon on 14th.

BOSTON.—A cold, dull, wet month, with several sharp frosts, the ther. at 4 ft. falling to 28° on the 10th. All vegetation very backward; cowslips were not in flower till the 11th, and lilac not till the 28th; hawthorn and laburnum not in flower by June 3rd; the elms began to break into leaf about the end of the first week.

GRIMSBY.—Several times during the month winter for a short time feigned to retreat, notably on the 31st, but for the last hours of the month he was again in possession. The wettest May but one in the last fourteen years. The scarcity of small birds, both resident and migrant, shows what havoc the protracted cold period has produced amongst them. T on 10th, 13th, and 31st.

MANSFIELD.—Sharp frosts on 3rd and 4th, S on 7th, T on 14th, TS at 1.30 p.m. on 26th.

MANCHESTER.—The month was very ungenial, not at all like a spring month, the weather being gloomy and cold, especially in the early part, when there were frosts on several occasions. Vegetation is, in consequence, a month later than usual. Slight S on 7th.

YORK.—S on three days.

ARNCLIFFE.—S on 6th, 7th, and 9th.

NORTH SHIELDS.—H on 1st, 6th, 7th, and 8th; S on 6th, 7th, 8th, and 9th.

SEATHWAITE.—Beginning of month cold; warmer towards the end.

WALES.

HAVERFORDWEST.—The first seven days of May were very cold, and the nights frosty air, very dry and keen easterly wind. S fell heavily on the 7th; the weather from that date to the end of the month was cold, with R at night,

excepting a few warm days from the 18th to the 21st. The 28th commenced with R, about 4 p.m. the sky became densely overcast in the E., and distant T was heard; the storm approached nearer till 5 p.m., when it was very violent, the flashes of forked lightning following each other in rapid succession.

LLANDUDNO.—Though the month was characterized by a large amount of sunshine, and was free from frost, the mean temp. was about $3^{\circ}5$ below the average, no doubt owing to the great prevalence of polar winds. The R fell mostly in the latter part of the month, and was just in time to ensure a good hay crop. Fruit is well set and promises to be an abundant crop; potatoes also promise well.

SCOTLAND.

CARGEN.—Mean temp. of the month 2° below the average. Vegetation very backward.

HAWICK.—The month has been cold and vegetation of all kinds is fully three weeks late. The winds have been mostly easterly, but very changeable. Keen frosts on the mornings of the 1st and 2nd; hills white with S on the 6th, 7th, and 8th; T and H on the 25th; swallows appeared on the 5th, but disappeared again for a fortnight, owing, no doubt, to the scarcity of insect food.

KILMORY.—The temp. of the month was particularly low, especially during the night, and vegetation has been much retarded. The oak, ash, and sweet chestnut are this year coming into leaf almost simultaneously. A remarkable profusion of blossom on apples, pears, and currants, also on the beech and elm; the latter present a very unhealthy appearance, in many instances pushing out hardly any leaves, and what there are not at the points of the branches, but on the sides in small bunches, giving the idea of the flow of sap being checked, very similar to the effect of the larch disease. I have observed a tree here or there thus affected in previous years, particularly in wet ground, but it seems now to be irrespective of situation and to an extent that calls for enquiry as to the cause. I shall be glad to know if other observers have noticed the disease.

QUINISH.—Month, on the whole, cold and backward until the 27th; persistent N. wind until the 16th; from 16th to end, warm and wet from S.W. and cold drought from N. alternately, the changes from one to the other being curiously sudden and frequent.

ABERDEEN.—Mean temp. $46^{\circ}5$, $1^{\circ}8$ below the average for 22 years; rainfall 1.08 in. above the mean of 22 years. A month of cold, wet, ungenial weather. Crops unusually backward; S on 3 days; H on 5; and fog on 5.

PORTREE.—A very cold, frosty month, scarcely any vegetation. Grass on pastures quite brown. More frost and S than have ever been known before in May. A third of the young lambs have succumbed to the cold.

CULLODEN.—Temp. low; easterly winds prevailed. Willow wren, swallows, cuckoo, and landrail all late in arriving. Vegetation advancing by the close of the month.

SANDWICK.—The weather in May has been a great improvement on that of the preceding months. The first five days were favourable to vegetation, the next five we had S or H showers, then more favourable weather, when vegetation made great progress; but towards the latter part we have had prevailing cold N. and E. winds. The sea was uncommonly high on the 21st and three or four following days, without any high wind here to cause it. It was probably the storm predicted from America which raised the Atlantic, though the storm did not reach us.

IRELAND.

DARRYNANE ABBEY.—A harsh, cold month, with northerly winds almost constantly. Vegetation very backward.

WATERFORD.—Wind throughout the month slight at 9 p.m., usually northerly, but at 9 a.m. variable, or calm.

KILLALOE.—A cold, backward month, with almost continuous N. wind.

OMAGH.—Weather still harsh and inclement; vegetation very backward.