VIII. *On the Corrections to be applied to the Monthly Means of Meteorological Observations taken at any hour, to convert them into Mean Monthly values.*

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ONE of the most useful results of observations made at short intervals during the day and night, and continued for several years, is the knowledge we thus obtain of the diurnal ranges of the different subjects of investigation, and consequently the difference between the mean values of each element, as deduced from observations at one or more hours daily, and the true mean for the period over which the observations are spread.

At the Royal Observatory at Greenwich magnetical and meteorological observations have been taken since the year 1840, as is familiar to the Fellows of this Society. These have been published to the end of the year 1845. The whole of these observations have been made under my immediate superintendence, under the direction of the Astronomer Royal, and I believe that no observations have been made and reduced with greater care or regularity. As the person entrusted with the superintendence of these operations, I have a more perfect knowledge of them than any other person can have; I feel it therefore a duty to communicate their results from time to time, when the doing so promises to be of essential service in promoting the advancement of the subjects of investigation.

I have selected for my present communication some results deduced from the meteorological observations, and I have preferred these to the magnetical, not only on account of the greater accordance in the results year by year, but also because of their more immediate and general use. At the present time I believe that there are a greater number of persons engaged on meteorological researches upon a systematic plan, than have hitherto been so engaged, but, necessarily, these persons can observe only at certain times convenient to themselves, and these times differ from each other. To render their results comparable, it is necessary to apply corrections to every different result depending upon the time, or times of the day at which the observations have been made.

The barometrical and thermometrical observations treated of in this paper have been made at every even hour of Göttingen mean solar time, throughout each of the five years, except on Sundays, Good Friday and Christmas day; the mean of each hour represents the results deduced from about 150 observations; those for each

month represents about 1800 observations; and those for the year represents upwards of 21,000 observations of each element. The hygrometrical observations were not commenced at so early a period as those of the barometer and thermometer; and each of the following yearly tables, relative to the hygrometrical states of the air, represents about 20,000 simultaneous observations of the dry- and wet-bulb thermometers.

The method of formation of the tables was as follows:—

The first step was the formation of tables representing the excess of the mean value of each element at every hour of observation, in every month, above the mean value for the month.

The second step was the formation of tables containing the numbers found in the first process, arranged for the different years. The accordance of these numbers for the different years was found to be very close indeed.

The third step was the taking the mean of the numbers in the second set of Tables, at the same hour in every month.

The fourth process was the laying down these mean values on paper divided into square portions of 144 to one square inch, and considering that every division corresponded to twenty minutes of time; the numbers being laid down as ordinates with "the time of day" for abscissa.

The fifth step was drawing a curve line passing through or near every point in every month at all the hours, giving equal weight to every point. In nearly every case a simple curved line passed through all the points.

The sixth and last step was the measuring the ordinates at every Greenwich hour, and in this way the tables were formed.

The accordance in the results at the same hour in the same month in the different years being found so close and satisfactory, together with the fact of a simple curve passing through all the points, the diurnal march, as shown in the Tables, may be considered as a very close approximation to the facts of nature.

There is a promise at present of systematic observations being taken at many places in England, and by gentlemen of assured competency; these tables will assist such persons very much in determining at what times observations should be taken to determine different atmospherical elements.

As a remark applying to all the Tables in this paper, I may here mention that observers will find that comparatively a very few observations in each day, at hours by no means inconvenient in ordinary life, will furnish a near approximation to the mean and extreme values, as well as to the diurnal and annual variations of atmospherical phenomena.

TABLE I.—Showing the corrections to be applied to the Monthly Mean of the daily readings of the barometer at any hour, to deduce the true mean reading for the month from the observations taken at that hour.

Local mean time.	January.	February.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Midnight.	0·000	−0·001	−0·002	−0·008	−0·005	0·000	−0·006	−0·010	−0·005	−0·005	−0·011	−0·004
1 A.M.	+0·001	+0·004	+0·013	0·000	+0·002	+0·004	0·000	0·000	0·000	+0·004	−0·005	+0·001
2	+0·002	+0·008	+0·020	+0·007	+0·004	+0·005	+0·003	+0·007	+0·005	+0·010	+0·003	+0·006
3	+0·005	+0·012	+0·023	+0·010	+0·005	+0·004	+0·005	+0·011	+0·010	+0·015	+0·008	+0·010
4	+0·011	+0·014	+0·022	+0·011	+0·005	+0·001	+0·005	+0·014	+0·012	+0·020	+0·013	+0·012
5	+0·015	+0·015	+0·019	+0·011	+0·006	−0·002	+0·006	+0·011	+0·014	+0·022	+0·016	+0·014
6	+0·015	+0·012	+0·012	+0·006	+0·006	−0·006	+0·002	+0·005	+0·010	+0·018	+0·015	+0·011
7	+0·010	+0·007	+0·005	−0·003	+0·006	−0·010	−0·004	0·000	+0·001	+0·008	+0·010	+0·006
8	+0·003	0·000	−0·004	−0·008	+0·003	−0·012	−0·008	−0·007	−0·006	−0·003	+0·003	+0·004
9	−0·008	−0·008	−0·010	−0·011	−0·007	−0·012	−0·010	−0·008	−0·011	−0·009	−0·005	−0·010
10	−0·010	−0·015	−0·015	−0·014	−0·009	−0·011	−0·010	−0·009	−0·013	−0·014	−0·007	−0·015
11	−0·014	−0·016	−0·015	−0·011	−0·006	−0·009	−0·009	−0·008	−0·010	−0·014	−0·005	−0·015
Noon.	−0·005	−0·012	−0·010	−0·008	−0·002	−0·006	−0·006	−0·005	−0·005	−0·010	+0·002	−0·009
1 P.M.	+0·002	−0·006	−0·005	−0·004	0·000	−0·003	−0·003	0·000	0·000	−0·003	+0·007	+0·003
2	+0·005	+0·003	0·000	+0·003	+0·003	+0·003	+0·001	+0·003	+0·004	+0·004	+0·011	+0·008
3	+0·004	+0·006	+0·003	+0·009	+0·006	+0·007	+0·005	+0·005	+0·008	+0·005	+0·010	+0·010
4	+0·002	+0·008	+0·005	+0·004	+0·010	+0·013	+0·009	+0·009	+0·010	+0·003	+0·008	+0·009
5	0·000	+0·006	+0·004	+0·014	+0·014	+0·017	+0·013	+0·011	+0·011	0·000	+0·004	+0·006
6	−0·003	+0·002	0·000	+0·011	+0·015	+0·017	+0·013	+0·011	+0·006	−0·005	0·000	+0·002
7	−0·005	−0·004	−0·006	−0·007	+0·010	+0·014	+0·010	+0·005	0·000	−0·008	−0·006	−0·003
8	−0·006	−0·006	−0·012	−0·005	0·000	+0·008	+0·004	−0·005	−0·005	−0·011	−0·012	−0·006
9	−0·007	−0·008	−0·015	−0·009	−0·006	+0·003	−0·001	−0·010	−0·009	−0·014	−0·017	−0·009
10	−0·005	−0·007	−0·012	−0·012	−0·008	−0·002	−0·005	−0·015	−0·011	−0·012	−0·019	−0·010
11	−0·004	−0·005	−0·010	−0·012	−0·008	−0·002	−0·012	−0·015	−0·011	−0·009	−0·017	−0·009

The sign + denotes that the number is to be added, and the sign − denotes that the number is to be subtracted.

The double sets of + and − signs in every month show that there are two maxima and two minima in the daily variation in the reading of the barometer, and consequently the fact of a triple maximum and a triple minimum at times occurring, is due to accidental circumstances and to irregular daily oscillation.

