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SOME PRESSURE AND TEMPERATURE RESULTS FOR
THE GREAT PLATEAU OF SOUTH AFRICA.

By J. R. SUTTON, M.A. (Cantab.).

(Communicated April 24, 1901.)

The accompanying notes were begun during 1897. The intention was to make them serve as an introduction to an inquiry of a physical rather than a climatological character. But their aggregate magnitude has increased step by step along a divergent direction, until it seemed better to present them as a separate paper, leaving the other matter for a future communication.

In its present form the paper contains the preliminaries of an attempt to make a systematic comparison between the temperatures and pressures of the air over a plateau and corresponding coast station (on much the same lines as the comparisons which are made between the summit and base of a mountain), at two of the most favourable geographical positions it is possible to combine, and with what are perhaps the best materials ever used for the purpose in South Africa. Plateau meteorology has a special interest all its own. Observations taken upon the summit of an elevated peak are important, because they tell us roughly something of the conditions prevailing in the free air at the same altitude, albeit balloons and kites give results which are superior in every way, excepting that continuity and regularity are not yet possible. Balloons or mountains, however, tell us only of the air: this great South African plateau gives us something more than a rough notion of what the climate of a great portion of the earth's surface will be like in ages to come, when the cooling earth has absorbed a considerable volume of its liquid envelope.

The stations referred to are Kimberley and Durban. The Kimberley results, given in Tables 13-24, are from the observations taken by the late Mr. G. J. Lee, F.R.Met.S., at his own second order station, with instruments that were very good of their kind, and nearly all properly certified at Kew. These instruments are now deposited at Kenilworth (Kimberley), and, with the exception of the wet bulb,

compare excellently with the observatory standards there. Few gaps appear in the Lee register: scarcely any in earlier years, and not many in later years when the observer's advancing age might have excused them. Necessary interpolations have been made whenever possible from the Kenilworth records. The site of the station was not good, nor was the exposure of the thermometers all that could be desired. The thermometers were mounted on a modified Glaisher stand, and consequently the maximum shade temperatures, particularly in the summer, were somewhat too high; the minimum shade temperatures, particularly in the winter, being correspondingly too low. The wet bulb being found erroneous has, unfortunately, prevented the inclusion of a moisture comparison between the two places. The barometer—a Fortin, with adjustable cistern, by Negretti and Zambra—was kept in good order and hung in a good place. It may be fairly claimed that until the establishment of the first-class meteorological station at Kenilworth, some three miles from Kimberley, no better series of observations of temperature and pressure, probably none nearly so good, has ever been made in Cape Colony north of the Hex River.

The Durban observations, summarised in Tables 1–12, are taken from the Annual Reports of the Astronomer to the Government of Natal. Their quality appears to be exceptionally good. One observation only has been missed throughout the period considered. The instruments, and method of using them, will be found fully described in the same publications.

The order in which the results appear is as follows:—

Tables 1–12 give the daily mean temperatures and pressures of the air at Durban for the ten years 1888 to 1897 arranged in the following way:—

Opposite each date in the first column will be found values of—

M, the mean maximum temperature of the day;

m , the mean minimum temperature of the day;

$M - m$, the mean range of temperature;

$\frac{M + m}{2}$, the mean of the readings of the maximum and minimum

thermometers equal roughly to the mean temperature of the day;

M' , the highest temperature observed in the ten years upon the date of the same line;

m' , the lowest temperature observed in the ten years;

($M +$), the number of times the maximum temperature has exceeded the mean maximum temperature of the day;

($M =$), the number of times the maximum temperature has equalled the mean maximum temperature of the day;

(M -), the number of times the maximum temperature has fallen short of the mean maximum temperature of the day;

(M +), (m =), (m -), the number of times respectively upon which the minimum temperature has exceeded, equalled, or fallen short of the mean minimum temperature of the day;

In the next six columns M_3 and m_3 give values of M and m in trihemera, the values entered opposite January 3rd, for example, being the mean values for January 1, 2, 3;

P, the mean barometric pressure of the day, reduced to mean low-water sea-level, from readings taken at IX. and XV. o'clock N.M.T.;

MP, the highest pressure observed upon the date in ten years;

mP, the lowest pressure observed;

P_3 , MP_3 , mP_3 , trihemerial values of P;

(P +), (P =), and (P -), the number of times upon which the pressure was respectively above, equal to, or less than the mean pressure of the day.

Tables 13-24 give the corresponding **Kimberley** temperatures for the same period; but the Kimberley barometric pressures are available for eight years only, commencing in 1890. These are for the hours VIII. and XX. C.M.T.

Monthly and yearly summaries of Tables 1-24 are given in Table 25.

The successive values of M'_3 , M_3 , $\frac{M_3 + m_3}{2}$, m_3 , and m' are depicted in Fig. 1, for both Durban and Kimberley; and of MP_3 , P_3 , and mP_3 for Durban in Fig. 2. In Fig. 2 also the curve P_3 , only, for Kimberley is drawn below that for Durban and to the same scale, but *plus* 3.9 inches.

The mean pressure curves of the two places are practically identical in shape, the mean daily differences being something over 4 inches throughout the year with certain minor periods of approach and recession to be more fully referred to later on. The variations from the mean curve are, however, much greater at Durban, the extreme range in the eight years, 1890-97, being from 29.518 inches to 30.801 inches, *i.e.*, 1.283 inches, as compared with an extreme range at Kimberley from 25.665 inches to 26.508 inches, *i.e.*, 0.843 inch. The Durban readings, however, are timed to give almost the greatest range possible. Readings taken at Kimberley at IX. and XV. would give a mean daily range of about 0.04 inch more than those taken at VIII. and XX., and most likely an extreme range considerably greater.

The principal general differences between the temperature curves

of the two places are just such as would be expected from the contrast of continental and coast stations: the mean daily temperature ranging from $44^{\circ}6$ (July 17th) to $80^{\circ}2$ (Dec. 28th) at Kimberley; and from $62^{\circ}0$ (July 17th) to $79^{\circ}2$ (Jan. 27th) at Durban—or rather less than one-half the other. The respective ranges from the lowest mean daily minimum to the highest mean daily maximum are—

At Kimberley from $32^{\circ}1$ (July 17th) to $98^{\circ}4$ (Dec. 28th),
At Durban from $51^{\circ}7$ (July 18th) to $90^{\circ}4$ (Jan. 27th).

For the extreme range of temperature observed in the whole ten years, we have: at Kimberley $20^{\circ}0$ to $108^{\circ}5$ —the latter occurring in the midst of what would appear to be an annual wave of high maximum temperature at the end of January—and at Durban $42^{\circ}3$ to $110^{\circ}6$, the latter in a hot wind of the spring months.

By suitably choosing the scales on the paper it will be easily seen that the maximum temperature curve for Kimberley is almost identically the same as the mean pressure curves, inverted, for both Kimberley and Durban, either, as it happens, following closely upon the sun's changes of declination. An approximate formula for the relationship in inches and degrees Fahr., is—

$$100p + t = 0$$

where p is the total increase of pressure and t the total increase of temperature reckoned from any epoch.

The Durban temperatures lag very considerably behind those of Kimberley, in the summer months at any rate, and have no simple relationship to the collateral pressures. This is doubtless brought about by the vicinity of the ocean, and to a smaller extent by the greater quantity of vegetation, the moisture of the air along the Natal coast, and by the greater cloudiness of the sky. Clouds, generally speaking, prevent loss of temperature during the night in proportion to the area of blue sky hidden, and up to a certain limit—which does not, apparently, differ greatly at Kimberley from 50 per cent. of sky obscured—assist the rise of temperature during the day. Below this limit they admit more direct heat from the sun than they allow to radiate from the earth, but in a less and less degree as the sky is less cloudy; above it the quantity of heat admitted bears a less and less proportion to the amount checked in its radiation. Moreover, apart from the influence of the clouds, *i.e.*, the humidity of the upper air, the influence due to the amount of moisture, or rather the humidity, of the lower air is greater than one would expect at first, although Tyndall's "fairly tales," as Prof. Callendar calls them, would not

altogether carry conviction, so far as can be seen at present, to the child of science who had seen meteorology at Kimberley.

It is to be regretted that the very important question of the moisture, or humidity, of the atmosphere of the two places does not admit of comparison, for its importance is not second to that of temperature and pressure. In Table 25, however, additional columns are inserted giving the amount of cloud month by month at Durban and Kimberley from one observation per diem at both places; also the moisture at Durban from observation at IX. and XV., and the humidity at Kimberley from observations at VIII. The Kimberley results for cloud and humidity are extracted from the annual reports of the Meteorological Commission, monthly numbers only being available: they must be regarded as very rough, although the deduced hygrometric state of the air is nearer to the truth than that obtained by the Lee wet bulb. The Natal reports give the temperatures at IX. and XV., and the mean moisture of the same two hours expressed in grains per cubic foot; but the wet bulb, dew-point, and humidity are omitted: the want of the first making the exact determination of the two latter a task of extreme difficulty and labour—almost an impossibility. It will be seen that the greatest cloudiness of the sky at Durban occurs during the five months Oct.–Feb., jumping at once to its maximum in October, and gradually falling off through the season, whereas the moisture of the lower air attains its maximum in the four months, Dec.–March. It is during these last months, it will be remembered, that N.E. winds prevail over Kimberley.* At Kimberley, on the other hand, there is an abortive increase in the cloudiness of the sky in October, the maximum not definitely establishing itself until the first quarter of the year. Some consequences of these changes will be seen when we come to the variations in the range of temperature later on.

The shape of the temperature curves in Fig. 1 obviously suggests that their irregularities may be best smoothed out by means of some simple sine curves. As a first approximation the equation—

$$y = \frac{R}{2} \sin x + T \dagger$$

* See “The Winds of Kimberley” (*Trans. of the Phil. Soc. of S. Africa*, vol. xi. pp. 75–112).

† “Playfair, following the steps of Kirwan, . . . endeavoured to create a formula which should enable him to approximate to the mean temperature of any day. This formula is the following;—

$$y = T + F \sin (\lambda - 30)$$

in which T denotes the mean temperature of the given place, F a constant coefficient

will be found of service to the curves of either maximum, mean, or minimum,

y being the temperature of any day required ;

R the mean range of the curve ;

T the mean value of the curve ; and

x the angular distance reckoned from the day whose mean temperature (maximum, mean, or minimum) is also the mean of the year.

