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WORK AND WATER POWER.

By Hugh Robert Mill.

The force of gravity is the potent agent in doing several kinds of work. These examples will make this plain :—

(1.)—A glass bottle may be smashed into little pieces by means of a small hammer and any one who does so is conscious of doing quite a heavy piece of work, and the smaller the fragments into which the bottle is reduced the heavier is the work required in wielding the hammer. But if a bottle is placed on a first-floor window sill no appreciable work is required to push it over, and when it falls on the pavement below it will be smashed in pieces. If a bottle is similarly released from a second floor window the pieces into which it is smashed will be smaller ; and if from a third floor window smaller still. Hence it is obvious that the greater the height from which the bottle drops the smaller are the fragments into which it is broken, in other words, the greater is the amount of work expended in smashing it. This work was done by gravity bringing the bottle and the ground together ; but gravity is powerless to produce this effect unless the bottle and the ground were originally apart ; and this was effected by the person who did the work of carrying the bottle from the ground to the upper window. The more work done in raising the bottle above the ground, the more work was the weight of the bottle able to do when the bottle reached the ground by falling freely.

This is an uneconomical way of utilising gravity to transform energy which is the technical name for the power of doing work, because the person carrying the bottle to the upper window carries himself there too, and he being much heavier than the bottle, requires a much greater expenditure of energy in the process than is applied to the smashing of the bottle.

(2.)—A falling mass instead of being set to smash itself may be made to do other work. Thus the great wooden piles on which buildings are reared on marshy ground, or the piers of a bridge built in a river are driven into the ground by dropping a weight on them. The pile is placed in position below a lofty frame from which

a mass of iron is dropped upon it. The force of the impact drives the pile a little distance into the ground and the mass of iron is raised again to the top of the frame by a couple of workmen turning a winch The energy they expend against gravity by raising the mass of iron is transformed into work done in driving home the pile. If the mass of iron is doubled and raised to the same height, twice as much work is done by it as it falls.

(3.)—A grandfather's clock is driven by the same power as a pile driver; that is to say, by the descent of weight that has been wound up to some definite height above the ground. But instead of being allowed to fall the whole distance at once, as in the pile-driving, the weight in the clock has its fall regulated by the escapement and pendulum, which allow it to fall so slowly that it takes a whole week to reach the ground. All the time it has been doing work against friction in turning the wheels of the clock and keeping the pendulum swinging against the resistance of the air. When the weight reaches the floor of the clock case it rests quietly upon it, for it has done its work in driving the clock and making the wheels go round. Thus it is obvious that the work of a raised weight falling under the influence of gravity can be made to turn machinery which in the case of the clock moves the hands or strikes the bell, though it could be made to run a sewing machine or turn a roast.

Passengers who land at Madeira to see the Mount Church frequently return to the lower town in a "running carro," a basket-work sledge which glides and sweeps over the polished pebbles paving the steep narrow lanes with no motive force but gravity, and is dexterously steered round the most alarming corners by the agile guide, who rides behind. But the exulting rush of the carro is only possible because it has been carried uphill on the head of a toiling porter, whose work done against gravity is the real source of energy.

(4.)—The steep railway which conveys stones from a quarry on the hill-side to the plain below is often so fitted that the loaded trucks descending by the action of gravity pull up the empty trucks the weight of which acts as a brake preventing the too rapid descent of the loaded waggons. The only mechanism required is a pulley at the top and a rope or chain passing round it and connecting the two sets of trucks. An elaboration of this simple arrangement is found in the funicular railways familiar at seaside resorts, in towns like Valparaiso and at mountain villages on the continent. Here a pair of cars running on a steep railway with safety devices to reduce risk are connected by a wire cable which passes round a wheel at the top. Passengers going down enter the top car, those going up enter the bottom car simultaneously, and if the top car has a smaller weight of passengers, water is allowed to flow into a tank which it carries until the increased weight counter-balances the

lower car, which is drawn up as the other descends. Here we find water-power at last. It acts simply by its weight, like the falling bottle, the block of the pile-driver, the weight of the grandfather's clock, the passengers of the running carro, or the stones from the quarry.