Four times daily the reading of the barometer is at its mean value; these times in the several months are as follows:—

	h m		h m		h m
In January .....at midnight ;	at 8 0 A.M. ;	at	0 40 P.M. ;	and at	5 0 P.M.
In February.....at midnight ;	at 8 0 A.M. ;	at	1 40 P.M. ;	and at	6 20 P.M.
In March.....at midnight ;	at 7 35 A.M. ;	at	1 50 P.M. ;	and at	6 0 P.M.
In April .....at 1h 0m A.M. ;	at 6 40 A.M. ;	at	1 40 P.M. ;	and at	7 20 P.M.
In May .....at 1h 0m A.M. ;	at 8 20 A.M. ;	at	1 0 P.M. ;	and at	8 0 P.M.
In June .....at midnight ;	at 4 20 A.M. ;	at	1 40 P.M. ;	and at	9 20 P.M.
In July .....at 1h 0m A.M. ;	at 6 25 A.M. ;	at	1 40 P.M. ;	and at	8 45 P.M.
In August .....at 1h 0m A.M. ;	at 7 0 A.M. ;	at	1 10 P.M. ;	and at	7 35 P.M.
In September ...at 1h 0m A.M. ;	at 7 30 A.M. ;	at	1 0 P.M. ;	and at	7 0 P.M.
In October .....at 0h 25m A.M. ;	at 7 50 A.M. ;	at	1 10 P.M. ;	and at	5 0 P.M.
In November ...at 1h 40m A.M. ;	at 8 20 A.M. ;	at	11 40 A.M. ;	and at	5 45 P.M.
In December ...at 0h 40m A.M. ;	at 7 40 A.M. ;	at	0 45 P.M. ;	and at	6 5 P.M.

The diurnal oscillations of the sum of the pressures of air and vapour are plainly very different at different times of the year, the season therefore has an influence over the diurnal oscillation; this circumstance is sufficient to prevent us from being able to determine the mean height by taking the observations at any fixed time throughout the year for the morning mean, and at any fixed time for the evening mean. That mean reading takes place with the greatest degree of steadiness, which occurs between midday and 2^h P.M.; the actual time however varies with the season.

As we can deduce the mean temperature of the air from a few daily observations, to be spoken of presently, so also can we deduce the mean reading of the barometer from a few readings taken daily; and if this be the only element of investigation, that time or times most convenient to the observer may be chosen; but if, in addition, such observations be needed as will serve for studying the irregular oscillations of the readings of the barometer, then several observations should be taken daily, and at such times as appear in the foregoing table to require the largest corrections, both plus and minus. The greater number of observations which are taken daily, will not only serve for investigations of irregular oscillation, but the mean pressure will be more accurately determined, and they will be available in the study of the transmission of waves.

TABLE II.—Showing the corrections to be applied to the Monthly Mean reading of a thermometer placed at the height of four feet above the soil with its bulb freely exposed to the air, but in other respects protected from the influence of radiation and rain, at any hour, to deduce the true mean temperature of the air for the month from the observations taken at that hour.

Local mean time.	January.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
	°	°	°	°	°	°	°	°	°	°	°	°
Midnight.	+1·0	+1·6	+2·9	+4·8	+5·4	+6·2	+5·0	+5·1	+4·0	+2·9	+1·7	+0·9
1 A.M.	+0·9	+1·8	+3·0	+5·2	+6·0	+7·1	+5·5	+5·5	+4·5	+3·0	+1·8	+1·0
2	+1·2	+2·0	+3·3	+5·7	+6·4	+8·0	+6·0	+6·0	+5·5	+3·4	+2·0	+1·2
3	+1·3	+2·1	+3·6	+6·2	+6·7	+8·7	+6·4	+6·3	+6·4	+3·6	+2·0	+1·3
4	+1·6	+2·3	+3·9	+6·6	+6·7	+9·3	+6·6	+6·5	+6·6	+3·8	+2·1	+1·4
5	+1·8	+2·2	+4·0	+6·7	+6·3	+8·8	+6·2	+6·5	+6·2	+3·8	+2·0	+1·4
6	+1·9	+2·3	+3·9	+6·0	+4·8	+6·4	+4·5	+5·5	+5·3	+3·5	+1·9	+1·4
7	+1·9	+2·1	+3·6	+4·3	+2·6	+3·0	+2·5	+3·3	+4·0	+2·8	+1·7	+1·5
8	+1·5	+1·6	+2·5	+2·0	+0·5	0·0	0·0	+0·9	+2·1	+1·6	+1·0	+1·3
9	+1·0	+0·7	+0·2	−0·9	−2·0	−2·5	−2·0	−1·6	−0·4	0·0	+0·4	+0·9
10	+0·2	−0·5	−1·9	−3·2	−4·0	−4·5	−4·0	−3·5	−3·0	−2·0	−0·6	0·0
11	−1·3	−2·1	−3·5	−5·3	−5·5	−5·8	−5·4	−5·4	−5·0	−3·8	−2·0	−1·3
Noon.	−2·3	−3·2	−5·0	−6·8	−6·7	−7·3	−6·4	−6·5	−6·4	−5·1	−3·1	−2·1
1 P.M.	−2·9	−3·9	−5·8	−7·9	−7·5	−8·1	−6·7	−7·5	−7·1	−5·5	−3·5	−2·4
2	−3·0	−3·9	−5·8	−8·2	−7·7	−8·6	−6·7	−7·7	−7·1	−4·9	−3·6	−2·3
3	−2·5	−3·6	−5·5	−7·7	−7·3	−8·4	−6·5	−7·0	−6·6	−3·7	−3·0	−1·9
4	−1·9	−2·8	−4·5	−6·7	−6·1	−7·4	−5·8	−5·5	−5·5	−2·8	−2·1	−1·3
5	−1·1	−1·6	−3·3	−5·4	−4·8	−6·1	−4·9	−3·6	−4·2	−1·7	−1·2	−0·8
6	−0·6	−0·6	−1·8	−3·5	−3·0	−4·5	−3·5	−2·0	−2·5	−0·8	−0·4	−0·4
7	−0·3	+0·3	−0·4	−1·1	−1·0	−2·4	−1·5	−0·5	−0·6	0·0	+0·1	−0·1
8	+0·1	+0·6	+0·9	+0·7	+0·9	0·0	+0·3	+1·0	+1·0	+0·7	+0·6	+0·2
9	+0·4	+1·0	+1·7	+2·0	+2·3	+1·8	+1·9	+2·4	+1·8	+1·3	+1·0	+0·4
10	+0·6	+1·3	+2·3	+3·2	+3·5	+3·6	+3·3	+3·3	+2·7	+1·9	+1·3	+0·5
11	+0·7	+1·5	+2·6	+4·1	+4·5	+5·0	+4·2	+4·3	+3·4	+2·4	+1·5	+0·8

The sign + denotes that the number is to be added, and the sign − denotes that the number is to be subtracted.

Twice during the day the temperature of the air is at its mean value, and these times are as follows in the several months:—

	h	m		h	m	
In January ..... at	10	0	A.M. and again at	8	0	P.M.
In February ..... at	9	30	A.M. and again at	6	40	P.M.
In March ..... at	9	10	A.M. and again at	7	20	P.M.
In April ..... at	8	40	A.M. and again at	7	0	P.M.
In May ..... at	8	25	A.M. and again at	7	30	P.M.
In June ..... at	8	0	A.M. and again at	8	0	P.M.
In July ..... at	8	0	A.M. and again at	8	5	P.M.
In August ..... at	8	20	A.M. and again at	7	20	P.M.
In September ..... at	8	55	A.M. and again at	7	20	P.M.
In October ..... at	9	0	A.M. and again at	7	0	P.M.
In November ..... at	9	25	A.M. and again at	6	45	P.M.
In December ..... at	10	0	A.M. and again at	7	20	P.M.

To determine the mean temperature of the air, it might therefore seem that it would be sufficient to take an observation at one of these two periods; but it must be borne in mind that at these times the changes of temperature are rapid, and, consequently, if the observation be made a little too soon or a little too late, very considerable errors might be committed; therefore, observations at these times, unless they are made very accurately with respect to time, are not worthy of implicit confidence.

The better way is to take observations several times during the day, and at such times that the algebraical sum of the corrections is a minimum.