For Durban, we have :—

$$y = M = (4.8) \sin x + 80.6$$

$$y = \frac{M + m}{2} = 6 \sin x + 71.2$$

$$y = m = (7.3) \sin x + 61.8$$

the angles x being reckoned from near Oct. 31st, Oct. 24th, and Oct. 16th, respectively.

For Kimberley we have :—

$$y = M = (14.7) \sin x + 79.3$$

$$y = \frac{M + m}{2} = 13 \sin x + 64.5$$

$$y = m = (12.1) \sin x + 49.8$$

the angles x being reckoned from near Sept. 20th, Sept. 28th, and Oct. 4th, respectively.

The smooth curves derived from these formulæ are plotted on Fig. 1, from the calculated values of y found in Table 26. The retardation of the minimum curve for Durban is easily seen, and even more so the retardation of all the three curves for Kimberley. It is significant, and may indicate some interaction of climatic conditions between the coast and interior that the maximum temperature at Durban lags as much behind the minimum as the minimum temperature at Kimberley lags behind the maximum. Taking the numbers from Table 26 for example, the greatest value of M at Durban is $85^{\circ}.4$ on Jan. 31st, the greatest value of m being $69^{\circ}.1$ on Jan. 16th. But at Kimberley the greatest value of M is $94^{\circ}.0$ on Dec. 20th, the greatest value of m being $61^{\circ}.9$ on Jan. 4th. Again,

determined by observation, λ the mean longitude of the sun computed from the first of Aries, for any day of the year, the mean temperature of which is y (Harvey, Art. "Meteorology," *Ency. Metr.*, 1845). The formula, however, was not very successful, the errors in some places approaching 4° F. as compared with the mean daily temperatures of Stockholm derived from fifty years' observations.

and still more curiously, the mean date of the greatest maximum for Durban and Kimberley together is Jan. 10th—*i.e.*, half-way between Dec. 20th and Jan. 31st—which is also, as it happens, the very mean date of greatest minimum—*i.e.*, half-way between Jan. 4th and Jan. 16th. And here it is only fair to state that this neat result was only detected after Table 26 was fully complete, so that the dates were not “cooked” to bring it about.

But perhaps the most useful application of the sine formula will be to the differences of mean minimum temperature, Durban *minus* Kimberley. Here it takes the shape—

$$y = - (5.4) \sin x + 12,$$

the angles being reckoned from near the end of September; nor does it differ anywhere by more than a few tenths of a degree from the observed differences. The value of so simple a connecting link, if only as an aid to memory, between the meteorological elements of the two places will be readily recognised. The calculated values, reckoned from just after the equinox, are given in Table 27. The corresponding calculated differences of mean and maximum temperature having no special exactitude are not thought worth insertion.

Lambert's formula is commonly used when it is required to smooth out the irregularities of temperature or other meteorological curves to any great degree of exactitude. It is—

$$\begin{aligned} a = p + p_1 \cos \frac{\pi}{n} + q_1 \sin \frac{\pi}{n} + p_2 \cos \frac{2\pi}{n} \\ + q_2 \sin \frac{2\pi}{n} + p_3 \cos \frac{3\pi}{n} + q_3 \sin \frac{3\pi}{n} + \dots \end{aligned}$$

in which a is the required temperature, or whatever it may be, and $p, p_1, p_2, \dots, q_1, q_2, q_3, \dots$ constants to be determined. When a is the maximum, minimum, or mean temperature of any month, p is the mean yearly value, and p_1 approximately one-half the yearly range — corresponding, that is, to the T and $\frac{R}{2}$ used in the simple sine curve above.

Putting $n = 12$ and solving Lambert's equation by the method of least squares, we get the coefficients as in Table 28. The pressure numbers have also been added. But if

$$\begin{aligned} p_1 &= u_1 \sin V_1 \\ q_1 &= u_1 \cos V_1, \text{ \&c.,} \end{aligned}$$

we get Bessel's formula—

$$a = p + u_1 \sin \left(V_1 + \frac{\pi}{n} \right) + u_2 \sin \left(V_1 + \frac{2\pi}{n} \right) \\ + u_3 \sin \left(V_3 + \frac{3\pi}{n} \right) + \dots$$

which is sometimes thought to be more advantageous than the formula of Lambert.* For the different elements it becomes :—

1. For the monthly maximum temperature at Durban—

$$a = 80^{\circ}6 + 5\cdot056 \sin (77^{\circ} 12\cdot8' + t) \\ + 0\cdot4916 \sin (48^{\circ} 14\cdot3' + 2t) \\ - 0\cdot3934 \sin (36^{\circ} 22\cdot6' + 3t) \\ + 0\cdot1833 \sin (270^{\circ} + 4t) + \dots$$

2. For the monthly mean temperature at Durban—

$$a = 71^{\circ}2 + 6\cdot144 \sin (80^{\circ} 50\cdot2' + t) \\ + 0\cdot769 \sin (2^{\circ} 29' + 2t) \\ - 0\cdot267 \sin (360^{\circ} + 3t) \\ + 0\cdot087 \sin (360^{\circ} + 4t) + \dots$$

3. For the monthly minimum temperature at Durban—

$$a = 61^{\circ}8 + 6\cdot964 \sin (84^{\circ} 4\cdot6' + t) \\ + 1\cdot289 \sin (324^{\circ} 51\cdot5' + 2t) \\ - 0\cdot240 \sin (33^{\circ} 41' + 3t) \\ + 0\cdot242 \sin (333^{\circ} 25' + 4t) + \dots$$

4. For the monthly mean pressure at Durban—

$$a = 30\cdot105 \text{ inches} + 0\cdot1174 \sin (273^{\circ} 7\cdot7' + t) \\ + 0\cdot0097 \sin (62^{\circ} 27\cdot7' + 2t) \\ + 0\cdot0065 \sin (309^{\circ} 48' + 3t) \\ - 0\cdot0107 \sin (315^{\circ} 34' + 4t) + \dots$$

5. For the monthly maximum temperature at Kimberley—

$$a = 79^{\circ}3 - 14\cdot775 \sin (290^{\circ} 12' + t) \\ + 1\cdot604 \sin (319^{\circ} 6\cdot4' + 2t) \\ - 0\cdot232 \sin (21^{\circ} 1\cdot6' + 3t) \\ - 0\cdot259 \sin (26^{\circ} 48\cdot7' + 4t) + \dots$$

* Kaemtz, "On the deduction of mean results from meteorological observations" (*Quarterly Journal of the R. Met. Soc.*, vol. iii. p. 120; also E. E. Schmid, *Lehrbuch der Met.*, p. 8).

6. For the monthly mean temperature at Kimberley—

$$\begin{aligned} a = & 64^{\circ}5 - 13.365 \sin (283^{\circ} 15' + t) \\ & + 1.626 \sin (318^{\circ} 13' + 2t) \\ & - 0.271 \sin (42^{\circ} 30' + 3t) \\ & - 0.159 \sin (24^{\circ} 48' + 4t) + \dots \end{aligned}$$

7. For the monthly minimum temperature at Kimberley—

$$\begin{aligned} a = & 49^{\circ}8 - 12.162 \sin (272^{\circ} 6' + t) \\ & + 1.724 \sin (318^{\circ} 54' + 2t) \\ & - 0.247 \sin (61^{\circ} 14.6' + 3t) \\ & - 0.148 \sin (347^{\circ} 0.3' + 4t) + \dots \end{aligned}$$

8. For the monthly mean pressure at Kimberley—

$$\begin{aligned} a = & 26.055 \text{ inches} + 0.1132 \sin (285^{\circ} 26.5' + t) \\ & - 0.0070 \sin (330^{\circ} + 2t) \\ & + 0.0087 \sin (275^{\circ} 29.4' + 3t) \\ & - 0.0052 \sin (343^{\circ} 18' + 4t) + \dots \end{aligned}$$

Although Lambert's and Bessel's formulæ represent the facts of observation with remarkable accuracy, the simple sine curve, because it is less cumbersome, is advantageous when, searching for analogies, we wish to roughly compare different curves together, say, for example, the temperatures of Durban with those of Kimberley. Neither, however, has any actual physical basis, or involves the effecting agencies any more than p , q , and a , in Lambert's equation, applied to the path described by an inebriate would have anything to do with pints and quarts or the price of alcohol. The variable in each case, x , or π/n , or t , depends upon the sun's Right Ascension. The seasons depend almost entirely upon the sun's Declination. Right Ascension and Declination, it is true, vary together, but in such a totally different manner that the changes of temperature have no proportion to the sun's angular velocity. In fact, of the two only the Declination needs to appear in any physical formula dealing with the supply of heat received from the sun. This, manifestly, does not imply that such a formula is easy to discover. Indeed it is not; the diversity of condition prevailing over the earth's surface: land and water, garden and desert, acting and reacting upon the heat received; weather not being made where it is used; and so forth—all help to order it otherwise. Thus we are, in general, content to accept the purely mathematical equation to a curve drawn on paper in the place of a formula based upon natural phenomena.

The rise of temperature during the day depends mainly upon radiation from the sun ; the fall during the night depends mainly upon radiation from the earth. Leaving the latter for future discussion, let us consider the course of the former as given in the daily and monthly averages. At the outset we detect the fact, differentiating Kimberley from most places in other countries, that the greatest and least values of the maximum temperature curve for Kimberley are nearly synchronous with the solstices. This suggests some possible simplification of the difficulties that otherwise might reasonably have been expected in the framing of a formula involving some direct function of the Declination. It is a legitimate argument, *a priori* that

$$y = A \cos Z + B ;$$

where y is the required daily average maximum temperature ;

A a constant defining the amplitude of the curve ;

B the distance from the base line of reference ;

Z the sun's zenith distance.

Applying the equation, as a test, to the Kimberley maximum values, we find—

$$y = 79 \cos Z + 14$$

a very good approximation to the observed facts—much better in every way than the simple sine curve.

The philosophy of this formula is evidently based upon the law that the quantity of heat falling upon any given surface for a given time will vary as the cosine of the inclination of the incident rays to the normal. But there is a factor, not to be neglected, arising out of the eccentricity of the earth's orbit. The sun's distance changes, being greatest early in July and least in January, and the amount of solar heat intercepted by the earth's full disk is less or greater accordingly. The sun's apparent area varies inversely as the square of its distance ; the solar heat and light received also vary inversely as the square of the same distance ; the quantity of heat received, then, at any time will be in proportion to the sun's apparent area. This last, multiplied by some suitable constant, we shall for the present call the heat coefficient, and denote by S^2 . The formula therefore takes the amended form—

$$y = AS^2 \cos Z + B,^*$$

* Compare L. W. Meech, "On the relative intensity of the Heat and Light of the Sun upon different latitudes of the earth" (*Smithsonian Contributions to Knowledge*). He argues thus:—

in which y , A, B have the same meaning as before, though in general different values. Approximate values of A and B are $73^{\circ}4$ and $22^{\circ}8$ respectively.