Whatever the material may be that has been utilized by gravity to do work, it possessed the power of doing work in a potential form when it rested at the high level; it possesed the power of doing work in a moving or kinetic form when it was falling or sliding or rolling from the high level to the ground; but when it rested on the ground it possessed no power of doing work whatever. It has to be lifted up to a high level again before it regains its power of doing work, and the only means of doing this is by expending energy upon it in raising it against the resistance of gravity. The essential fact which has been ascertained is that gravity enables a falling body to do just as much work in descending from a given height as was expended in raising the body to that height; no more and no less.

No accounts can be kept of the expenditure of money without the use of units by which it may be measured, and the same is true of work. The unit by which work against gravity can be measured is compounded of the weight raised and the vertical distance or height through which it is raised. Any units can be employed, a gramme of weight and a centimetre of height, or a pound of weight and a foot of height; in either case we have an adequate measure, the centimetre-gramme, or the foot-pound. It is a matter of convenience only whether we use the smaller or the larger unit just as it is a matter of convenience only whether we count our money in francs, dollars or pounds. Keeping for the present to the old British units by which the laws of energy were first investigated we shall use the foot-pound as the unit of work. If the bottle in our example (1), weighed 1 lb. and the windows of each floor were successively 10 feet above the floor below, the work done in carrying the bottle (neglecting that done in carrying the person) to the first floor was 10 foot pounds, to the second floor, 20 foot pounds, and to the third floor, 30 foot pounds, and the work expended in smashing the bottle from the three positions was, 10, 20 and 30 foot-pounds respectively. So in example (2), if the height of the frame of the pile driver at first was 10 feet above the head of the pile, and the weight 100 lb., it would do 1,000 foot-pounds of work when it fell, or if the weight were 200 lbs. it would do 2,000 foot-pounds of work when it fell. Generalizing this we get the statement that the amount of work which a given weight can accomplish depends only on the height from which it falls; and conversely the amount of work which can be accomplished by a body falling from a given height depends only on its weight.

(To be continued.)

CLOUD FORMS.

By Lieut. A. S. Martin-Smith.

Not least among the luxuries which we have had to forego during the war is the daily issue of weather forecasts from the Meteorological Office. We have had to rely almost exclusively upon our own experience of sky indications, together with an individual use of the barometer.

If we ask ourselves—have we suffered a great deal of inconvenience thereby, I wonder how many of us can honestly answer that question in the affirmative. I do not think that I get caught unawares by the elements more frequently now than in the days when we had other people to think for us.

Surely it must have occurred to some of us that there is room for improvement, and that therefore in this, as in other spheres of activity, the time to act is now, not after the conclusion of peace. Possibly steps with that end in view may already have been taken, even so I venture to suggest that in the past there has not, by any means, been an adequate appreciation of the valuable service of which the intelligence to be derived from the systematic observation of clouds is capable of affording the professional meteorologist especially when engaged in forming his forecasts. If the forfeiture of my life depended upon the correctness or otherwise of a weather forecast for any given day I would prefer to rely on the one based upon cloud reports rather than that derived from the study of a similar number of barometer readings.

The recent publication by the Meteorological Office of an illustrated booklet on Cloud Forms must meet with the warm approval of all who consider it desirable to bring at least one branch of meteorological knowledge within the mental grasp of the ordinary man. The photographic reproductions therein of Mr. Clarke's cloudscapes do neither him nor themselves justice. Excessive intensification is so obvious.

After perusing the introductory remarks one is tempted to regret that reference is not made to the charming book of Cloud Studies by A. W. Clayden.

What is disappointing and tends to shake one's faith in the efficacy of isobaric charts is the frequent omission of any reference to the probability of an electrical disturbance in the forecast for a day during which takes place a particularly awe-inspiring display of Nature's fireworks. It can hardly be denied that pre-war forecasts betrayed a marked timidity in this respect.

I lay particular stress on the occurrence of thunderstorms because they are the most truly splendid and self-assertive of all meteorological phenomena in this country and possess a peculiar power of making themselves felt by every one. I can honestly say that

during ten years or so of cloud study as a form of recreation, never have I had a thunderstorm take me by surprise, although I will not go so far as to assert that results have invariably justified the anticipation.