The best plan, however, is to take observations at those hours which are the least liable to interruption by the avocations of the observers, and to apply to their mean results the necessary corrections. Of the hours which are equally convenient, those are preferable about which the least changes are taking place, as then a small error in the time of observation will entail little or no error in the readings.

The mean temperature of the air has hitherto been considered by most observers to be that which is intermediate to the maximum and minimum of the day; and in most places in England the mean temperature has been deduced from these two elements, by taking a simple arithmetical mean between them. The true mean in the summer months is widely different from the half of the sum of the maximum and minimum readings. The mean temperatures, of nearly all places in England, have therefore been estimated too high. At Greenwich this empirical mean has been found always to exceed the true mean; but the amount of the error is variable in the different seasons, but it is found to be the same in the same months of different years. The following table gives the correction for all the months of the year.

TABLE III.—Showing the corrections to be applied subtractively to the simple arithmetical mean of the maximum and minimum thermometers, to deduce from their readings the true temperature of the air.

	°		°
January	0·2	July	1·9
February	0·4	August	1·7
March	1·0	September	1·3
April	1·5	October	1·0
May	1·7	November	0·4
June	1·8	December	0·0

We have thus two easy methods of finding the true mean temperature; first, by taking observations several times a day, and applying corrections to their means from Table II.; and, secondly, by taking the half of the maximum and minimum readings and correcting it by the numbers in Table III.

At all places the form of the diurnal variation is a single progression, having one ascending branch and one descending branch, the maximum occurring early in the afternoon and the minimum occurring at about sunrise; but the amount of the difference of these extremes is variable, depending upon latitude, elevation, locality and geological formation of the country.

If we compare the mean temperatures of places that differ considerably from each other in latitude, we shall find that the mean values are lower as we proceed north.

If we compare the mean temperatures of places having the same latitude, we shall find that the mean value of those situated at the higher level will be less than those at the lower level.

If we compare places having the same latitude, we shall find that the mean temperatures of those places situated inland will be higher in the summer months, and lower in the winter months than those situated in the vicinity of the sea.

If we compare places differing only in their geological formations, we shall find that those places situated upon an arid, dry soil, will have a greater range of temperature than those situated upon a clayey, wet soil.

It is therefore possible that the corrections in Table II. may not be of universal application, but, as the form of the curve described by the daily march is similar at all places, with the exception of being more or less bold, the turning points occurring at nearly the same local time, it is most probable that the amount of the correction applicable to any hour at any place is the same part of the whole monthly mean daily range at that place, as the correction at Greenwich is of the monthly mean daily range at Greenwich; I have therefore computed the following table upon this assumption, to be used at those places where the daily range of the temperature of the air is remarkably small or remarkably large.

TABLE IV.—Factors to be multiplied into the mean daily range of the reading of a thermometer placed at the height of 4 feet above the soil, with its bulb freely exposed to the air, but in other respects protected from the influence of radiation and rain, to deduce the correction to be applied to the monthly mean reading at any hour, to determine the true mean temperature of the air for the month.

Local mean time.	January.	February.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
Midnight.	+0·123	+0·170	+0·218	+0·286	+0·303	+0·318	+0·289	+0·298	+0·247	+0·266	+0·179	+0·106
1 A.M.	+0·111	+0·192	+0·225	+0·309	+0·337	+0·364	+0·318	+0·322	+0·278	+0·275	+0·190	+0·118
2	+0·148	+0·213	+0·248	+0·340	+0·359	+0·411	+0·347	+0·351	+0·340	+0·312	+0·211	+0·142
3	+0·152	+0·223	+0·271	+0·370	+0·376	+0·446	+0·371	+0·369	+0·395	+0·331	+0·211	+0·154
4	+0·198	+0·245	+0·293	+0·393	+0·376	+0·477	+0·382	+0·380	+0·407	+0·349	+0·222	+0·165
5	+0·222	+0·235	+0·301	+0·399	+0·354	+0·451	+0·358	+0·380	+0·383	+0·349	+0·211	+0·165
6	+0·234	+0·245	+0·293	+0·357	+0·270	+0·328	+0·260	+0·322	+0·327	+0·320	+0·201	+0·165
7	+0·234	+0·223	+0·271	+0·256	+0·146	+0·154	+0·145	+0·193	+0·247	+0·257	+0·179	+0·177
8	+0·185	+0·170	+0·188	+0·119	+0·028	0·000	0·000	+0·053	+0·130	+0·147	+0·106	+0·154
9	+0·123	+0·074	+0·015	−0·053	−0·112	−0·128	−0·116	−0·094	−0·025	0·000	+0·043	+0·106
10	+0·025	−0·053	−0·143	−0·191	−0·225	−0·231	−0·231	−0·205	−0·185	−0·184	−0·064	0·000
11	−0·152	−0·223	−0·263	−0·316	−0·309	−0·298	−0·312	−0·316	−0·309	−0·349	−0·211	−0·154
Noon.	−0·284	−0·340	−0·376	−0·405	−0·377	−0·374	−0·370	−0·380	−0·395	−0·468	−0·327	−0·248
1 P.M.	−0·358	−0·415	−0·436	−0·470	−0·421	−0·415	−0·387	−0·439	−0·438	−0·505	−0·369	−0·282
2	−0·369	−0·415	−0·436	−0·488	−0·433	−0·442	−0·387	−0·487	−0·438	−0·451	−0·379	−0·271
3	−0·309	−0·383	−0·414	−0·458	−0·410	−0·431	−0·376	−0·410	−0·408	−0·340	−0·316	−0·224
4	−0·234	−0·298	−0·338	−0·399	−0·343	−0·379	−0·335	−0·322	−0·340	−0·257	−0·222	−0·154
5	−0·136	−0·170	−0·248	−0·322	−0·270	−0·313	−0·283	−0·211	−0·260	−0·156	−0·127	−0·095
6	−0·074	−0·064	−0·135	−0·209	−0·169	−0·231	−0·202	−0·117	−0·154	−0·074	−0·043	−0·048
7	−0·037	+0·032	−0·030	−0·066	−0·056	−0·123	−0·087	−0·030	−0·037	0·000	+0·011	−0·012
8	+0·012	+0·064	+0·068	+0·042	+0·051	0·000	−0·017	+0·059	+0·062	+0·065	+0·064	+0·024
9	+0·049	+0·106	+0·128	+0·119	+0·130	+0·092	−0·110	+0·140	+0·111	+0·120	+0·106	+0·048
10	+0·074	+0·138	+0·173	+0·191	+0·197	+0·185	−0·191	+0·193	+0·167	+0·175	+0·137	+0·059
11	+0·086	+0·160	+0·195	+0·244	+0·253	+0·257	−0·243	+0·252	+0·210	+0·221	+0·158	+0·095

The sign + denotes that the number is to be added, and the sign − denotes that the number is to be subtracted.

The use of this table is very simple: I will suppose that in January the difference between the mean of the maxima readings and the mean of the minima readings, or the mean daily range be 8°, then the amount of the correction at 4^h P.M. would be

$$-0{\cdot}234 \times 8^\circ = -1^\circ{\cdot}9.$$

Again, in the month of June, suppose the mean daily range to be 19°·5, then the amount of the correction at 9^h A.M. would be

$$-0{\cdot}128 \times 19^\circ{\cdot}5 = -2^\circ{\cdot}5.$$

I have reason to believe that for most places the corrections in Table II. will be found to be sufficient; and although for some places we may not, by their application, obtain results that are perfectly accurate, they will, nevertheless, be nearer than those which are not corrected.

TABLE V.—Showing the mean depression of the temperature of evaporation below that of the air, at the height of 4 feet above the soil, at every hour in each month.