In Table 29 will be found the successive steps of the computation for the average maximum temperatures of Kimberley on or about the middle day of each month, the sun's Declination and semi-diameter being taken from the *Nautical Almanac*. The values of y thus determined are marked in ring dots (thus $\odot$) on Fig. 1. They evidently average a little higher in the spring months than the observed temperatures, for which, in all probability, the retardation of the minimum, on account of the cold wave of July, is responsible. The last column of Table 29 gives the numerical differences between the values of y for the middle day of each month and the mean monthly maximum temperatures, calculated *minus* observed, assuming—not quite accurately—that the latter is the same as the average maximum temperature of the middle day of the month.

In Table 30 is given some comparison values for Bloemfontein and Aliwal North, the respective conditions being :—

1. Bloemfontein—

$$\begin{aligned} \text{S. Lat. } 29^{\circ} 7' \\ y = 55^{\circ}8 \text{ S}^2 \cos Z + 33^{\circ}5. \end{aligned}$$

2. Aliwal North—

$$\begin{aligned} \text{S. Lat. } 30^{\circ} 41' \\ y = 53^{\circ} \text{ S}^2 \cos Z + 33^{\circ}6. \end{aligned}$$

The temperature numbers for both the stations are averaged from

Let L = the "apparent" latitude of the place,
D = the sun's meridian declination,
 Δ = the sun's semi-diameter,
A = the sun's altitude, and
H = the hour-angle from noon.

Then, generally, $\Delta^2 \sin A$ expresses the sun's intensity at any given instant during the day; and we have—

$$\Delta^2 \sin A = \Delta^2 (\sin L \sin D + \cos L \cos D \cos H).$$

Meech observes upon this result that it is "strictly true only at the exterior of the atmospheric envelope which encompasses the globe, or at the outer limit where matter exerts its initial change upon the incident rays." But there is every reason to suppose that the formula is more nearly true than would have been admitted at the time when this opinion was written (1855), or else that the table-land of South Africa is near the "outer limit." Writers generally have mistakenly applied formulæ involving the heating power of the sun to the determination of mean temperatures. Logically they can only be used for maxima.

the monthly results published by the Meteorological Commission in Cape Town.

Theory and practice are contrasted in Table 31, by comparing the calculated monthly changes of temperature with those observed for Kimberley, Bloemfontein, and Aliwal, separately and together. The chief deviations occur Nov.–Dec., and June–July, the observed variation being in the one case $1^{\circ}9$ greater, and in the other $1^{\circ}7$ less. The other deviations are not important, and the gradients are remarkably similar. Annual hot and cold periods seem to account in the main for such differences as do occur.

We gather from the close agreement between theory and observation how quickly the table-land of South Africa becomes heated by the sun's rays and how few of the rays it stores up. There is little resistance to or accumulation of heat at any time. Accepting for the present this responsiveness of the air to the action of the sun, we have now to face the curious and, at first sight, contradictory fact that the diurnal range of temperature at Kimberley is pretty well as great in winter as in summer, whereas, during the day at any rate, we should expect the winter range to be much less. For at the end of December and beginning of January the sun increases its altitude between VII. and Noon by fully 61 degrees of arc, but only by 37 degrees between the same hours at the beginning of July. Now taking the mean daylight temperatures during December and January to be the mean daylight temperature of December 31st or January 1st, we should, if the cosine formula applies to this special case, expect a rise of temperature between VII. and Noon of some 42° . The actual rise from VII. to the maximum (which occurs about 1h. 20m. p.m.) is on the contrary only 19° . Again about July 1st the calculated rise would be 39° , whereas the rise to maximum (which occurs about 2h. 35m. p.m.) is 27° —assuming, of course, that the initial temperature at sunrise is independent of any previous solar heat. If we calculate new values of A and B in the cosine formula, by considering only the rise of temperature to Noon, we shall get for the hourly rate of change—

$$\text{Winter} \quad \eta = 45^{\circ}5 S^2 \cos Z + 36^{\circ}1$$

$$\text{Summer} \quad \eta = 31^{\circ}4 S^2 \cos Z + 55^{\circ}8;$$

or by considering the rise of temperature to maximum :—

$$\text{Winter} \quad \eta = 51^{\circ}3 S^2 \cos Z + 36^{\circ}0$$

$$\text{Summer} \quad \eta = 33^{\circ}6 S^2 \cos Z + 55^{\circ}0.$$

In Table 32 will be found the result of the computation using the first of the two sets of coefficients :—

- Col. 1 gives the hours ;
Col. 2 the corresponding values of Z , the sun's zenith distance, obtained from the spherical equation—

$$\cos c = \cos a \cos b + \sin a \sin b \cos C ;$$

- Col. 3 the values of y for the respective winter and summer values of the coefficients for daily range of temperature ;
Col. 4 the values of y when A and B have their annual values ;
Col. 5 the temperatures hour by hour from the Kenilworth (Kimberley) records. These, it must be remembered, are not for the same years as the Kimberley temperature numbers used generally throughout this paper ; nor if the years were the same would they be quite the same as the Kimberley hourly temperatures. They must serve, nevertheless, because no hourly temperatures had ever been taken in Kimberley.

According to this Table the hourly differences between the observed and calculated temperatures are appreciably the same at the same hours in both summer and winter. In other words, the average hourly increase of temperature to noon in summer is to that in winter in the approximate ratio of 314 to 455. This greater winter rate of increase, together with the previous results elicited, may prove that the power of the sun to warm the air is limited, and that if it were to stand in the midst of heaven for any length of time the temperature over the table-land would not necessarily reach any very high degree. We see, for example, that when its zenith distance decreases from $66^{\circ} 37'$ to $53^{\circ} 44'$ (arc) it can raise the temperature from $67^{\circ} 7$ by $4^{\circ} 6$; but when its zenith distance decreases from $67^{\circ} 31'$ to $53^{\circ} 45'$ it can raise the temperature from $49^{\circ} 4$ by $9^{\circ} 5$. Also at the equinoxes a decrease of zenith distance from $64^{\circ} 0'$ to $51^{\circ} 32'$ will accompany a rise in the temperature of $5^{\circ} 2$ from $62^{\circ} 2$. Otherwise by taking averages we have a mean rise of temperature per 12 degrees decrease of zenith distance as follows :—

Summer.....	$4^{\circ} 3$ from $67^{\circ} 7$
Equinox.....	$5^{\circ} 0$ „ $62^{\circ} 2$
Winter	$8^{\circ} 0$ „ $49^{\circ} 4$.

By measuring initial temperatures horizontally to the right, and average increase per 12 degrees of zenith distance vertically upwards (*i.e.*, using rectangular axes) we get three points on some plane curve. Also the three equations—

$$4.3 (67.7 - x) = Q$$

$$5.0 (62.2 - x) = Q$$

$$8.0 (49.4 - x) = Q$$

are all nearly satisfied when $x = 28.1$. Whence it follows that the three points lie upon a rectangular hyperbola,* one of whose asymptotes is the line of initial temperatures, and the other the line $x = 28.1$: That is upon the rectangular hyperbola—

$$t(T - 28.1) = 170.4,$$

where T is the initial temperature, and t the rise of temperature. It is curious that the numerical value of the equation is just about the highest temperature likely to be registered at Kimberley by a black bulb *in vacuo* on a fairly clear day at the end of December.

So far as can be ascertained from the as yet limited materials, the corresponding values for other months, lying between the solstices and equinoxes, are points upon the same hyperbola. Yet it would be exaggerating the evidence to consider the asymptotic nature of our temperature changes demonstrated; because, for one thing, the Kenilworth hourly temperatures are read only at the whole hours, and thus it is not easy always to select periods in which an average rise of temperature can be estimated, for a decrease of zenith distance by 12 degrees, from somewhere near 65 degrees.

Again, the equation is not generally true for temperatures falling outside the Kimberley limits. For imagine a still more elevated table-land whereon we might happen upon an initial temperature $T = 28.1$ for a solar zenith distance of about 65 degrees. This would clearly make t infinite, which is as clearly impossible. Moreover, the equation would give a value of t —small it is true—for the largest assigned value of T short of infinity, which is as clearly unthinkable. Perhaps the explanation is that a similar formula, but with different constants, would apply elsewhere, within the observed limits of temperature, to furnish—if no more—a very useful mnemonical aid.

At Cordoba, for example, which lies in S. Lat. $31^{\circ} 24'$, and very nearly on the central meridian of South America, but otherwise having no great advantages of geographical position, we get the following increases of temperature for decreases of zenith distance by 12 degrees from somewhere near 65 degrees:

March	2°·25 C. from 18°·69 C.
June	4·36 „ 9·18
December	2·13 „ 19·79

Forming the equations as before, and solving by the method of least squares, we deduce the very accurate equation, in Centigrade degrees—

$$t(T + 0.943) = 44.154,$$

* C. Smith, *Conic Sections*, Art. 151. Casey, *Treatise on the Analytical Geometry of the Point, Line, Circle, and Conic Sections*, Sec. Ed., p. 269.

the smallest value of the equation being $44^{\circ}136$ C., and the greatest $44^{\circ}174$ C., as compared with an extreme error of $0^{\circ}1$ F. at Kimberley.

The only other hourly temperatures that have been tested in this way are for three (all that are available) incomplete years from Hong Kong in N. Lat. $22^{\circ}16'$. They surrender to the same treatment the equation, in Fahrenheit degrees,

$$t(T - 34.1) = 36.3,$$

but the errors amount to fully three-quarters of a degree—which might be accounted large for a place with such a small daily range of temperature, did the available observations cover a longer period.