I am convinced that by the encouragement and development, along scientific lines, of the study of clouds, much useful work could be accomplished, more particularly with reference to the occurrence of thunderstorms and phenomena similarly elusive to the forecaster. With the notable exception of Mr. Fairgrieve's work, is there in existence a complete or anything approaching a complete and faithful record of the cloud history of any given thunder system? If not, why not?

The following suggestions are here put forward :—

(1.) That propaganda be instituted with a view to arousing an intelligent interest in things meteorological, particularly with regard to cloud study.

(2.) That a public appeal be made for photographs of clouds, and subsequently the formation at the Meteorological Office or elsewhere of a collection comprising a selection of the best available.

(3.) The establishment of an increasing number of auxiliary cloud stations and arrangements made for the telegraphic transmission of reports.

(4.) The thorough investigation of thunderstorm systems with particular reference to the cloud antecedents.

There are several thousands of voluntary rainfall Observers in this country and I am sure that from these alone some hundreds would be found both capable and willing to render this additional service.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

BAROMETRIC PRESSURE AND THUNDERSTORMS.

THOUGH thunderstorms—at least of the more intense type—are generally associated with hot weather, I think it is a mistake to suppose, as some people do, that they are independent of the barometer. According to my experience, thunder rarely develops, even in very hot weather, while the pressure is decidedly high.

I think records would show that thunder is most commonly experienced during cyclone or semi-cyclone weather (in the season of strong sun) or that, in other words, the majority of storms, even in summer, are of a semi-cyclonic nature. G. WESTON.

47, Chester Terrace, S.W. 1, August 22nd, 1918.

INFLUENZA AND WEATHER IN LONDON.

By Chas. Harding.

There is in most minds a lurking suspicion, if nothing more, that influenza is associated in some way with the weather, but a fairly close examination of several epidemics with the accompanying weather conditions fails to show any very definite connection. In the past 80 years there have been in London some 32 epidemics. Sir Arthur Mitchell and Dr. Buchan, in a discussion published in 1890, showed five epidemics in the 45 years from 1845 to 1890, and an examination of the Registrar General's returns from 1891 to 1918 shows 27 epidemics. Dealing with the records from 1891, the disease is considered epidemic when 20 deaths occur in a week and this number or more is maintained for successive weeks.

By far the majority of epidemics have occurred in winter and spring, but the disease seems in no way associated with cold weather. In the epidemics discussed by Mitchell and Buchan the authors say that the epidemics occur "rather with exceptionally warm weather, which manifests itself generally both before and during the epidemic." With the waning of the epidemic the temperature is generally much below the average. The epidemics subsequent to 1890 confirm this statement with regard to the accompanying weather, but in some cases the temperature was very variable.

Heavy rains commonly accompany the epidemics and the attack during the present summer was at its worst in July, when it will be remembered that the rainfall in South London was a record, not only for July, but there has only been one wetter month at any period of the year for the last 100 years. The present epidemic has occurred with exceptionally mild and humid weather, the night temperatures being frequently 10° above the average. It should be mentioned, however, that in London wet weather is as a rule by no means unhealthy, the rain washing the dust and impurities from the atmosphere; 1903, the wettest year on record, was one of the healthiest ever experienced; the deaths in London were 15,000 fewer than the average of the previous ten years.

Belville, in his journal for 1837, says: "The complaint known by the name of the influenza prevailed during January and February, attended by a great mortality—the deaths were alarming." The cold in March was said to be "more severe than ever known to have been felt." January and February were wet and fairly mild.

In the forty-five years dealt with by Mitchell and Buchan epidemics occurred in the years 1847-48, 1850-51, 1855, 1857-58 and 1889-90. During the forty-five years the total deaths due directly to influenza in London were 4,690, and the five epidemics yielded 2,687 deaths. In the more recent years, from 1891 to 1918

(to October 26th), deaths in London in the epidemics from influenza alone were 23,071.

Influenza sadly requires further enquiry. There is need for very special discussion. It has been asserted that the summer and present epidemics resemble greatly the epidemic of 1890; an examination of the facts, however, shows very many differences.

In 1890 the total deaths during the epidemic in London from influenza were 3 per cent. of the deaths from all causes; deaths from pneumonia were 8 per cent., and from bronchitis, 20 per cent. In the epidemic of 1892, which was apparently the worst prior to the present attack, the deaths were respectively 7, 8 and 22 per cent. In the epidemic during the past summer, 11 per cent. of all deaths occurred from influenza, 9 per cent. from pneumonia, and 4 per cent. from bronchitis. The autumn attack now in progress has from influenza 32 per cent. of the deaths from all causes, 11 per cent. from pneumonia, and 6 per cent. from bronchitis.