Local mean time.	January.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
	°	°	°	°	°	°	°	°	°	°	°	°
Midnight.	0·9	0·9	1·1	1·2	1·3	1·7	1·7	1·0	0·6	0·9	0·9	0·9
1 A.M.	1·0	0·9	0·9	1·0	1·0	1·5	1·3	0·9	0·7	0·7	0·9	1·0
2	1·0	0·9	0·8	0·8	0·7	1·2	1·1	0·8	0·6	0·6	0·9	0·9
3	1·0	0·8	0·7	0·7	0·6	1·0	0·8	0·6	0·4	0·6	0·9	0·9
4	1·0	0·8	0·7	0·6	0·6	0·9	0·6	0·5	0·3	0·5	0·8	0·9
5	1·0	0·9	0·7	0·7	0·8	0·9	0·8	0·7	0·3	0·4	0·8	0·8
6	1·0	0·9	0·7	1·0	1·0	1·5	1·4	1·0	0·3	0·4	0·8	0·7
7	1·0	0·9	0·9	1·5	1·5	2·6	2·1	1·4	0·5	0·6	0·7	0·8
8	1·0	1·0	1·4	2·1	2·3	3·7	3·0	2·3	1·2	0·7	0·8	0·9
9	1·0	1·3	2·0	3·0	3·2	4·8	4·0	3·4	2·0	1·2	1·1	1·0
10	1·0	1·5	2·5	4·0	3·9	5·8	5·0	4·4	2·9	1·9	1·5	1·3
11	1·1	1·8	2·9	4·8	4·6	6·8	5·8	5·3	3·8	2·7	1·8	1·8
Noon.	1·4	2·0	3·3	5·6	5·4	7·7	6·5	6·1	4·5	3·3	2·1	2·0
1 P.M.	1·6	2·2	3·7	6·2	6·0	8·3	6·7	6·6	5·1	3·7	2·3	2·1
2	1·8	2·3	3·8	6·5	6·3	8·6	6·7	6·7	5·6	3·8	2·3	2·1
3	1·9	2·5	3·8	6·3	6·2	8·2	6·7	6·6	5·9	3·7	2·0	1·9
4	1·9	2·0	3·6	5·9	5·6	7·1	6·1	6·0	5·3	3·5	1·8	1·6
5	1·7	1·5	3·3	5·5	5·1	6·9	5·9	5·8	4·2	2·7	1·6	1·5
6	1·6	1·2	2·7	4·8	4·5	6·2	5·2	5·0	3·0	2·0	1·4	1·1
7	1·3	1·0	2·0	3·8	3·5	5·3	4·3	4·3	2·1	1·8	1·1	1·0
8	1·0	0·9	1·6	2·9	2·8	4·4	3·5	3·5	1·5	1·4	1·0	0·9
9	1·0	0·8	1·4	2·3	2·3	3·3	2·8	2·5	1·0	1·2	1·0	1·0
10	0·9	0·8	1·2	1·7	1·7	2·5	2·3	1·7	0·7	1·0	0·9	1·0
11	0·9	0·8	1·1	1·4	1·4	2·0	1·9	1·3	0·5	0·8	0·9	1·0

The times at which the least and greatest differences, between the readings of the dry- and wet-bulb thermometers, with the amounts of the differences in every month, were as follows :—

Jan.	The least difference	was 0°·8	And it took place	at 11h 20m P.M.;	The greatest difference	was 1°·8	And it took place	from 2h P.M. to 4h P.M.
Feb.	„	was 0°·8 or 0°·9	„	during the night hours;	„	was 2°·5	„	at 3h P.M.
Mar.	„	was 0°·7	„	from 3h A.M. to 6h A.M.;	„	was 3°·8	„	from 1h 40m P.M. to 3h 0m P.M.
April	„	was 0°·6	„	at 4h A.M.;	„	was 6°·5	„	from 2h 0m P.M. to 2h 50m P.M.
May	„	was 0°·6	„	from 3h A.M. to 4h A.M.;	„	was 6°·3	„	from 2h 0m P.M. to 2h 40m P.M.
June	„	was 0°·9	„	from 4h A.M. to 5h A.M.;	„	was 8°·6	„	from 1h 40m P.M. to 2h 10m P.M.
July	„	was 0°·6	„	from 4h 0m A.M. to 4h 40m A.M.;		was 6°·7	„	from 0h 40m P.M. to 3h 0m P.M.
Aug.	„	was 0°·5	„	from 3h 40m A.M. to 5h 45m A.M.;		was 6°·7	„	from 1h 10m P.M. to 2h 50m P.M.
Sept.	„	was 0°·2	„	at 5h 20m A.M.;	„	was 5°·9	„	at 3h P.M.
Oct.	„	was 0°·4	„	from 5h A.M. to 6h 20m A.M.;		was 3°·8	„	from 1h 40m P.M. to 2h 50m P.M.
Nov.	„	was 0°·8 or 0°·9	„	at all night hours;	„	was 2°·3	„	from 1h 0m P.M. to 2h 10m P.M.
Dec.	„	was 0°·9	„	at all night hours;	„	was 2°·1	„	from 1h 0m P.M. to 2h 0m P.M.

The times of least difference in the year are the morning hours in September, and the times of greatest difference are from 1h P.M. to 3h P.M. in June.

TABLE VI.—Showing the mean depression of the temperature of the dew-point below that of the air at the height of four feet above the soil at every hour in each month.

Local mean time.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
	°	°	°	°	°	°	°	°	°	°	°	°
Midnight.	2·5	2·5	2·8	2·8	2·5	3·1	2·8	1·9	1·5	1·7	2·0	2·6
1 A.M.	2·8	2·6	2·5	2·4	2·2	2·6	2·2	1·4	1·2	1·4	2·1	2·6
2	2·9	2·6	2·5	2·0	1·9	2·4	1·8	1·2	1·0	1·2	2·1	2·6
3	2·7	2·4	2·4	1·7	1·6	2·0	1·6	1·0	0·8	1·0	2·0	2·5
4	2·6	2·1	2·3	1·6	1·6	1·7	1·5	0·9	0·6	0·9	1·9	2·1
5	2·3	2·0	2·3	1·7	1·6	1·8	1·7	1·0	0·7	0·9	1·8	2·0
6	2·2	2·0	2·4	2·5	2·1	2·7	3·0	1·7	1·0	1·3	1·7	2·0
7	2·1	2·2	2·8	3·7	3·6	5·1	5·1	3·0	1·9	1·9	1·7	2·0
8	2·1	2·3	3·7	4·6	4·5	6·3	6·0	4·2	2·5	2·4	1·8	2·1
9	2·2	2·8	4·7	6·1	5·8	8·1	7·5	5·7	3·7	3·3	2·3	2·3
10	2·5	3·6	5·6	7·8	7·1	9·8	8·8	7·3	5·0	4·1	2·7	2·8
11	3·1	4·3	6·6	9·4	8·5	11·1	9·9	8·8	6·6	5·3	3·1	3·4
Noon.	3·7	4·7	7·5	10·6	9·5	12·1	10·6	9·9	7·9	6·4	3·7	3·7
1 P.M.	3·9	5·2	8·1	11·5	10·3	12·9	10·8	10·7	8·6	7·1	4·3	4·1
2	4·4	5·3	8·6	12·1	10·6	13·3	11·1	10·9	8·9	7·5	4·6	4·2
3	4·6	5·2	8·5	12·0	10·3	13·0	11·0	10·3	8·7	7·3	4·4	4·3
4	4·5	4·8	8·1	11·0	9·5	12·1	10·3	9·7	7·9	6·4	3·8	4·0
5	3·6	4·0	7·5	10·1	8·7	11·1	9·5	8·9	6·7	5·3	3·3	3·7
6	3·1	3·1	6·5	9·0	7·6	10·0	8·5	7·8	5·5	4·4	2·8	3·4
7	2·3	2·5	5·0	6·8	6·4	9·0	7·1	6·3	4·3	3·6	2·6	3·1
8	2·1	2·3	3·9	5·5	5·3	7·5	6·0	4·8	3·1	2·9	2·4	2·8
9	2·0	2·1	3·3	5·0	4·3	6·0	4·8	3·5	2·4	2·4	2·1	2·7
10	2·0	2·0	3·0	4·1	3·6	4·7	3·7	2·6	1·7	2·0	2·0	2·6
11	2·1	2·1	2·6	3·1	2·7	3·5	3·1	1·8	1·3	1·7	1·9	2·4

The times at which the least and greatest excess of air-temperature above dew-point temperature, with the amounts of the differences, were as follows:—

Jan. {The least difference} was 2°·1 {And it took place} {at 11h 20m P.M., and from 6h A.M. to 8h A.M.} {The greatest difference} was 4°·5 {And it took place} at 3h 20m P.M.