At the least, whether the changes of temperature be exactly or only approximately asymptotic, we conclude that the air of the table-land responds to the solar energy the more vigorously the more it happens at any time to be found below its theoretical temperature for that concomitant altitude of the sun; and that the time it requires to attain to its highest temperature is a question rather of hours than of days. The great lagging at Durban of more than a month must be regarded as pre-eminently due to the adjacent ocean *per se*. As to the atmospheric moisture rising from the water, its effect is probably infinitesimal by comparison, whether it be condensed into clouds or not. Nor does the ocean domain, meteorologically speaking, end with the shore, as is attested by Tables 33 and 34, in which the monthly means of maximum and minimum air-temperature, extracted from the annual reports of the Cape Meteorological Commission, are given not in districts but in sets according to distance from the sea; and by Tables 35 and 36 giving the monthly means of temperature, and of range of temperature, deduced from 33 and 34. The periods of observation vary from ten to seventeen years. The respective latitudes, altitudes, and distances from the sea are given more or less accurately below:—

1. Coast Stations:—

	S. Latitude.	Altitude.	Distance from sea.
Durban	$29^{\circ}51'$	260 feet	$2\frac{1}{2}$ miles
East London.....	33 2	33 "	0 "
Port Elizabeth ...	33 58	181 "	0 "
Mossel Bay	34 11	105 "	0 "
Cape L'Agulhas	34 50	55 "	0 "
Simonstown	34 12	12 "	0 "
Average	$34^{\circ}2'$	64 feet	

2. Middle Stations :—

	S. Latitude.	Altitude.	Distance from sea.
Umtata	31° 35'	2,400 feet	35 miles
Queenstown ...	31 54	3,500 „	100 „
Somerset East...	32 44	2,400 „	70 „
Graaff-Reinet ...	32 16	2,500 „	123 „
Prince Albert ...	33 14	2,120 „	60 „
Worcester	33 40	771 „	50 „
Average	32° 34'	2,300 feet	73 miles

3. Table-Land Stations :—

	S. Latitude.	Altitude.	Distance from sea.
Kimberley	28° 43'	4,042 feet	340 miles
Bloemfontein ...	29 7	4,518 „	290 „
Aliwal North ...	30 41	4,330 „	180 „
Philippolis	30 13	4,700 „	235 „
Average.....	29° 41'	4,400 feet	261 miles

In the above list Durban should not properly be called a *coast* station, the observatory being two and a half miles from the sea—a distance which is pretty often quite enough to alter the type of temperature very sensibly. But it seemed better not to omit it, especially as its annual curves do not differ in character from those of the true coast stations.

In some respects Philippolis occupies a unique position : the lateness of the epoch of both its highest monthly maximum and minimum temperatures giving it Middle characteristics, yet showing full title to its position in the Table-Land set by reason of its early lowest maximum and minimum. But it has been included, although its meteorological history only runs back for nine years, chiefly because of the good quality of the observing, and next because of the lack of other material. Quite a half of Cape Colony is on the table-land, and as yet, unfortunately, the labours of the Meteorological Commission have only brought forth one complete register extending over a period exceeding ten years for a high level station. That being so, it is a distinct comfort to be able to cordially admit that the one register—for Aliwal North—is a good one.

Prince Albert belongs by reason of its altitude and distance from the sea to the Middle stations, but its meteorological elements seem to place it in a class intermediate between those and the Table-Land stations.

The numbers in 33-36 want little explanation. Their salient features only require a cursory inspection. We see that the highest mean maxima occur towards the end of December on the table-land ; from a fortnight to three weeks later on the lower land ; not appearing on the coast until the end of January. Again, on the table-land June is a little colder in the daytime than July ; on the lower land July is a little colder than June ; while on the coast July and August are both a good deal colder than June. In all the three sets of stations the difference of time between the highest and lowest maximum is just about six months. The average ranges of mean monthly maximum are—

Table-Land Stations	24°·3
Middle „	18°·4
Coast „	10°·9

In each set the highest and lowest monthly minima are reached a little later than the corresponding maxima, and are sufficiently pronounced to place the general highest mean temperature (*i.e.*, $\frac{1}{2}[M + m]$) of the whole country between the middle and end of January, and the lowest averages in July. But on the table-land July is very little colder at night than June, though much colder than August ; in the middle stations August is somewhat warmer than June ; while on the coast June is warmer than August. The average ranges of mean monthly minimum are—

Table-Land Stations	26°·4
Middle „	20°·6
Coast „	14°·2

The average annual ranges of monthly mean temperatures are—

Table-Land Stations	25°·0
Middle „	19°·4
Coast „	12°·5 *

The unlike influence of ocean and land upon the insolation and radiation to which the air is at any time subjected, is strikingly illustrated by the mean monthly range of temperature. Upon the table-land the curve is a simple one, having only a single maximum and minimum. The former comes in September, the latter in March. Bloemfontein and Aliwal North are almost identical, but Kimberley and Philippolis differ somewhat from them and from each other.

* The average temperature ranges of the middle stations are almost the same as the means of the averages of the coast and table-land.

The middle stations have also a minimum in March and also a second, much less pronounced, in the spring. The separate stations exhibit considerable variation among themselves, Worcester having the greatest range in the summer, while the others, on the whole, have theirs in the winter. The coast stations have a decided minimum range in February, and a smaller and, in some cases, abortive minimum in October. They are all alike in having the greatest range in winter, Simonstown excepted. At this station there is a third minimum, which also happens to be the greatest, and runs concurrently with that at Worcester, in the winter. Now Worcester and Simonstown are both in the Western Province, and their minimum winter range is no doubt a consequence of the greater rainfall, cloudiness, and humidity there at that season. The average annual ranges of monthly mean ranges of temperature are—

Table-Land Stations	7°·0
Middle ,,	3°·7
Coast ,,	3°·8

The results of the four Tables (33–36) seem to indicate that in the same way as the power of the sun to heat the air is limited by radiation, so is that same radiation limited (at night mainly) by the air's hygrometric condition. The curves of Fig. 3 suggest the conclusion perhaps better than the tabular numbers.

The influence of local surroundings is very clearly shown when we compare the temperatures of the different places with what some theory should indicate. The coast stations do not, for example, follow any simple cosine law in either their maxima, minima, or means of temperature. Neither do the various stations, when allowances have been made for latitude, conform to any law of decrease with altitude. Supposing the average in free air to hold good over South Africa, Prince Albert should have, approximately, a mean temperature $6\frac{1}{2}^{\circ}$ less than that of East London, instead of $4\frac{1}{4}^{\circ}$; Worcester nearly 2° less than Port Elizabeth, instead of 1° ; Bloemfontein about 13° less than Durban, instead of $9\frac{3}{4}^{\circ}$; and the Table-Land stations generally quite 5° less than that of the middle stations. The common reduction of temperature to sea-level, made with more or less (usually less) success in other countries, is therefore quite illusory here. We may conclude that the effect of the table-land is to reduce the fall by about one-third of its amount in free air, bringing it to, say, 1° in 440 feet. This is rather less than the rate (1° in 410 feet) connecting the temperatures of Mount Abu and Karachi, India, both near 25° N. Lat., at the respective altitudes of 3,945 feet and 49 feet,

and in a climate not differing greatly, excepting at midsummer, from that of the dry regions of South Africa. Between Kimberley and Durban, making every allowance for the difference of latitude, the fall is not quite a degree in 500 feet. The monthly comparison numbers for Mount Abu and Karachi are given below in Table 37.* Considered side by side with the comparison of Table 25 they are most instructive, Abu being a fairly typical isolated mountain, and its observatory standing at about the same elevation above Karachi as Kimberley, on its typical table-land, is above Durban.

We come now to the remarkable numbers tabulated in columns 8-13 of Tables 1-25. Their meaning has been explained near the beginning of this paper. They show that the curve of daily maximum, and the curve of daily minimum temperature for the year have almost the same characters at both Durban and Kimberley, the respective positive and negative excursions occupying the same intervals of time at both places. Fifty-four per cent. of the registered maxima are above the mean maximum, and 52 per cent. of the registered minima are above the mean minimum. We infer from the given ratios that when the maximum falls below its mean amount it does so deeply and sharply, but its rises are more leisurely and more prolonged: that is to say, the general aspect of the graph is that of a prolate cycloid on the positive side of its base. The minima follow much the same course, although the cycloid shows a disposition in the winter months to shift to the negative side of the base.

Compare these temperature numbers with those for the pressures given in the concluding columns of Tables 1-24, and in columns 17, 18, 19, of the monthly summaries. Here the position is that the barometer at both Durban and Kimberley is as many times above the mean as it is below; *i.e.*, the average shape of the negative parts of the curve of departure from the mean daily pressure is an exact reflection of the average shape of the positive parts. In other words the curve displays the same peculiarities of detail either way up. Such being the case at both Durban and Kimberley, we must conclude that the mean pulsation is essentially undulatory. The idea is to some extent justified by an analysis of the pressures year by year deduced from hourly observations at Kenilworth. It is found that the annual mean pressure is practically constant, although the mean barometer during any month may differ greatly from that of the same month of another year.

As stated at the outset, the Durban pressures are for ten years, while only eight years are available at Kimberley; moreover, the

* From Blanford's *Climates and Weather of India*.

observing hours are different. Before the two may be compared, then, it is necessary first to determine the Durban means for the same eight years, and next to correct the readings of either for the diurnal oscillation. We are able, fortunately, in the case of Kimberley, to do this with some precision from the known hourly variation at Kenilworth. The result will be found in Table 38, the monthly numbers denoting the mean sea-level pressures at Durban from readings at IX. to XV. for the eight years 1890–1897, and the Kimberley means for the same years reduced to the mean of the same hours.

Although the period used is not so great as might be wished, some very remarkable facts stand out very plainly. First that the highest and lowest monthly pressures, occurring respectively in July and January, differ by 0·245 inch at Durban, and by 0·242 inch at Kimberley, which practically means an identical range. Now in free air, where there is a normal decrease of temperature with height, a point whose altitude is equal to that of Kimberley (4,042 feet) above sea-level at Durban would have a barometric range not much greater than one-half the observed range. We should have, in fact, counting both temperatures and pressures upwards from Durban, at the given altitude—

In July	26·14 inches
In January	26·01 „
For the year	26·08 „

At the same time it is not improbable that the Durban pressures would be rather different if there were no table-land behind it.

The range of monthly mean pressures at Mount Abu is but three-fifths of that at Karachi for a difference of elevation of 3,896 feet. Their monthly numbers are given in Table 38 for comparison with those of Kimberley. They illustrate very well how the indications of a mountain barometer differ from those of a table-land barometer. The orderly sequence of differences for the Indian stations is worth notice, these being least in summer and greatest in winter. Now all places whose altitudes are not very great have their pressures invariably greater in winter than in summer. But the difference of pressure between a sea-level station and an adjacent point at a moderate elevation is least in summer because the access of heat expands the air, thereby raising the surfaces of given pressure; and in the same way the cold of winter contracts the air, thereby lowering the surfaces. Evidently Mount Abu conforms to this law. In South Africa, on the contrary, the least differences come towards the end of

the summer, the greatest near the end of the winter—some two months late for both phases.