In the epidemics prior to the present year deaths occurred mostly at ages above 40 or 45 years. This year deaths were most numerous between the ages of 20 and 45. In the epidemic now in progress influenza deaths between the ages of 5 and 20 were 54 per cent. of the deaths from all causes at those ages, and between 20 and 45 were 53 per cent. of the total deaths at the respective ages, whilst between 45 and 65 the percentage was 22, from 65 to 75, 10 per cent., and above 75 years only 4 per cent. In the week ending October 26th, fully two-thirds of the total deaths between ages 5 and 45, were from influenza.

OUR RAINFALL TABLES.

We have received a great many letters from readers expressing regret, disappointment and indignation at the non-appearance of our Rainfall Tables. With these we fully agree, but it is not in our power to move the mountain which has blocked the way. Our correspondents make various guesses, most of them correct, as to the nature of this mountain, and several wish us to explain exactly what it is. We are reluctant to do this at present for two reasons. We do not wish to embarrass anyone who has important duties to attend to, and at present we cannot trust ourselves to write with editorial calmness on a subject on which we feel so intensely.

We hope to be able to say something to the purpose in our next issue, and we cordially thank those Observers who have not failed to send in their records in spite of the irritating and unnecessary postponement of publication.

Climatological Table for the British Empire, May, 1918.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	87·5	21	38·9	9	69·1	47·8	...	76	127·5	33·1	2·11	11	6·0
Malta	78·3	26	56·2	1	70·7	60·7	...	77	133·5	52·5	·20	1	1·0
Lagos	91·4	14	70·0	24	88·6	74·9	73·7	73	148·3	69·0	7·85	16	7·2
Cape Town	83·6	19	39·7	30	66·9	52·0	50·1	73	...	...	4·61	12	5·4
Johannesburg	72·0	6	24·9	30	62·0	42·9	38·7	70	...	22·4	·21	3	2·2
Mauritius	81·8	4	57·8	28	77·9	64·8	63·5	78	...	50·0	3·73	20	5·3
Bloemfontein	72·1	6	21·0	30	63·0	37·5	38·7	71	..	...	1·17	5	2·4
Calcutta... ...	96 6	26	70·0	6	92·1	76·6	75·6	80	...	65·3	8·19	8	6·3
Madras	102·8	15	72·7	17	96·3	79·5	74·2	72	156·3	72·9	5·80	7	4·6
Colombo, Ceylon ..	89·5	4	71·2	18	86·4	76·2	74·1	82	161·8	70·9	12·14	21	7·8
Hongkong	86·9	31	66·3	5	80·3	73·1	71·4	84	...	...	6·66	19	8·5
Sydney	77·1	2	45·1	27	69·8	52·5	50·5	74	121·4	37·1	·53	7	3·3
Melbourne	75·7	10	37·1	27	63·2	49·4	47·1	71	127·2	31·9	3·11	14	6·3
Adelaide	86·0	4	43·5	26	70·3	54·7	49·9	63	143·0	35·4	3·37	15	7·0
Perth	78·4	20	40·6	15	68·4	54·4	52·6	74	135·0	30·5	6·36	18	6·4
Coolgardie	79·0	6, 7	38·5	15	68·3	47·5	45·6	61	140·0	32·0	·79	7	5·2
Brisbane	77·9	29	43·5	19	73·0	53·1	53·2	71	139·0	40·1	2·49	12	4·1
Hobart, Tasmania ..	72·0	9	35·2	26	58·7	45·8	41·3	64	113·8	30·2	2·41	16	6·4
Wellington	64·0	12	38·7	28	53·7	39·9	47·0	78	122·0	27·4	4·14	11	5·1
Jamaica, Kingston ...	90·6	17	68·6	14	86·3	71·2	70·9	84	...	...	3·44	7	6·6
Grenada	87·0	sev.	69·0	31	85·0	74·0	...	76	138·0	...	7·93	15	5·0
Toronto	82·0	22	30·0	11	68·6	45·7	45·8	73	132·5	24·3	2·64	13	5·8
Fredericton	89·5	18	26·0	5	65·7	41·6	42·0	64	...	...	2·70	11	5·7
St. John, N.B. ...	63·9	11*a*	32·5	5	55·6	41·5	39·9	74	125·6	27·5	2·07	14	6·4
Victoria, B.C.	68·5	27	40·5	20	59·2	45·0	43·0	72	139·0	35·5	·70	9	4·7

a—22.