Feb. „ was 2°·0 „ from 5h 20m A.M. to 7h 0m A.M.; was 5°·3 „ at 1h 40m P.M. to 2h 40m P.M.

Mar. „ was 2°·4 „ from 4h 0m A.M. to 5h 40m A.M.; was 8°·5 „ at 2h 40m P.M.

April „ was 1°·6 „ at 4h 20m A.M.; „ was 12°·1 „ at 2h 20m P.M.

May „ was 1°·5 „ at 5h 0m A.M.; „ was 10°·5 „ at 1h 40m P.M.

June „ was 1°·8 „ at 4h 40m A.M.; „ was 13°·3 „ at 1h 40m P.M.

July „ was 1°·5 „ from 3h 40m A.M. to 4h 40m A.M.; was 11°·0 „ from 1h 40m P.M. to 3h 0m P.M.

Aug. „ was 0°·8 „ from 3h 40m A.M. to 4h 20m A.M.; was 10°·8 „ at 1h 20m P.M.

Sept. „ was 0°·6 „ at 4h 40m A.M.; „ was 8°·9 „ at 1h 20m P.M.

Oct. „ was 0°·9 „ at 4h 20m A.M.; „ was 7°·5 „ at 2h 0m P.M.

Nov. „ was 1°·6 „ from 6h 20m A.M. to 7h 20m A.M.; was 4°·6 „ from 1h 40m P.M. to 2h 20m P.M.

Dec. „ was 2°·0 „ from 4h 20m A.M. to 7h 20m A.M.; was 4°·3 „ from 1h 40m P.M. to 3h 0m P.M.

The time at which the temperatures of the air and of the dew-point were most nearly alike, was in September at 4h 40m A.M., and the time at which the greatest difference took place between these temperatures, was in June at 1h 40m P.M. The times of the least difference are at about the time of sunrise at all seasons of the year, and the times of the greatest difference are at about the time of the maximum temperature of the air at all periods.

TABLE VII.—Showing the corrections to be applied to the monthly mean readings of the wet-bulb thermometer placed at the height of four feet above the soil at any hour, to deduce the true mean temperature of evaporation for the month from the observations taken at that hour.

Local mean time.	January.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
Midnight.	+0°·7	+1°·2	+2°·1	+2°·9	+3°·8	+3°·5	+3°·1	+2°·6	+2°·2	+1°·9	+1°·3	+0°·5
1 A.M.	+0·7	+1·4	+2·0	+3·1	+3·1	+4·2	+3·2	+2·9	+2·8	+1·8	+1·4	+ 07
2	+1·0	+1·6	+2·2	+3·4	+4·2	+4·8	+3·5	+3·3	+3·7	+2·1	+1·6	+0·8
3	+1·1	+1·6	+2·4	+3·8	+4·4	+5·3	+3·6	+3·4	+4·1	+2·3	+1·6	+0·9
4	+1·4	+1·8	+2·7	+4·1	+4·4	+5·8	+3·6	+3·5	+4·5	+2·4	+1·6	+1·0
5	+1·6	+1·8	+2·8	+4·3	+4·2	+5·3	+3·4	+3·7	+4·1	+2·3	+1·5	+0·9
6	+1·7	+1·9	+2·7	+3·9	+2·9	+3·5	+2·3	+3·0	+3·2	+2·0	+1·4	+0·8
7	+1·7	+1·7	+2·6	+2·7	+1·2	+1·2	+1·0	+1·2	+2·1	+1·5	+1·1	+1·0
8	+1·3	+1·3	+2·0	+1·0	−0·1	−0·7	−0·6	−0·3	+0·9	+0·4	+0·5	+0·9
9	+0·8	+0·7	+0·3	−1·0	−3·7	−2·1	−1·6	−1·7	−0·8	−0·7	+0·2	+0·6
10	0·0	−0·3	−1·3	−2·3	−3·0	−3·1	−2·6	−2·6	−2·5	−2·0	−0·4	0·0
11	−1·4	−1·6	−2·5	−3·6	−3·8	−3·4	−3·2	−3·6	−3·6	−3·0	−1·5	−0·8
Noon.	−2·1	−2·5	−3·6	−4·3	−4·2	−4·0	−3·5	−3·9	−4·3	−3·7	−2·3	−1·4
1 P.M.	−2·5	−3·0	−4·0	−4·8	−4·4	−4·2	−3·6	−4·3	−4·4	−3·7	−2·5	−1·6
2	−2·4	−2·9	−3·9	−4·8	−4·3	−4·4	−3·6	−4·5	−3·9	−3·0	−2·6	−1·5
3	−1·8	−2·4	−3·6	−4·5	−4·0	−4·6	−3·4	−3·9	−3·1	−1·9	−2·3	−1·3
4	−1·2	−2·1	−2·8	−3·9	−4·4	−4·7	−3·3	−3·0	−2·6	−1·2	−1·6	−1·0
5	−0·6	−1·4	−1·9	−3·0	−2·6	−3·6	−2·6	−1·3	−2·4	−0·9	−0·9	−0·6
6	−0·2	−0·7	−1·0	−1·8	−1·4	−2·7	−1·9	−0·5	−1·9	−0·7	−0·3	−0·6
7	−0·2	0·0	−0·3	−0·4	−0·4	−1·5	−0·8	+0·3	−0·9	−0·1	−0·1	−0·4
8	−0·1	+0·2	+0·6	+0·5	+0·8	0·0	+0·2	+1·0	+0·1	+1·2	+0·3	−0·2
9	+0·2	+0·5	+1·2	+1·2	+1·4	+0·7	+1·1	+1·4	+0·4	+0·6	+0·7	+0·1
10	+0·3	+0·8	+1·6	+1·8	+2·3	+1·7	+2·0	+1·5	+1·0	+1·0	+0·9	+0·2
11	+0·4	+1·0	+1·8	+2·4	+3·0	+2·6	+2·5	+2·1	+1·5	+1·3	+1·1	+0·5

TABLE VIII.—Showing the corrections to be applied to the monthly mean reading of the temperature of the dew-point at the height of four feet above the soil at any hour, to deduce the true mean temperature of the dew-point for the month from the observations taken at that hour.