A phenomenon like this is worth elucidating. Sir George Airy, whose gird at meteorology—because it requires neither money nor brains; or as he, more mildly, put it in the last report he wrote, “perhaps because it requires little of expense or science” *—was quite a hardy annual, seems to have believed that all ever done, or, for that matter, likely to be done, by meteorologists (except at Greenwich, where the meteorological work is “the best in the world”) was to pile inches, or degrees, and decimal parts upon previous similar observations: Pelion and Ossa upon Olympus. The meteorologist’s obvious retort is that astronomers have done their share of mountain piling in the past, with what they are pleased to describe as “fundamental” astronomy, and may do still more in the future, and yet not always succeed in scaling the high heavens. Neptune, for instance, was not discovered at Greenwich, nor would it have been later on, even though the Right Ascension of Uranus on, shall we say, 1847, August 31d. 14h. 27m. 38·9s. was somewhere about 1h. 6m. 11·37s.! But although

“*cætherique ingenio supposuere suo*
. . . non ut ferat Ossan Olympus
summaque Peliacus sidera langat apex” †

may be occasionally true of astronomers, whether directed by Heaven or the Admiralty, who would argue that the present enormous bulk of the present volumes of fundamental astronomy published as GREENWICH OBSERVATIONS should be curtailed? Not the meteorologist certainly. His only regret is that Airy should have risked adding to “hi montes” a Vale of Tempe by not inserting the necessary fourth decimal places, in seconds of arc, to the 1,294 elegant star-positions for January 1, 1880. Is it not, for example, sacrificing a reasonable accuracy to a most unreasonable brevity to call the R.A. of Alpha Ceti 2h. 56m. 0·328s., when the seconds should be 0·3275? Still less would the meteorologist argue that the meteorological observations taken at any astronomical observatory, even though they be not discussed by the observatory staff, should, for that reason, be discontinued. The industry that has accumulated there will be thankfully recognised by some future Titan. It is, indeed, much to be regretted that observers have not been so industrious in South Africa. Here, when extensive sets of observations are wanted, and that is at nearly every turn, they are not

* *Greenwich Observations*, 1880.

† Ovid, *Fasti*, Lib. i. 306, &c.

forthcoming, and for the simple reason that they never existed. Good observations at Bloemfontein, and at Port Nolloth, and plenty of them, would be invaluable in the framing of a pressure theory for the table-land. Still more so would be a set of good records from a chain of stations across the continent near S. Lat. 29°.

Failing such, as an experiment the monthly barometer results for Aliwal North, Philippolis, and Umtata, from the annual reports of the Cape Meteorological Commission have been compared with the observations for the same years at Durban.* They are each derived from one observation *per diem*, at VIII., of a marine barometer, the sluggishness of which may flatten the curves somewhat.

Umtata, below the high table-land, shows the normal winter maximum difference, and summer minimum, with very little retardation. Philippolis and Aliwal North both incline to Kimberley characteristics. The monthly rate of increase of mean pressure is pretty much the same for each station, *i.e.*, the pressure curve for each is to all intents and purposes an inverted curve of table-land temperatures. [See Tables 39 and 40.]

We may, it seems, without unduly magnifying the force of the evidence, regard the lagging in the differences of mean pressure as a peculiarity differentiating a table-land from a mountain in a germane latitude. The actual process seems to be much in this way:—

1. The annual mean temperature of the air immediately over the table-land being much greater than that of the free air over the coast at the same elevation, the layers of equal pressure that would otherwise be level planes are expanded upwards in surfaces that follow the contour of the land. Those portions of the surfaces protruding thus above the elevation proper to their given pressures push outwards against the normal surfaces over the coast—not sliding upon each other as von Siemens has truly said†—until equilibrium is established. That is, for any given latitude the barometer would read lower on the table-land and higher on the coast than it would if the table-land were replaced by a mountain of the same altitude, because of this outward extension.

* Some Durban results for VIII., Royal Observatory mean time, are published by the Cape Meteorological Commission each year; but they do not tally with those published direct by the Natal Observatory, and so have not been used here. It seems probable that before being sent to Cape Town they are corrected for latitude. If so, they are not really comparable with the results from the other coast ports published on one page as “Monthly Means of Barometer . . . reduced to 32° F. and Sea-level,” none (or few at any rate) of which have undergone the latitude correction.

† “On the General System of Winds of the Earth” (*Phil. Mag.*, 1890). But it is largely a question of words, although, perhaps, not quite true in the sense in which von Siemens intended.

2. Starting now in the height of summer, when the temperatures over the table-land are the greatest possible, we have at any instant the whole atmospheric envelope of the southern hemisphere expanded upwards, the tendency of which is to decrease the differences of pressure between upper and lower stations. But the air being expanded over the high land not simply in terms of its altitude, but according to its temperature, the excess of volume presses coastwards, counteracting more or less completely the processes that make for a minimum pressure-difference.

3. During February pressures are rising generally in the southern hemisphere. Also the temperature is rising over the coast, but falling over the table-land: that is, the pressure surfaces are still rising over the coast, but have begun to sink over the interior. More of the inflow from the north, therefore, goes to the table-land stations than to the coast.

4. During March temperatures are falling generally, and pressures are rising, the surfaces of equal pressure are tending to sink. But the temperatures of the upper stations are falling very much faster than those of the coast, and hence a small excess of the still expanded air (it still being warmer than the mean) is pressing inwards.

5. During April and May temperatures are falling most rapidly at inland and coast stations alike. The pressure surfaces are still of themselves tending to sink faster over the interior than over the coast, but now it would seem are lost in the maximum effect of the general inflow from the north. In a lesser degree the same applies to June. There is some irregularity in the behaviour of the barometer at this season, which seems to be due to the barometric depression that annually (probably) spreads over the land for a fortnight or so towards the end of May. The general character of this depression will be best understood after reference to the daily numbers in Tables 5 and 17.

6. In July the mean temperatures of the table-land cease falling, and, indeed, saving for the annual cold wave of the month—to be mentioned again presently—would be actually rising; as the maximum temperatures are in spite of the cold wave. At the middle stations and on the coast, however, the fall continues both by night and by day. That is, the pressure surfaces over the coast and the slopes are still sinking, while over the higher land they are sinking no longer. At this time also the general pressure over the southern parallels is practically stationary at its highest amount. So the crests of the stationary or ascending pressure surfaces are free to extend laterally, adding something to the coast pressures [see Table 25] and deducting something from those of the interior.

7. In August the same state of things prevails. For although the temperature rises slightly over the coast, the rise on the table-land is at least four times as great; and thus while the seasonal fall of pressure has well set in, over the whole southern hemisphere, it is checked a little on the coast and increased on the table-land by the outward expansion arising from the more rapid increase of temperatures. In September the pressure surfaces are rising generally, and the differences begin again to decrease.

8. In October we see another increase in the difference of pressure. It is very plain at Aliwal North and Kimberley, and appears as a considerable temporary check in the curve rates of Philippolis and Umtata. Now at the coast stations the monthly rate of increase of temperature augments far into the summer, reaching its maximum from November to December. On the table-land the maximum rate is reached from August to September. The middle stations seem to feel the influence of both, having a marked break in their rates of temperature increase from September to October. Corresponding to this is the marked October decrease in the rate of fall of the barometer at Durban, where for pretty well a whole month the pressure curve lies above the inverted Kimberley temperature curve. A glance at the daily values in Tables 10 and 22 will be sufficient to prove this month of high relative pressure an essentially Durban phenomenon: the rate of fall of pressure from September to October being considerably checked there, slightly so at Umtata, and not at all at the higher stations. The interpretation is not obvious. Perhaps it is not unlikely that the check to the rate of rise of temperature at the middle stations may also indicate a sufficient check to the rise of the pressure surfaces to allow the expanding air of the table-land—which experiences no such check—to again, temporarily, push outwards over the coast. The check of the temperature increase concerns the maximum almost entirely.

The general trend of the changes just sketched in detail will be best understood by superimposing Fig. 2 upon Fig. 1; from which it will appear that the Durban pressure curve falls below the inverted Kimberley temperature curve in autumn, and above it in spring, whereas the Kimberley pressure curve is above its inverted temperature curve in summer, and below it in winter.* Of course it will be understood that the above sketch aims at neither completeness nor great exactitude. That unfortunately is out of the question, and

* Compare V. Bjerknes, "The Dynamic Principle of the Circulatory Movements in the Atmosphere" (*Monthly Weather Review*, Oct., 1900). This paper came after the above sketch in the text was written: too late for use here. It is of exceptional interest.

will so continue until meteorology is better served by the Legislature. There are chances here, too, for kites and balloons. Nor is it quite clear why the Kimberley wind-vane tends to make one complete, if at times vacillating, clockwise rotation per annum. That one depends to some extent and in some way upon the other is a reasonable idea. Certainly the Kimberley diurnal wind stratum is very shallow, and possibly the annual stratum is so also. The seasonal transfer of air from one hemisphere to the other may take place at a great altitude, and the transfer from coast to table-land and back somewhere between, in the middle reaches. The barometer necessarily integrates the combined effect of the three movements.

The chances of solving the problem of reducing the table-land pressures to sea-level are not simplified by our results so far, although the conditions may be made clear by future research along similar lines. And the difficulty exists not merely because, as is commonly stated, our knowledge of the temperature of the air is limited and fragmentary, but because the ordinary formula is insufficient. But at the least the annexed tabular matter ought to say to what extent it is likely to be so. It is a question whether it would not be possible, if we had the material, to make a synoptic weather-map for the higher stations reduced to, say, a 4,000-foot datum, and another for the coast and middle districts reduced to sea-level, combining the two by some suitable process afterwards. On the whole, however, it is likely that a weather-map depicting only proportional departures from the normal daily means will be the most useful tool of our future weather-bureau—when we get it!