Johannesburg.—Bright sunshine 272·3 hours.

COLOMBO, CEYLON.—Mean temp. 81°·3, or 1°·2 below, dew point 1°·3 below, and R ·37 in. below, averages. Mean hourly velocity of wind 5·3 miles.

HONGKONG.—Mean temp. 76°·2. Bright sunshine 124·5 hours. Mean hourly velocity of wind 12·6 miles.

Sydney.—Mean temp.. 61°·2, the highest on record.

Melbourne.—Mean temp. 2°·3 above, and R ·93 in. above, averages.

Adelaide.—Mean temp. 4°·8 above, and R ·65 in. above, averages. The warmest May on record.

Perth.—R 2·03 in. above average.

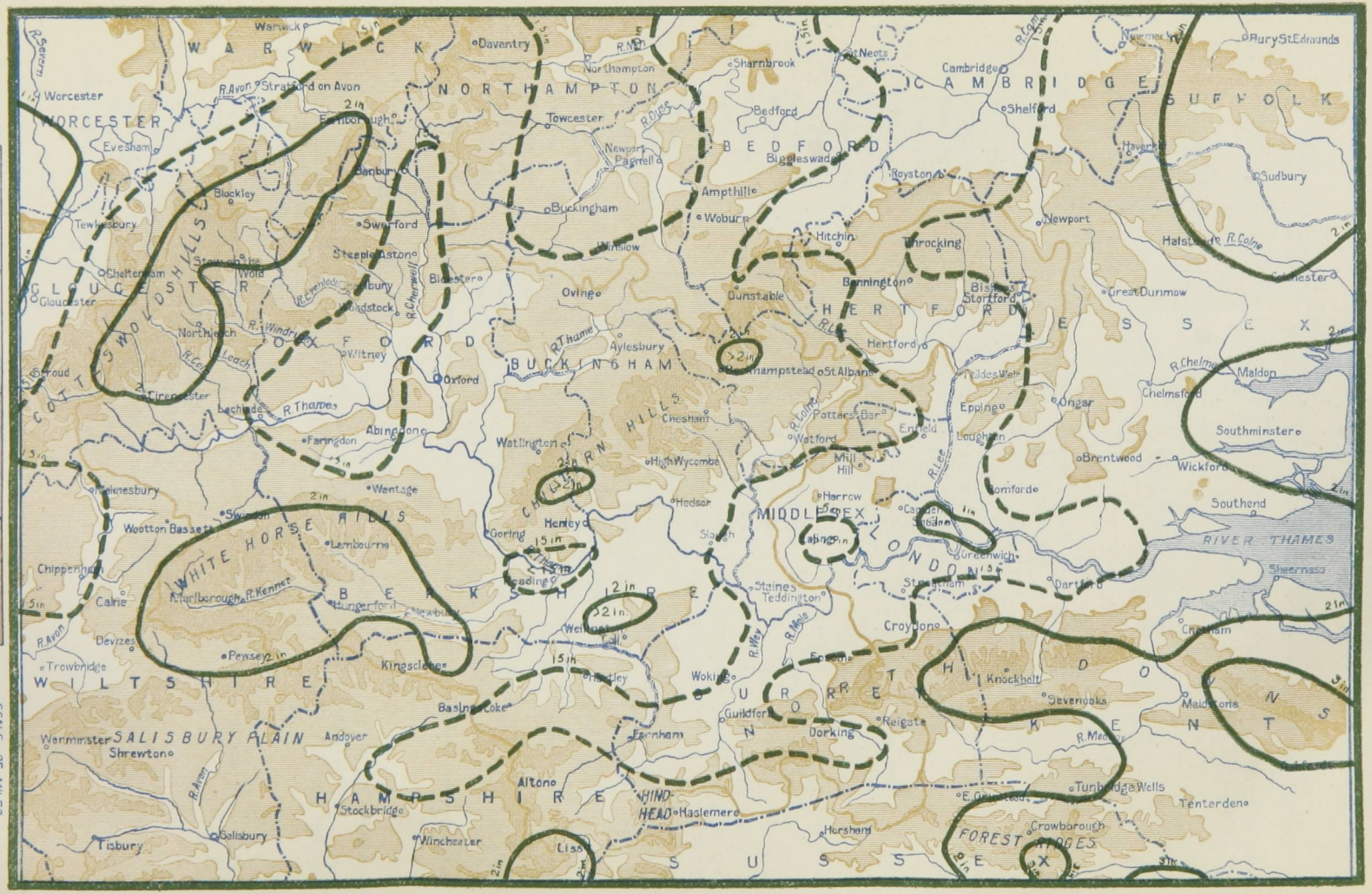
Coolgardie.—Temp. 3° above, and R below, averages.