Local mean time.	January.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
Midnight.	+0°·6	+0°·8	+0°·9	+1°·4	+2°·5	+2°·2	+1°·7	+1°·5	+1°·4	+1°·0	+1°·1	+0°·5
1 A.M.	+0·8	+1·1	+0·7	+1·4	+2·8	+2·6	+1·6	+1·4	+1·6	+0·8	+1·3	+0·6
2	+1·2	+1·3	+1·0	+1·5	+2·9	+3·3	+1·7	+1·7	+2·4	+1·0	+1·5	+0·8
3	+1·1	+2·2	+1·2	+1·7	+2·9	+3·6	+1·9	+1·8	+3·1	+1·0	+1·4	+0·8
4	+1·3	+2·1	+1·4	+2·0	+2·9	+3·9	+2·0	+1·9	+3·1	+1·1	+1·4	+0·5
5	+1·2	+0·9	+1·5	+2·2	+2·5	+3·5	+1·8	+2·0	+2·8	+1·1	+1·2	+0·4
6	+1·2	+1·0	+1·5	+2·3	+1·5	+2·0	+1·4	+1·7	+2·2	+1·2	+1·0	+0·4
7	+1·1	+1·0	+1·6	+1·8	+0·8	+1·0	+1·5	+0·8	+1·8	+1·1	+0·8	+0·5
8	+0·7	+0·6	+1·4	+0·4	−0·4	−0·8	−0·1	−0·2	+0·5	+0·4	+0·2	+0·4
9	+0·3	+0·2	+0·1	−1·0	−1·6	−1·5	−0·6	−1·4	−0·8	−0·3	+0·1	+0·2
10	−0·2	−0·2	−1·1	−1·6	−2·3	−1·8	−1·3	−1·7	−2·1	−1·5	−0·5	−0·2
11	−1·1	−1·1	−1·7	−2·1	−2·4	−1·8	−1·6	−2·1	−2·5	−2·1	−1·5	−0·9
Noon.	−1·5	−1·8	−2·3	−2·4	−2·6	−2·3	−1·9	−2·1	−2·6	−2·3	−2·0	−1·4
1 P.M.	−1·9	−2·0	−2·5	−2·6	−2·6	−2·3	−2·0	−2·3	−2·6	−2·0	−1·8	−1·3
2	−1·5	−1·7	−2·0	−2·3	−2·5	−2·4	−1·7	−2·3	−2·3	−1·0	−1·6	−1·1
3	−0·8	−1·7	−1·8	−1·9	−2·4	−2·5	−1·6	−2·2	−2·0	0·0	−1·2	−0·6
4	−0·3	−1·3	−1·2	−1·9	−2·0	−2·4	−1·6	−1·3	−1·7	0·0	−0·9	−0·3
5	−0·4	−0·9	−0·6	−1·5	−1·5	−2·1	−1·5	−0·2	−1·6	0·0	−0·5	−0·1
6	−0·4	−0·8	−0·1	−0·7	−0·8	−1·6	−1·1	+0·3	−1·1	0·0	−0·2	0·0
7	−0·9	−0·5	−0·2	0·0	0·0	−0·5	−0·5	+0·3	−0·4	0·0	+0·1	0·0
8	−0·7	−0·4	0·0	0·0	+0·8	+0·4	+0·2	+0·3	0·0	0·0	+0·4	0·0
9	−0·5	−0·2	+0·2	+0·8	+0·9	+0·7	+0·6	+0·4	+0·1	+0·1	+0·5	+0·1
10	−0·3	0·0	+0·5	+1·1	+1·7	+1·2	+0·9	+0·4	+0·3	+0·3	+0·7	+0·1
11	−0·1	+0·3	+0·4	+1·0	+1·8	+1·4	+1·2	+0·6	+0·6	+0·5	+0·8	+0·2

The sign + denotes that the number is to be added, and the sign — denotes that the number is to be subtracted.

In every month the largest number in this table to which the plus sign is affixed, indicates the time of minimum temperature of the dew-point; and the largest number to which the minus sign is affixed indicates the time of maximum temperature of the dew-point. The laws which we may deduce from the numbers in this table are as follows:—

At Greenwich the temperature of the dew-point attains its minimum in the first two months, and in the last two months of the year, some hours before the time of sunrise; as the sun rises above the horizon and approaches the meridian, evaporation increases, and the air constantly receives a greater quantity of vapour, consequently the temperature of the dew-point increases till, at about the time of the maximum temperature of the air, the maximum temperature of the dew-point takes place. In summer time the minimum temperature of the dew-point attains its minimum a little before sunrise, and its maximum at about noon. In winter time, after having attained its maximum, the temperature of the dew-point decreases very regularly till next morning. In summer time the value remains very nearly at its maximum value till after the temperature of the air begins to decline; it then very regularly decreases as before, till the following morning.

The fact of the almost stationary temperature of the dew-point during the early afternoon hours in summer is important, and will be referred to again presently.

TABLE IX.—Showing the corrections to be applied to the monthly mean elastic force of vapour at the height of four feet above the soil at any hour, to deduce the true mean elastic force of vapour for the month from the observations taken at that hour.

Local mean time.	January.	February.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Midnight.	+0·006	+0·006	+0·008	+0·017	+0·026	+0·031	+0·028	+0·025	+0·024	+0·018	+0·010	+0·009
1 A.M.	+0·011	+0·008	+0·010	+0·021	+0·028	+0·037	+0·031	+0·031	+0·030	+0·020	+0·012	+0·010
2	+0·015	+0·010	+0·011	+0·024	+0·031	+0·043	+0·036	+0·035	+0·035	+0·021	+0·015	+0·010
3	+0·015	+0·011	+0·013	+0·027	+0·032	+0·048	+0·038	+0·039	+0·037	+0·023	+0·017	+0·011
4	+0·015	+0·013	+0·015	+0·029	+0·031	+0·047	+0·037	+0·040	+0·040	+0·025	+0·019	+0·011
5	+0·015	+0·014	+0·016	+0·029	+0·027	+0·037	+0·031	+0·038	+0·040	+0·023	+0·021	+0·011
6	+0·014	+0·015	+0·016	+0·025	+0·019	+0·022	+0·019	+0·029	+0·033	+0·021	+0·021	+0·010
7	+0·013	+0·014	+0·014	+0·016	+0·007	+0·008	+0·007	+0·014	+0·022	+0·018	+0·018	+0·009
8	+0·010	+0·010	+0·010	+0·005	−0·005	−0·004	−0·004	0·000	+0·010	+0·011	+0·012	+0·007
9	+0·007	+0·006	+0·005	+0·005	−0·016	−0·015	−0·014	−0·012	−0·005	+0·005	+0·005	+0·005
10	+0·002	0·000	−0·003	−0·013	−0·024	−0·027	−0·019	−0·021	−0·019	−0·005	−0·004	+0·001
11	−0·004	−0·005	−0·007	−0·020	−0·028	−0·036	−0·025	−0·027	−0·027	−0·009	−0·010	−0·004
Noon.	−0·007	−0·009	−0·012	−0·026	−0·030	−0·042	−0·029	−0·030	−0·030	−0·015	−0·017	−0·007
1 P.M.	−0·008	−0·013	−0·013	−0·027	−0·030	−0·045	−0·033	−0·032	−0·030	−0·018	−0·019	−0·008
2	−0·007	−0·015	−0·013	−0·027	−0·028	−0·043	−0·034	−0·034	−0·029	−0·017	−0·020	−0·008
3	−0·007	−0·012	−0·012	−0·025	−0·026	−0·039	−0·033	−0·031	−0·027	−0·014	−0·016	−0·008
4	−0·007	−0·010	−0·010	−0·020	−0·021	−0·035	−0·028	−0·027	−0·021	−0·009	−0·010	−0·007
5	−0·004	−0·006	−0·006	−0·014	−0·015	−0·025	−0·021	−0·020	−0·017	−0·006	−0·005	−0·005
6	−0·002	−0·004	−0·002	−0·006	−0·010	−0·017	−0·016	−0·015	−0·010	−0·004	0·000	−0·003
7	−0·001	−0·001	+0·002	+0·001	−0·004	−0·007	−0·007	−0·006	−0·003	+0·003	+0·004	−0·001
8	0·000	+0·001	+0·004	+0·005	+0·005	+0·005	+0·004	+0·004	+0·004	+0·005	+0·006	+0·001
9	0·000	+0·003	+0·005	+0·007	+0·013	+0·015	+0·010	+0·010	+0·008	+0·008	+0·008	+0·004
10	+0·001	+0·004	+0·007	+0·010	+0·017	+0·023	+0·017	+0·015	+0·013	+0·011	+0·009	+0·005
11	+0·002	+0·005	+0·008	+0·014	+0·022	+0·029	+0·024	+0·020	+0·018	+0·014	+0·010	+0·006

The sign + denotes that the number is to be added, and the sign − denotes that the number is to be subtracted.

The remarks following Table VIII. apply equally well to this table; I may add, however, that as the temperature increases from the time of sunrise more rapidly than the amount of water necessary to keep the air at the same degree of humidity evaporates, the atmosphere becomes farther and farther removed from a state of saturation; and this is particularly the case in summer time, between the hour of noon and the time of the highest temperature of the air; for, as the temperature increases all this time, whilst the amount of water is stationary or becomes less, it follows that the air is more and more removed from the point of saturation, as is shown by the increasing numbers with a plus sign between these times in Table XI.