Although the average monthly differences of pressure between Durban and Kimberley, deduced from two observations per diem, may not be so exact as they might be if they were deduced from one observation per diem for twice the number of years, yet for the annual mean difference they are doubtless quite as good. Assuming this much, we may calculate the values of the numerical coefficient in the formula—

$$Z = K \log \frac{H}{h}$$

in which Z is the altitude of Kimberley in feet, H is the mean height of the barometer at Durban sea-level (mean low water), and h the mean height of the barometer at Kimberley, H and h being corrected and reduced to 32° F. K includes a number of petty factors; the gravity correction for both altitude and latitude, corrections for air-temperature, and for humidity. Since Durban and Kimberley are only about a degree of latitude and some 4,000 feet

of altitude apart the gravity correction may be ignored for the time. The air-temperature factor is—

$$1 + \frac{T + t - 64}{900}$$

in which T is the mean temperature of Durban, and t that of Kimberley, the mean temperature of the intervening air-strata being supposed to be $\frac{1}{2}(T + t)$, which happens not to be quite the actual case. But whatever the actual mean temperature of the intervening air may be, an examination of the numbers in Table 35 will readily prove that the numerical value of the air-temperature factor for all the given places must lie between the limits 1.0733 and 1.0797, numbers equivalent at their full effect to an error of about 13 feet of elevation in excess or defect. Assuming this temperature factor to be also constant, we have yet to consider a further correction for diurnal range. Now the daily pressure values for Durban refer to observations at IX. and XV. N.M.T. (= mean time of 30° E.), the corresponding number for Kimberley referring to observations at VIII. and XX. C.M.T. (= mean time of 18° 29' E.). That is, the Durban barometer was read at 9h. 4m. a.m., and 3h. 4m. p.m., local time, and the Kimberley barometer at 8h. 25m. a.m. and p.m. local time. As previously stated, the Kimberley values in Table 38 have been corrected, by the aid of the Kenilworth horary pressures, to agree approximately with readings taken at 9h. 4m. a.m. and 3h. 4m. p.m., Kimberley local time. It seemed proper to make such a correction, but since the mean differences at Durban between the pressures at IX. and XV. (N.M.T.) are only about three-quarters of those for the same hours (C.C.M.T.) at Kenilworth, it is possible that the increased accuracy is not in the same ratio as the extra labour. Obviously the correct method would be to reduce all the observations to the mean of the day, if we only had the observations.

Again in the comparison between Durban, Umtata, Aliwal North, and Philippolis, the times have been IX. N.M.T. at Durban, and VIII. C.C.M.T. at the other places, which reduces to, say,—

9h. 4m. a.m.	Durban local time,
8h. 25m. a.m.	Umtata „
8h. 17m. a.m.	Aliwal North local time,
8h. 11m. a.m.	Philippolis „

Fortunately on the mean of the year the South African barometer is not changing much between VIII. and IX., and thus the correction on account of difference of local time is very small—less in fact than

the possible secular error of a single observation with a marine barometer—although in the case of Philippolis it may amount to fully 0·008 inch during the winter months. Making the necessary corrections from the Kenilworth observations, allowing for the differences of local time, we get finally the values, for 9h. 4m. local time, of Table 39.

Granting the cistern of the Kimberley barometer to have been 4,042 feet above the sea, and substituting this value of *Z* in the formula, we derive *K* = 64250 approximately. If this result hold for South Africa generally, we determine respective solutions for *Z* to be—

Umtata	2,352 feet
Aliwal North	4,362 „
Philippolis	4,556 „

Here Aliwal North comes out 12 feet higher than the railway level, and 32 feet higher than the altitude published by the Meteorological Commission; but Umtata is 48 feet less, and Philippolis 144 feet less than the Commission has said. It has never been explained how the altitudes given in the Annual Reports of the Meteorological Commission have been determined, but, since they are generally in round numbers, it is a fair inference that they claim no great excellence. Kenilworth (Kimberley) with the same factor, for some four years' mean, comes out at 3,928 feet.

Professor Guthrie, about twelve years ago, constructed a table of altitudes above Cape Town sea-level,* using *K* = 64300, and made a remarkable, not to say miraculous, agreement for quite a number of places all over the country between the altitudes by railway levelling and those by the barometer; the differences, for example, between the two methods being only 2 and 4 feet respectively at Aliwal North and Kimberley. He depended upon a mean pressure of 25·762 inches at Aliwal North, and 26·031 at Kimberley, at about 8 a.m. local time. The former agrees closely enough with the value in Table 39 (= 25·777 inches at 9h. 4m. a.m.); but the Kimberley value is almost certainly 0·04 inch too low at least. Moreover, he has a difference of only six feet between the barometer and the level at Bloemfontein, of all places! The observing is pretty feeble at many second-order stations in the world, and in South Africa especially, but if a worse lot of barometer results than that taken at the capital of the quondam “Free State” has ever been evolved, it ought to be carefully preserved—as a *record*. No confidence what-

* F. Guthrie, “Sea Levels in South Africa from barometric observations” (*Trans. S. Af. Phil. Soc.*, vol. v., p. 318).

ever can be placed in the pressure returns so far published from that place, and the fortuitous agreement between the two methods only proved that the factor brought the level into very bad company. It is hard to say what the mean pressure at Bloemfontein ought to be, for at the beginning, even before the novelty should have worn off, the observing hours and seasons seem to have been erratic; while throughout the "nineties" the whole operation has approached the ridiculous. Latterly the results may have been not more than 0.16 inch from the truth.

It seems not unlikely that the factor 64250 will give fair altitudes above sea-level when the upper and lower stations are near the same latitude. Thus, for example, we know that the pressure increases very rapidly from East London along the coast to Durban: then taking 4,350 as the altitude of the Aliwal North barometer we deduce a 9 a.m. mean sea-level pressure for the same latitude, say at Port Shepstone, of 30.125 inches.

When it is not convenient to employ logarithms, Babinet's excellent formula may be used with advantage.* It is—

$$Z = C \cdot \frac{H - h}{H + h}$$

where Z , H , h , are as before, and C a numerical coefficient containing, like K , a number of petty factors. The approximate value of C , for the stations previously considered, is 55900, and the resulting altitudes are—

Umtata	2,354 feet
Aliwal North	4,360 „
Philippolis	4,553 „
Kimberley	4,042 „
Kenilworth	3,928 „

Passing now from generalities to details we see, according to Fig. 2, that high pressures are rare in the summer, nothing exceeding 30.4 inches being at all likely at Durban from the end of November to the end of March, and that the high pressures, say exceeding 30.66 inches, belong almost exclusively to the three months beginning about the end of the third week of July, extreme minimum pressures being also common at the same period. Sometimes we find low minima prevailing in conjunction with low maxima, or high minima with high maxima—suggesting here and there a certain sort of annual periodicity—and then again high minima accompanying low maxima, or *vice versa*, quite at random. Of the presumably

* See Greenhill, *Hydrostatics*, p. 310.

periodic phenomena we have the very interesting, deep, **W**-shaped depression covering the whole country from May 11–29, already spoken of; and the period of abnormal pressure from about September 25th to October 17th, felt at the coast, only, as an increase, but on the table-land as a slackening of pressure, and due doubtless to the overflow of heated and expanded air from inland coastwards when the transfer along the parallels is temporarily greater than the seasonal meridional drift to the other hemisphere.

It is significant that the occasional abnormal hot winds of Durban blow at the season when the air is thus supposed to expand outwards from the table-land. They exercise a striking disturbing influence upon the regularity of the curve of maximum temperatures (Fig. 1) between August and December. The Government astronomer for Natal thus describes some that visited Durban in the early summer of 1896:—

“Among the meteorological phenomena of the year calling for notice was the exceedingly high temperature registered on September 21st and October 3rd.

“September 21st was the hottest day recorded at the Observatory, and probably the hottest day experienced in Durban during the last twenty years. The early morning was cool, but shortly after 8 a.m. the wind shifted towards the N.W., and the temperature began to rise fast, the wind growing hotter and hotter, and the barometer fell slowly. By nine o'clock the temperature had risen from 68° to 85°, and by half-past ten o'clock it had risen to over 100°. Then the wind shifted back towards the N.E., and under the influence of the sea-breeze the temperature fell fast, until by eleven o'clock it was only a little above 90°. Then the wind went back to the N.W. and grew stronger, coming in sharp gusts, with the effect of sending the temperature up fast, until by noon it had reached 108°. By two o'clock the temperature reached its maximum, the thermometer then registering 109°·6, and it was still over 100° at three o'clock, not falling below 100° until after 4 p.m., after having been above 100° for over six hours. During the night the temperature fell steadily to 63°, the change of temperature in twelve hours, therefore, being over 48°.

“At the Observatory we have no record of so hot a day. It is true that once, previously, we have registered a higher temperature, and, curiously enough, that was on exactly the same date in the year 1890. Then the maximum temperature registered was 110°·6, or exactly a degree greater; but the intense heat was of far shorter duration, the temperature being only 70° at 6 a.m., and had

fallen below 90° before 3 p.m., so that the temperature was only over 100° for less than three hours.

"On the morning of both September 16th and 17th there were hot winds of similar character, the maximum temperature registered on the 16th being $95^{\circ}2$, and on the 17th was 100° exactly, but on this day the hot spell broke before noon from the wind shifting, or a much higher temperature would have been registered during the early part of the afternoon.

"On October 3rd a similar hot wind sprang up before 8 a.m., and the temperature rose rapidly, reaching 95° at nine o'clock, and $107^{\circ}9$ shortly after noon. Fortunately the wind then shifted towards the east, and the temperature fell rapidly, until by half-past one it was below 90° again, and the rest of the afternoon was fairly cool.

The maximum temperatures registered at other stations on these days were as follows :—

" *Coast Stations* :—

	Sept. 17th.	Sept 21st.	Oct. 3rd.
Stanger	103°	103°	104°
Verulam	109	111	101
Durban	100	110	108
Umzinto	70° ?	106	84
Port Shepstone	100	107	72

" *Mid-Country Stations* :—

Richmond	97°	81°	105°
Maritzburg	99	100	102
New Hanover.....	100	92	99
Greytown	93	94	91
Impendhle	99	90	100
Howick	95	89	85

" *Up-Country Stations* :—

Weenen	99°	97°	99°
Ladysmith	97	95	92
Dundee	90	93	89
Newcastle	89	89	90
Estcourt	72	92	92

"From these figures," continues Mr. Nevill, "it is apparent that these hot winds do not come from up-country as is commonly supposed, though the fact that they blow from the N.W. appears to

point to this origin. They are purely a coast phenomenon, as the high temperature does not extend far inland.