Brisbane.—Mean temp. 2°·1 below, and R ·41 in. below, averages.

Hobart.—Mean temp. 2°·3 above average.

Wellington.—Mean temp. 0°·9 above, and R ·81 in. below, averages. Bright sunshine, 165·6 hours.

THAMES VALLEY RAINFALL. OCTOBER, 1918.



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RAINFALL TABLE FOR OCTOBER, 1918.

STATION.	COUNTY.	RAINFALL. Aver. 1875—1909. in.	1918. in.	Diff. from Av. in.	Per cent. of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	Nos. of Day
Camden Square	*London*	2·72	1·23	—1·49	45	·19	11	16
Tenterden	*Kent*	3·48	2·35	—1·13	68	·56	20	17
Arundel (Patching)	*Sussex*	4·01	1·80	—2·21	45	·37	14	13
Fordingbridge (Oaklands)	*Hampshire*	3·97	1·91	—2·06	68	·33	10	18
Oxford (Magdalen College)	*Oxfordshire*	2·82	1·80	—1·02	64	·45	16	22
Wellingborough (Swanspool)	*Northampn*	2·60	1·40	—1·20	54	·27	11,14	13
Bury St. Edmunds (Westley)	*Suffolk*	2·72	2·28	— ·44	84	·94	11	16
Geldeston [Beccles]	*Norfolk*	2·84	2·71	— ·13	95	·83	11	20
Polapit Tamar [Launceston]	*Devon*	4·84	3·07	- 1·77	63	·44	15	25
Rousdon [Lyme Regis]	,,	3·81	2·18	—1·63	57	·46	8	21
Stroud (Field Place)	*Gloucester*	3·21	1·08	—2·13	34	· 13	9	19
Church Stretton	*Shropshire*	3·77	1·95	—1·82	52	·36	5	22
Boston	*Lincoln*	2·75	1·91	— ·84	69	·63	11	21
Worksop (Hodsock Priory)	*Nottingham*	2·77	1·14	—1·63	41	·18	9	17
Mickleover Manor	*Derbyshire*	2·81	1·24	—1·57	44	·35	9	16
Congleton (Buglawton Vic.)	*Cheshire*	3·10	1·48	—1·62	48	·32	9	24
Southport (Hesketh Park)	*Lancashire*	3·74	3·28	— ·46	88	·64	9	19
Wetherby (Ribston Hall)	*York, W.R.*	3·18	1·49	—1·69	47	·38	21	10
Hull (Pearson Park)	,, *E.R.*	3·19	1·17	—2·02	37	·44	9	17
Newcastle (Town Moor)	*North'land*	3·20	2·41	— ·79	75	·70	19	18
Borrowdale (Seathwaite)	*Cumberland*	12·71	15·55	+2·84	122	...	...	...
Cardiff (Ely)	*Glamorgan*	4·87	2·67	—2·20	56	·50	5	26
Haverfordwest	*Pembroke*	5·51	5·76	+ ·25	105	·83	31	28