TABLE X.—Showing the corrections to be applied to the monthly mean value of the water contained within a cubic foot of air at the height of four feet above the soil at any hour, to deduce the true mean value of the month from the observations taken at that hour.

Local mean time.	January.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
	gr.	gr.	gr.	gr.	gr.	gr.	gr.	gr.	gr.	gr.	gr.	gr.
Midnight.	0·0	+0·1	+0·1	+0·1	+0·2	+0·3	+0·3	+0·2	+0·2	+0·2	+0·1	+0·1
1 A.M.	+0·1	+0·1	+0·1	+0·2	+0·3	+0·4	+0·3	+0·3	+0·3	+0·2	+0·1	+0·1
2	+0·1	+0·1	+0·1	+0·2	+0·3	+0·5	+0·4	+0·3	+0·4	+0·2	+0·1	+0·1
3	+0·1	+0·1	+0·1	+0·2	+0·3	+0·5	+0·4	+0·3	+0·4	+0·2	+0·1	+0·1
4	+0·1	+0·1	+0·1	+0·2	+0·3	+0·4	+0·3	+0·4	+0·3	+0·2	+0·1	+0·1
5	+0·1	+0·1	+0·2	+0·2	+0·2	+0·3	+0·2	+0·3	+0·3	+0·1	+0·1	+0·1
6	+0·1	+0·1	+0·2	+0·2	+0·2	+0·1	+0·1	+0·2	+0·1	+0·1	+0·1	+0·1
7	+0·1	+0·1	+0·1	+0·1	+0·1	−0·1	0·0	+0·1	+0·1	+0·1	+0·1	+0·1
8	+0·1	+0·1	+0·1	0·0	0·0	−0·1	−0·1	0·0	0·0	0·0	0·0	0·0
9	0·0	0·0	0·0	−0·1	−0·1	−0·2	−0·1	−0·1	−0·1	0·0	0·0	0·0
10	0·0	0·0	0·0	−0·1	−0·2	−0·2	−0·2	−0·2	−0·2	−0·1	−0·1	−0·1
11	0·0	−0·1	−0·1	−0·2	−0·2	−0·3	−0·2	−0·2	−0·2	−0·2	−0·2	−0·1
Noon.	−0·1	−0·1	−0·1	−0·2	−0·2	−0·4	−0·2	−0·3	−0·3	−0·2	−0·2	−0·2
1 P.M.	−0·1	−0·1	−0·1	−0·2	−0·2	−0·4	−0·2	−0·3	−0·3	−0·2	−0·2	−0·2
2	−0·1	−0·1	−0·1	−0·2	−0·3	−0·5	−0·3	−0·4	−0·4	−0·2	−0·2	−0·2
3	−0·1	−0·1	−0·1	−0·1	−0·2	−0·4	−0·3	−0·3	−0·3	−0·1	−0·2	−0·2
4	−0·1	−0·1	−0·1	−0·1	−0·2	−0·3	−0·2	−0·3	−0·3	−0·1	−0·1	−0·1
5	−0·1	−0·1	0·0	−0·1	−0·2	−0·2	−0·2	−0·2	−0·2	−0·1	−0·1	−0·1
6	−0·1	0·0	0·0	−0·1	−0·1	−0·2	−0·1	−0·1	−0·1	−0·1	0·0	−0·1
7	−0·1	0·0	0·0	−0·1	0·0	−0·1	0·0	0·0	0·0	−0·1	+0·1	0·0
8	−0·1	0·0	+0·1	−0·1	+0·1	+0·1	+0·1	+0·1	+0·1	−0·1	+0·1	0·0
9	0·0	0·0	+0·1	+0·1	+0·1	+0·2	+0·1	+0·1	+0·1	+0·1	+0·1	0·0
10	0·0	0·0	+0·1	+0·1	+0·2	+0·2	+0·2	+0·1	+0·1	+0·1	+0·1	0·0
11	0·0	+0·1	+0·1	+0·1	+0·2	+0·2	+0·2	+0·2	+0·2	+0·1	+0·1	0·0

The sign + denotes that the number is to be added, and the sign — denotes that the number is to be subtracted.

TABLE XI.—Showing the corrections to be applied to the monthly mean value of the degree of humidity at the height of four feet above the soil at any hour, to deduce the true degree of humidity for the month from the observations at that hour.

Local mean time.	January.	February.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
Midnight.	−0·013	−0·021	−0·063	−0·095	−0·087	−0·105	−0·091	−0·096	−0·080	−0·053	−0·018	−0·011
1 A.M.	+0·002	−0·021	−0·065	−0·106	−0·100	−0·114	−0·095	−0·104	−0·080	−0·059	−0·009	−0·012
2	+0·004	−0·026	−0·066	−0·116	−0·108	−0·125	−0·107	−0·113	−0·085	−0·066	−0·011	−0·017
3	−0·003	−0·033	−0·067	−0·123	−0·113	−0·132	−0·116	−0·117	−0·091	−0·070	−0·020	−0·019
4	−0·013	−0·036	−0·068	−0·126	−0·114	−0·138	−0·120	−0·123	−0·097	−0·075	−0·030	−0·024
5	−0·019	−0·035	−0·066	−0·125	−0·106	−0·139	−0·120	−0·123	−0·098	−0·077	−0·030	−0·024
6	−0·021	−0·034	−0·063	−0·112	−0·085	−0·107	−0·097	−0·107	−0·097	−0·071	−0·033	−0·026
7	−0·020	−0·030	−0·055	−0·080	−0·059	−0·065	−0·055	−0·061	−0·080	−0·058	−0·031	−0·025
8	−0·020	−0·020	−0·035	−0·065	−0·024	−0·015	−0·005	−0·020	−0·047	−0·037	−0·021	−0·018
9	−0·017	−0·007	−0·003	−0·034	+0·018	+0·035	+0·041	+0·030	0·000	−0·009	−0·008	−0·007
10	−0·004	+0·009	+0·031	−0·015	+0·051	+0·078	+0·080	+0·070	+0·042	+0·025	+0·008	+0·008
11	+0·011	+0·028	+0·060	+0·022	+0·083	+0·100	+0·104	+0·102	+0·082	+0·060	+0·027	+0·022
Noon.	+0·031	+0·045	+0·084	+0·070	+0·110	+0·123	+0·114	+0·127	+0·115	+0·088	+0·040	+0·033
1 P.M.	+0·054	+0·058	+0·100	+0·132	+0·126	+0·137	+0·119	+0·142	+0·131	+0·109	+0·050	+0·046
2	+0·059	+0·065	+0·106	+0·151	+0·125	+0·135	+0·123	+0·145	+0·132	+0·113	+0·054	+0·048
3	+0·048	+0·065	+0·104	+0·147	+0·118	+0·123	+0·121	+0·138	+0·126	+0·108	+0·047	+0·036
4	+0·036	+0·053	+0·087	+0·128	+0·108	+0·113	+0·111	+0·120	+0·103	+0·089	+0·032	+0·024
5	+0·021	+0·032	+0·063	+0·110	+0·091	+0·099	+0·095	+0·100	+0·071	+0·055	+0·018	+0·013
6	+0·007	+0·009	+0·038	+0·088	+0·074	+0·078	+0·062	+0·071	+0·044	+0·030	+0·005	+0·004
7	−0·005	−0·010	+0·010	+0·059	+0·052	+0·049	+0·025	+0·036	+0·009	+0·007	−0·005	−0·003
8	−0·014	−0·023	−0·010	+0·020	+0·022	+0·010	−0·015	0·000	−0·015	−0·011	−0·012	−0·005
9	−0·016	−0·029	−0·032	−0·030	−0·018	−0·025	−0·040	−0·038	−0·040	−0·025	−0·017	−0·007
10	−0·019	−0·030	−0·048	−0·058	−0·050	−0·060	−0·068	−0·067	−0·058	−0·039	−0·020	−0·008
11	−0·018	−0·036	−0·060	−0·080	−0·075	−0·085	−0·080	−0·085	−0·071	−0·048	−0·020	−0·009

The sign + denotes that the number is to be added, and the sign − denotes that the number is to be subtracted.