"These coast hot winds appear to be due to an intensely heated lower stratum of air from three to five thousand feet in thickness, being confined beneath a uniform heavier upper stratum of cold air, which, owing to its homogeneity, cannot be broken through by the lower lighter stratum of hot air. There is good reason to believe that this arises from the approach from the N.E. of a thick mass of cold air slowly sinking from the upper strata of the atmosphere. As this impinges against the mountains and highlands up-country it is deflected, and drives the lower-lying hot strata of air partly before it, but in great part back along the low-lying surface toward the sea, in the form of a N.W. hot wind. The thicker the stratum of hot air, the further inland extends the hot wind, but usually the less intense the heat.

"Despite these hot winds the months of September and October were not abnormally hot, the intervening days being usually rather below the average temperature."

It is not to be denied that this interesting account, and the quoted temperatures, do prove the *very* high temperatures to be purely a coast phenomenon, but the assigned origin is not so certain, nor is it shown where the low-lying stratum of hot air gets its heat from. This is a problem of sufficient importance to justify rather more than a superficial notice. And there are certain material and related facts which may be of utility in assisting us, or some future investigator, in framing some sort of a solution. These facts reveal themselves very plainly in Table 41. In this Table the Durban pressures at 9 a.m., the Kimberley pressures at 8 a.m., and the maximum shade temperatures at both places, are arranged, as departures from the normal daily means of Tables 1-24, for the day of a hot wind and for three days before and after. There were six occasions to consider in the ten years 1890-9, three being in 1896. The average condition follows the separate details.

We notice at once that the rule at Durban is for the temperatures to rise gradually for two or three days before the final rapid development of heat. The pressures begin the period well above the normal—nearly a third of an inch in one instance, nearly a tenth of an inch on an average—the curve being almost the inverse of the temperature curve, and agreeing moderately well with the formula proposed above as connecting the annual curves of the same two elements at Kimberley. But now we have the conspicuous and noteworthy fact that at Kimberley the maximum temperatures, and the pressures, are both greatly above the normals throughout the

week, the temperature departures, in particular, for the first three days being twice as great as those of Durban. But the maximum is reached a day earlier, and the succeeding fall is gradual. During the whole week the Kimberley pressures are slackening almost uniformly, a faint and scarcely perceptible minimum commanding the averages on the same day as the deep minimum of the coast

It appears, then, that for some days previous to a hot wind on the coast pressures and temperatures are both exceptionally high on the table-land. Such a peculiarity, occurring at a time when the surfaces of equal pressure are always greatly elevated over the interior, will obviously give an additional impetus to the (supposed) overflow of air common at this season. The paucity of the necessary meteorological records makes it impossible to assert with any confidence what will be the final result at the lower levels of the increased overflow. We know enough of the winds of Kimberley to be able to predict that the overflow will probably take a spiral path. But it is not at all certain to what extent and how far the operation will be propagated. Manifestly the gradual slackening of the high pressures above does not communicate an immediate increase below. Possibly the enforced outflow sets up some sort of compression in the upper, or rather middle reaches of the atmosphere over the coast, making a still further increase of temperature there; which again sets up a vortex motion, and an upcast, where otherwise we should have had augmented pressure. The littoral high temperatures may therefore arise from the compression, *and friction*, of the expanding air of the high land upon the elastic walls of this natural chimney. Of course the compression of itself, whatever its possible superior limit, would not be competent to develop the observed degree of heat. That is convincingly argued by the terms of the "Characteristic Equation of a Perfect Gas," $pv = RT$.* Lastly, in further confirmation of the possibility that the factors of a hot wind originate on the table-land, it may be added that the phenomenon is almost invariably accompanied by clouds of the cirro-stratus type, and by a considerable falling off in the quantity of moisture present.

The May depression does not greatly affect the temperatures while it lasts, albeit colder nights herald its breaking up and cold days succeed. There is apparently not much doubt of its really being an annual event, the mean dates of the double minimum departing practically nothing from the 16th and 25th. There is a very similar depression at Adelaide (S. Aus.), but coming a little earlier, the dates of the double minimum being about the 11th and 17th. As will be seen from Fig. 2, the Durban maximum pressures are never very

* Preston, *Theory of Heat*, p. 127; Greenhill, *Hydrostatics*, p. 281.

high during the greater part of May, while the minima are at times extraordinarily low. So far as Kimberley is concerned it is the only depression of the mean curve having both depth and length.

But by far the most interesting of all the possibly annual phenomena is the narrow but deep depression recurring year after year near the middle of July. Speaking in averages, the barometer begins to fall at Durban on the 11th, is falling for four days, and rising for five to a point (on the 18th) rather higher than it originally fell from. At Kimberley the fall begins on the 12th and continues until the 15th—i.e., it is still falling at Kimberley after the minimum has passed over Durban—rising from that time to the 20th. Apart from the difference of time, and the somewhat greater range at Durban, the depression is pretty much of the same aspect at both places with regard to the gradients; resembling in this the ordinary sporadic cyclonic disturbances that visit the country ubiquitously. Now it may be laid down as a rule, in a general way, that pressure is the inverse of temperature, the one being high while the other is low. But this rule does not rigidly apply to the July depression, nor for that matter to the prevailing conditions during the greater part of the month. On the contrary, the temperature begins the month by rising and falling with the pressure, next it does not respond one way or the other to the changes of pressure, then it begins to fall two days after the pressure has begun to fall, and to rise also two days after the pressure has risen; afterwards for a time it behaves normally. It is curious, too, that although the pressure wave is felt first at Durban by fully a day, the temperature wave is felt first at Kimberley, just as though the two waves were independent and travelling in opposite directions.

It needs no very keen discernment to see that we have here a very different class of depression to that which accompanies the hot winds of the coast. This one is common to high and low land without bias, and appears to be as much *communibus annis* as the mean pressure or temperature of any month. To show this better Table 42 has been constructed from all the materials available here (namely, eight years from Kimberley proper, three from Kenilworth, and fourteen from Durban), giving the daily readings of the barometer for nine days in July (10th–18th) during each year. It will be seen that the tendency to a minimum at the mean date not only holds for the ten years from which the averages of Tables 7 and 19 have been computed, but also for the years before and since. One cannot help regretting that the pressure conditions of Port Nolloth may not also be examined.

The atmosphere consists of a quantity of matter which cannot

materially change in amount in any given not great interval of time. Hence a depression in one spot must be balanced by a crest in another.* Where, then, does the July depression come from? and what becomes of it? or rather, how does it originate? If it be essentially a planetary phenomenon, that is to say set directly in motion by outside influences, like the monthly mean temperatures, and not by any reflex terrestrial influence, then clearly we must expect a collateral process about the same time in other parts of the world, its simultaneous aspect varying probably according to the geographical conditions of the place. Does this then appear, in any manner, elsewhere, on or near the same parallel? The question is worth asking, although, unfortunately, only a shadow of a reply is to be anticipated for the simple reason that observations have not yet been piled upon previous observations industriously enough in the southern hemisphere. It has only been possible to attempt it for Adelaide and Cordoba besides Durban. The comparison, dealing with the whole month, for the two first and Kimberley, will be found in Table 43, the temperatures and pressures in the several columns having first been "bloxamed" in threes. The Kimberley numbers refer, as before, to eight years of barometer and ten of thermometer; the Adelaide numbers are for the twelve years 1885-96; † those of Cordoba for the years 1885-92 and 1894-7, the last year (1897) having been included to make up the twelve years because the results for 1893 were overlooked.‡ Table 43 is represented

* This obvious inference has been occasionally denied. Among the various explanations of the double diurnal oscillation of the barometer, ranging over the whole gamut from the utterly feeble to the egregiously stupid, it has been stated that the afternoon minimum is due to the loss of weight by the air due to heating; and that the daily pressure tide does not indicate any inward and outward movement, but simply an up and down one! Von Siemens languished fondly round a twin sister.

† From *Meteorological Observations made at the Adelaide Observatory*, by Sir Chas. Todd. The latitude of Adelaide is 34° 57' S.

‡ And scarcely through any great fault of mine. Tomo ix. of the *Anales de la Oficina Met. Argentina* is published in two parts, both dealing with the meteorology of Cordoba, entitled respectively:

"Primera parte: Observaciones hechas en la Oficina Central."

"Segunda parte: Discusion de las observaciones hechas en la Of. Cent."

The first part, published in 1893, contains the complete registers 1872-92. The second part, dated 1894, is a full and very excellent discussion of the first, running to nearly 500 pages, with 25 plates. After the text above and the corresponding tables were complete, it was recollected that the register for 1893 was bound up, in the second part, between the discussion and the plates, put *there* because "debido à la demora en la publicacion de la segunda parte de este tomo, podemos incluir aqui las observaciones al año pasado [*i.e.*, 1893]." It has not been thought worth while to recompute the numbers, or to feel annoyed.

graphically in Fig. 4 in which the thin black line represents the temperature, and the thicker red line the pressure, at each place.

All three places begin the month with a rising temperature which in each case comes to its highest value about the 4th. From the 1st to the 13th the temperatures of Adelaide and Kimberley are much alike in their changes, and not greatly different in quantity. But between the 13th and 22nd there is a great dip at Kimberley, defining, in fact, the coldest period of the year, and apparently delaying the rise of temperature to such an extent as to materially alter the coefficients in the cosine formula; whereas the Adelaide temperatures show on the whole a gradual increase. The Cordoba temperatures fall uniformly from the 3rd to the 11th, the cold period lying between the 3rd and 20th. During their cold periods the temperature gradients at both Kimberley and Cordoba are nearly identical, and both by a coincidence have a "step" half-way down, although that at Cordoba is very small, the much larger one at Kimberley thrusting the actual minimum a full five days later than the date of its appearance at Cordoba. It is curious, however, that a much bigger step down is shown by the curve of mean daily temperatures of Cordoba for the period 1878-92, although the total fall occupies the same days of the year. A somewhat colder period visits Cordoba earlier and reaches its lowest mean temperature about June 21st. But it depends altogether on the lowness of the maxima, the July cold period, on the other hand, depending upon the lowness of the minima.

The Cordoba temperatures and pressures agree most consistently to differ, pulsating in opposite phases throughout the month. The Kimberley phases, on the contrary, have little in common or in contrast, such correspondence as there is suggesting that the temperature changes follow the pressure changes after a considerable interval of time. The same, though in a less degree, may be said of Adelaide.