Aberystwyth (Gogerddan)	*Cardigan*	5·38	5·31	— ·07	99	1·18	4	21
Llandudno	*Carnarvon*	3·78	2·38	—1·40	63	·35	5	22
Cargen [Dumfries]	*Kirkcudbrt.*	4·45	6·38	+1·93	143	·96	3	25
Marchmont House	*Berwick*	3·83	3·59	— ·24	94	·46	17,18	20
Girvan (Pinmore)	*Ayr*	5·38	6·82	+1·44	127	1·36	4	26
Glasgow (Queen's Park)	*Renfrew*	3·36	5·02	+1·66	150	·70	5	21
Islay (Eallabus)	*Argyll*	4·95	7·03	+2·08	143	·77	3	27
Mull (Quinish)	,,	5·87	8·14	+2·27	139	1·04	9	26
Balquhidder (Stronvar)	*Perth*	7·29	11·62	+4·33	160	2·00	6	22
Dundee (Eastern Necropolis)	*Forfar*	2·81	2·75	— ·06	98	·51	18	20
Braemar	*Aberdeen*	3·88	4·23	+ ·35	109	·80	18	15
Aberdeen (Cranford)	,,	3·23	2·59	— ·64	80	·30	4	23
Gordon Castle	*Moray*	3·38	1·73	—1·65	51	...	...	...
Drumnadrochit	*Inverness*	3·49	4·40	+ ·91	126	·94	6	22
Fort William	,,	7·32	11·33	+4·01	155	2·89	9	26
Loch Torridon (Bendamph)	*Ross*	8·38	13·02	+4·64	155	1·75	9	26
Dunrobin Castle	*Sutherland*	3·15	1·68	—1·47	54	·36	7	14
Glanmire (Lota Lodge)	*Cork*	4·35	3·57	— ·78	82	·60	3	19
Killarney (District Asylum)	*Kerry*	5·59	7·41	+3·82	133	1·33	5	26
Waterford (Brook Lodge)	*Waterford*	4·00	4·01	+ 01	100	·97	3	20
Nenagh (Castle Lough)	*Tipperary*	3·48	5·62	+2·14	160	·87	5	21
Ennistymon House	*Clare*	4·40	6·96	+2·56	158	1·44	2	22
Gorey (Courtown House)	*Wexford*	3·75	4·01	+ ·26	107	1·05	3	19
Abbey Leix (Blandsfort)	*Queen's Co.*	3·53	3·70	+ ·17	105	·60	3	20
Dublin (Fitz William Square)	*Dublin*	2·88	2·36	— ·52	82	·41	3	21
Mullingar (Belvedere)	*Westmeath*	3·19	4·05	+ ·86	127	·61	6	21
Crossmolina (Enniscoe)	*Mayo*	5·27	7·92	+2·65	150	1·19	5	26
Cong (The Glebe)	,,	4·60	...	...	...	...	...	...
Collooney (Markree Obsy.)	*Sligo*	4·21	5·78	+1·57	137	·96	7	26
Seaforde	*Down*	3·65	3·62	— ·03	99	·82	8	25
Ballymena (Harryville)	*Antrim*	3·78	4·24	+ ·46	112	·55	8	27
Omagh (Edenfel)	*Tyrone*	3·76	5·46	+1·70	145	·63	2	25