When evaporation commences in the morning with the increase of temperature, the vapour seems to accumulate on the surface of the soil, till the air in its vicinity becomes heated, and the daily ascending current of air commences. It seems likely that this stratum of vapour neither attains a great thickness nor spreads upwards till the ascending current takes place, and that it ascends and spreads as long as the ascending current continues.

In summer time, between the hour of noon and that of the maximum temperature of the air, the temperature of the dew-point remains nearly stationary*, and the degree of humidity becomes less in value notwithstanding that evaporation is the most rapid. It is evident, therefore, that all the water evaporated must at once pass upwards. The strength of the ascending current of air being at a maximum at the same time that the stream of vapour is the most rapid, it would seem that the rapidity of motion of the latter is dependent on the former. Towards the evening hours, when the temperature of the air is decreasing rapidly, the ascending current will decrease in force, and ultimately cease altogether, giving place to the descending current of night; then the vapour again accumulates on the surface of the earth, not only from evaporation, but also from the vapour flowing down with the descending current, the air more and more nearly approaches to a state of saturation, and the degree of humidity of the air arrives at its maximum.

* See remarks following Table VIII.

Therefore, there is a rapid increase of vapour and decrease of the degree of humidity during the day, and a rapid diminution of vapour and increase of the degree of humidity during the evening and night hours. These remarks are to be understood to apply to a point at the height of four feet only from the earth.

At present I cannot give any information relative to the distribution of vapour at distances greater than four feet. However, from the fact, that whilst evaporation is the most rapid, the air at the height of four feet becomes relatively drier than it would be in consequence of the increase of temperature alone, it is plain that much vapour must pass upwards.

In the higher strata of the atmosphere the changes of temperature are less than in the lower strata; and at a point not very distant from the earth, but varying in different seasons, the temperature must be stationary during the twenty-four hours of the day; we may readily infer that at a certain point above the earth, the air becomes relatively more moist during the course of the day whilst the ascending current continues, and less so at night whilst the vapour flows downwards with the descending current; being exactly the reverse of the facts which take place at the height of four feet. At some certain point above the earth, the temperature of the dew-point, like that of the air, must be stationary during the twenty-four hours of the day. Observations to determine the absolute quantity of water mixed with the air, and the relative humidity at different distances from the earth, are much needed.

TABLE XII.—Showing the corrections to be applied to the weight of a cubic foot of air, under the average temperature, humidity and pressure, at any hour, to deduce the true weight for the month from the observations taken at that hour.

Local mean time.	January.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
	gr.	gr.	gr.	gr.	gr.	gr.	gr.	gr.	gr.	gr.	gr.	gr.
Midnight.	−0·5	−1·7	−2·7	−5·3	−5·3	− 6·1	−5·1	−5·1	−4·2	−2·9	−1·8	−1·0
1 A.M.	−1·1	−2·0	−3·0	−6·0	−5·9	− 7·7	−5·8	−6·2	−5·2	−3·1	−1·7	−1·4
2	−1·6	−2·0	−3·2	−6·6	−6·5	− 9·0	−6·4	−6·5	−5·6	−3·5	−1·8	−1·5
3	−1·8	−2·2	−3·5	−7·1	−7·1	−10·0	−6·8	−6·8	−6·0	−3·8	−1·8	−1·7
4	−2·0	−2·3	−3·7	−7·6	−7·1	−10·1	−7·0	−7·0	−6·2	−4·0	−2·0	−1·6
5	−2·0	−2·5	−3·7	−7·7	−6·9	− 8·9	−6·7	−6·9	−6·0	−4·0	−1·9	−1·6
6	−2·0	−2·5	−3·7	−6·5	−5·5	− 6·5	−5·0	−5·9	−4·9	−3·8	−2·0	−1·6
7	−1·9	−2·5	−3·4	−4·5	−3·0	− 3·5	−2·7	−3·9	−3·0	−3·4	−2·0	−1·6
8	−1·7	−2·0	−2·5	−2·3	−0·7	− 0·0	−0·3	−1·0	−0·5	−2·5	−1·6	−1·5
9	−1·1	−0·9	−0·4	+0·3	+1·7	+ 2·4	+1·9	+1·5	+2·4	−1·0	−0·7	−0·9
10	−0·2	+0·4	+1·7	+2·6	+3·8	+ 4·5	+4·0	+3·7	+4·7	+1·5	+0·6	+0·1
11	+1·3	+1·8	+3·6	+5·4	+5·7	+ 6·2	+5·8	+5·9	+6·4	+4·0	+2·0	+1·5
Noon.	+2·4	+3·3	+5·2	+7·8	+7·2	+ 7·7	+7·3	+7·3	+7·5	+5·8	+3·5	+2·6
1 P.M.	+3·1	+4·4	+6·1	+9·3	+7·9	+ 8·7	+8·3	+8·1	+8·0	+6·6	+4·3	+3·1
2	+3·3	+5·2	+6·1	+9·2	+8·3	+ 8·8	+8·4	+8·3	+7·8	+6·6	+4·3	+3·1
3	+3·0	+5·0	+5·5	+8·7	+8·2	+ 8·8	+8·3	+8·0	+6·9	+6·1	+3·8	+2·7
4	+2·4	+3·8	+4·5	+7·5	+7·3	+ 8·2	+7·4	+6·8	+5·5	+4·9	+2·7	+1·7
5	+1·6	+2·5	+3·2	+5·8	+5·5	+ 6·8	+5·7	+5·1	+3·8	+3·3	+1·5	+1·1
6	+0·8	+1·2	+1·7	+4·0	+3·5	+ 4·5	+3·0	+3·0	+1·8	+1·7	+0·6	+0·6
7	+0·4	+0·4	0·0	+1·8	+1·1	+ 1·5	+1·8	+1·0	−0·2	+0·4	−0·3	+0·2
8	+0·1	−0·4	−1·1	−0·5	−1·0	− 0·5	0·0	−1·0	−1·5	−0·7	−1·0	−0·2
9	0·0	−1·2	−1·7	−2·3	−2·7	− 2·5	−1·8	−2·8	−2·4	−1·5	−1·4	−0·5
10	−0·1	−1·5	−2·4	−3·6	−4·3	− 4·0	−3·3	−4·0	−3·3	−2·0	−1·6	−0·7
11	−0·4	−1·9	−2·8	−4·7	−5·2	− 5·0	−4·4	−5·0	−4·1	−2·7	−1·8	−0·9

The sign + denotes that the number is to be added, and the sign − denotes that the number is to be subtracted.

It was a matter of considerable interest to determine the extent of country to which these corrections would apply, and to this purpose I have had recourse to the observations made at different parts of the country and furnished to the Registrar-General. Some of the results of this investigation I have already mentioned in the remarks following Table III. The general result was found to be, that for all places situated inland, the values contained in these tables may be adopted at once. For places situated near the sea the hygrometrical values may not be strictly true, but in the absence of any series of observations taken in these localities from which the corrections can be deduced, we must arrive at approximate mean values by means of the observations at the Royal Observatory at Greenwich. In the reduction of the observations for the Registrar-General I have so done; and I have found the tables to be of great assistance, not only in the reduction of the observations, but also in the detection of errors, and pointing out the place where such existed.

I have merely to remark that I have not formed tables of corrections for longer periods than a month, as the doing so would have extended this paper to a great length, and such can be readily formed from the tables themselves; neither have I spoken of the mean or other values, as I hope soon to have the honour of presenting to this Society some of the meteorological results deduced from the observations taken at the Royal Observatory between the years 1840 and 1845.

Greenwich, Feb. 10, 1848.