SUPPLEMENTARY RAINFALL, OCTOBER, 1918.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches
II.	Warlingham, Redvers Road..	2·52	XI.	Lligwy	5·05
,,	Ramsgate	2·14	,,	Douglas, Isle of Man	5·50
,,	Hailsham	3·08	XII.	Stoneykirk, Ardwell House...	4·24
,,	Totland Bay, Aston House...	1·91	,,	Carsphairn, Shiel.....	11·66
,,	Stockbridge, Ashley..	1·82	,,	Langholm, Drove Road	6·51
,,	Grayshott	1·75	XIII.	Selkirk, The Hangingshaw..	2·70
III.	Harrow Weald, Hill House...	1·32	,,	North Berwick Reservoir.....	2·07
,,	Pitsford, Sedgebrook...	1·34	,,	Edinburgh, Royal Observaty.	2·78
,,	Woburn, Milton Bryant.....	1·56	XIV.	Biggar.....	4·69
,,	Chatteris, The Priory..... ...	1·06	,,	Maybole, Knockdon Farm ...	6·40
IV.	Elsenham, Gaunts End	1·66	XV.	Buchlyvie, The Manse.....	6·57
,,	Shoeburyness	1·78	,,	Ardgour House	14·73
,,	Colchester, Hill Ho., Lexden	1·70	,,	Oban.....	8·29
,,	Ipswich, Rookwood, Copdock	2·11	,,	Campbeltown, Witchburn ..	...
,,	Aylsham, Rippon Hall..... ..	2·75	,,	Holy Loch, Ardnadam..... ...	8·73
,,	Swaffham	1·82	,,	Tiree, Cornaigmore	...
V.	Bishops Cannings	1·96	XVI.	Glenquey	6·70
,,	Weymouth.....	1·33	,,	Loch Rannoch Dall.....	6·29
,,	Ashburton, Druid House.. ...	3·34	,,	Blair Atholl	4·40
,,	Cullompton	1·98	,,	Coupar Angus	2·51
,,	Lynmouth, Rock House	2·99	,,	Montrose, Sunnyside Asylum.	2·20
,,	Okehampton, Oaklands... ...	2·92	XVII.	Balmoral	3·03
,,	Hartland Abbey.....	2·83	,,	Fyvie Castle	2·23
,,	St. Austell, Trevarna	4·13	,,	Keith Station	3·16
,,	North Cadbury Rectory.....	1·65	XVIII.	Rothiemurchus	3·18
VI.	Clifton, Stoke Bishop	2·04	,,	Loch Quoich, Loan	27·13
,,	Ledbury, Underdown..... ...	1·17	,,	Skye, Dunvegan	10·54
,,	Shifnal, Hatton Grange.....	1·63	,,	Fortrose.....	2·41
,,	Droitwich.....	1·64	,,	Glencarron Lodge	...
,,	Blockley, Upton Wold.....	2·14	XIX.	Tongue Manse	2·66
VII.	Grantham, Saltersford.....	1·47	,,	Melvich	1·95
,,	Louth Westgate	1·39	,,	Loch More, Achfary	9·39
,,	Bawtry, Hesley Hall	·97	XX.	Dunmanway, The Rectory ..	7·20
,,	Whaley Bridge, Mosley Hall	2·73	,,	Mitchelstown Castle.....	3·80
,,	Derby, Midland Railway.....	1·25	,,	Gap of Dunloe Gearahameen	15·50
VIII.	Nantwich, Dorfold Hall	1·59	,,	Darrynane Abbey.....	6·37
,,	Bolton, Queen's Park	5·31	,,	Clonmel, Bruce Villa	3·33
,,	Lancaster, Strathspey	4·10	,,	Broadford, Hurdlestown.....	5·30
IX.	Langsett Moor, Up. Midhope	2·26	XXI.	Enniscorthy, Ballyhyland...	5·30
,,	Scarborough, Scalby	1·48	,,	Rathnew, Clonmannon	2·88
,,	Ingleby Greenhow	...	,,	Ballycumber, Moorock Lodge	3·53
,,	Mickleton	2·80	,,	Balbriggan, Ardgillan	2·77
X.	Bellingham, High Green Manor	4·82	,,	Castle Forbes Gardens.....	4·85
,,	Ilderton, Lilburn Cottage ...	3·44	XXII.	Ballynahinch Castle.....	7·18
,,	Keswick, The Bank.....	9·66	,,	Woodlawn	3·71
XI.	Llanfrechfa Grange	3·07	,,	Westport, St. Helens	7·03
,,	Treherbert, Tyn-y-waun	7·44	,,	Dugort, Slievemore Hotel ...	10·81
,,	Carmarthen, The Friary	5·59	XXIII.	Enniskillen, Portora.....	3·95
,,	Fishguard, Goodwick Station.	7·19	,,	Dartrey [Cootehill]	4·31
,,	Crickhowell, Tal-y-maes.....	7·00	,,	Warrenpoint, Manor House	3·50
,,	Gwernargllwydd	1·60	,,	Belfast, Cave Hill Road	4·41
,,	Birmingham WW., Tyrmynydd	4·59	,,	Glenarm Castle	4·26
,,	Lake Vyrnwy	...	,,	Londonderry, Creggan Res...	5·15
,,	Llangynhafal, Plas Drâw.....	2·44	,,	Milford, The Manse.....	4·56
,,	Rhwibryfdir	16·99	,,	Killybegs	8·50
,,	Dolgelly, Bryntirion.....	6·18			