It is, to say the least, surprising to find the relationship between the July pressure and temperature conditions so completely diverse as it is at Cordoba and Kimberley. For both stations are continental, both are at a considerable elevation, and both are near the central meridian of their respective continents. It goes to confirm the conclusion suggested by a comparison of the Durban and the Kimberley daily numbers, that the pressure wave and the temperature wave of the middle of July at Kimberley are maintained somehow in a different way even though they be started by the same agency. Perhaps the simplest view is that the depression comes in from the Indian Ocean attracted by the suitable tempera-

ture conditions that originate and prevail inland. Or we might adopt the working theory (not forgetting how easy it is to theorise when facts are few), which, however, is rather a geometrical conception than a mechanical possibility, that there is a certain temperature factor—if we may so call it—travelling round the earth from west to east, while a pressure factor is going with the sun, the opposite way. Upon this view the barometric depression of July 14th at Durban, 15th at Kimberley, 19th at Cordoba, and 21st at Adelaide, have a closely related origin. Whence it would follow that the crest showing at Kimberley about the 9th, 10th, 11th, appears at Cordoba about the 12th, Adelaide 14th and 15th, Kimberley again 18th, 19th, 20th, Cordoba 22nd, and Adelaide on the 26th; and that the maximum points, therefore, in the curve for each continent are something more than an accidental effect of mere wave-length. Such Mauritius observations as could be culled from a few (nine years) odds and ends of starveling reports scattered over the years 1877 to 1894, fit into this scheme admirably. They give a curve for July agreeing in phase, though the amplitude is much less, with the Adelaide curve; and also in aspect, though a day or two earlier in date, with the Kimberley curve.

Upon the whole it is not unlikely that while the pressure and temperature waves of the three continents are demonstrably not one and the same thing, yet they may arise from the same impulse: some similar arrangement of conditions producing like effects. For one relief we have much thanks:—Swarms of meteors, or sunspots, have been, or are to be, the cause of everything. The July barometric and thermometric depressions, however, at any rate, are exceptions. Neither sunspots nor meteors have any influence over them, physical or occult.

Note.—Some progress has been made in a fuller discussion of the minimum temperatures than is given here; but since their treatment runs upon different lines it has been thought expedient to defer it for a separate communication later on. The hygrometric state of the air may not be neglected when the nocturnal cooling is under consideration, and therefore the Lee registers would be of limited utility in the same connection.

TABLE 1.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT DURBAN, NATAL, 1888-1897.

Jan.	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	$\frac{M_3+m_3}{2}$	$\frac{M_3+m_3}{2} \cdot M'_3$	m' ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	86.3	67.3	19.0	76.8	0	0	5	5	5	5	5	5	0	0	0	0	0	inches 30.014	inches 30.329	inches 29.692	inches 30.014	inches 30.329	inches 29.692	9	1	10
2	85.3	68.3	17.0	76.8	0	0	7	4	3	6	4	4	85.7	67.7	18.0	76.7	97.1	005	264	821	007	30.329	29.692	10		10
3	85.5	67.5	18.0	76.5	90.2	62.7	4	1	6	4	1	5	85.7	67.7	18.0	76.7	97.1	001	134	783	30.007	30.329	29.692	12		8
4	87.0	68.9	18.1	77.9	94.2	64.1	7	3	3	7	3	3	83.6	67.9	15.7	75.7	94.2	001	134	783	30.007	30.329	29.692	5		15
5	83.0	68.3	14.7	75.6	90.4	65.0	4	5	6	5	5	7	83.6	67.9	15.7	75.7	94.2	001	134	783	30.007	30.329	29.692	11		9
6	80.7	66.4	14.3	73.5	91.5	60.3	3	7	7	3	7	7	83.6	67.9	15.7	75.7	94.2	001	134	783	30.007	30.329	29.692	11		9
7	82.5	64.8	17.7	73.6	86.5	61.2	2	8	8	2	8	8	83.6	67.9	15.7	75.7	94.2	001	134	783	30.007	30.329	29.692	14		6
8	85.6	65.0	20.6	75.3	93.5	59.4	5	5	5	3	3	6	84.5	65.4	19.1	74.9	93.5	001	134	783	30.007	30.329	29.692	13		7
9	85.4	66.3	19.1	75.8	89.9	62.3	6	4	4	3	7	7	84.5	65.4	19.1	74.9	93.5	001	134	783	30.007	30.329	29.692	8		12
10	86.5	67.8	18.7	77.1	94.8	63.2	6	4	4	6	4	4	86.8	68.1	18.7	77.4	96.4	001	134	783	30.007	30.329	29.692	11		11
11	86.6	69.0	17.6	77.8	96.4	66.4	5	5	5	6	2	4	86.8	68.1	18.7	77.4	96.4	001	134	783	30.007	30.329	29.692	12		8
12	87.4	67.5	19.9	77.4	94.4	66.0	7	3	3	5	1	4	86.8	68.1	18.7	77.4	96.4	001	134	783	30.007	30.329	29.692	11		9
13	85.1	68.6	16.5	76.8	91.9	60.3	5	5	5	8	1	4	85.1	68.2	16.9	76.5	97.5	001	134	783	30.007	30.329	29.692	12		12
14	86.4	67.5	18.9	76.8	89.4	61.4	8	5	5	7	3	3	85.1	68.2	16.9	76.5	97.5	001	134	783	30.007	30.329	29.692	4		16
15	83.9	68.6	15.3	76.2	97.5	63.0	5	5	5	6	4	4	85.1	68.2	16.9	76.5	97.5	001	134	783	30.007	30.329	29.692	12		8
16	83.8	68.3	15.5	76.0	91.4	64.6	4	6	6	4	1	5	85.1	68.2	16.9	76.5	97.5	001	134	783	30.007	30.329	29.692	12		8
17	85.5	68.3	17.2	76.9	95.4	61.4	5	5	5	6	4	4	85.1	68.2	16.9	76.5	97.5	001	134	783	30.007	30.329	29.692	7		7
18	84.2	67.0	17.2	75.6	90.9	63.0	5	5	5	4	1	5	84.5	67.9	16.6	76.2	95.4	001	134	783	30.007	30.329	29.692	10		10
19	85.4	66.9	18.5	76.1	94.0	59.2	6	4	4	4	6	6	84.5	67.9	16.6	76.2	95.4	001	134	783	30.007	30.329	29.692	12		8
20	87.2	67.7	19.5	77.4	93.0	59.1	8	1	1	5	5	5	85.9	67.7	18.2	76.8	96.3	001	134	783	30.007	30.329	29.692	11		9
21	85.1	68.6	16.5	76.8	96.3	64.6	6	6	6	7	3	3	85.9	67.7	18.2	76.8	96.3	001	134	783	30.007	30.329	29.692	12		8
22	86.6	67.7	18.9	77.1	98.4	61.9	6	3	3	4	6	6	86.8	67.9	18.8	77.3	105.2	001	134	783	30.007	30.329	29.692	13		7
23	86.5	67.7	18.8	77.1	95.2	60.7	6	4	4	6	4	4	86.8	67.9	18.8	77.3	105.2	001	134	783	30.007	30.329	29.692	11		9
24	87.2	68.4	18.8	77.8	105.2	61.9	5	5	5	4	1	5	86.8	67.9	18.8	77.3	105.2	001	134	783	30.007	30.329	29.692	10		10
25	84.0	66.7	17.3	75.3	92.9	56.7	6	4	4	5	5	5	86.8	67.9	18.8	77.3	105.2	001	134	783	30.007	30.329	29.692	5		15
26	86.2	67.2	19.0	76.7	93.3	58.3	6	6	6	4	5	5	86.8	67.9	18.8	77.3	105.2	001	134	783	30.007	30.329	29.692	5		15
27	90.4	68.1	22.3	79.2	98.3	62.1	7	7	7	5	5	5	86.8	67.9	18.8	77.3	105.2	001	134	783	30.007	30.329	29.692	12		8
28	85.0	69.2	15.8	77.1	93.1	62.3	5	5	5	8	5	5	86.8	67.9	18.8	77.3	105.2	001	134	783	30.007	30.329	29.692	13		7
29	85.0	66.9	18.1	75.9	96.5	62.5	7	7	7	5	5	5	85.4	68.4	17.0	76.9	96.5	001	134	783	30.007	30.329	29.692	8		12
30	86.3	69.1	17.2	77.7	95.4	62.8	6	4	4	6	4	4	85.4	68.4	17.0	76.9	96.5	001	134	783	30.007	30.329	29.692	12		8
31	86.6	69.7	16.9	78.1	94.2	64.6	6	4	4	7	3	3	85.4	68.4	17.0	76.9	96.5	001	134	783	30.007	30.329	29.692	12		8

TABLE 2.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT DURBAN, NATAL, 1888-1897.

Feb.	M	m	M-n	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	M ₃ -m ₃	$\frac{M_3+m_3}{2}$	M ₃	m ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	86.1	67.8	18.3	76.9	93.7	61.9	6		4	4		6	86.3	68.7	17.6	77.5	94.2	61.9	30.051	30.281	29.796	30.028	29.758	30.028	29.758	11	9
2	86.3	68.5	17.8	77.4	93.2	63.2	6		4	6	1	3	86.3	68.7	17.6	77.5	94.2	61.9	30.051	30.281	29.796	30.028	29.758	30.028	29.758	11	11
3	86.5	68.6	17.9	77.5	94.7	60.5	6		4	5	1	4	86.5	68.7	17.8	77.6	94.7	60.5	30.051	30.281	29.796	30.028	29.758	30.028	29.758	11	9
4	86.3	68.6	17.7	77.4	92.8	63.7	8		2	4	2	4	86.3	68.6	17.7	77.4	92.8	63.7	30.051	30.281	29.796	30.028	29.758	30.028	29.758	10	10
5	85.1	69.7	15.4	77.4	90.8	64.6	6		4	7		3	86.0	69.0	17.0	77.5	94.7	60.5	29.996	30.238	29.742	30.011	29.742	30.011	29.742	8	12
6	84.5	69.4	15.1	76.9	89.8	63.0	6		4	7		3	86.0	69.0	17.0	77.5	94.7	60.5	29.996	30.238	29.742	30.011	29.742	30.011	29.742	8	12
7	83.7	68.2	15.5	75.9	91.7	56.4	5		5	6		4	84.0	68.6	15.4	77.3	91.7	56.4	30.041	30.278	29.680	29.980	29.680	29.980	29.680	10	10
8	83.7	68.1	15.6	75.9	89.8	61.4	3		7	5		4	84.0	68.6	15.4	77.3	91.7	56.4	30.041	30.278	29.680	29.980	29.680	29.980	29.680	10	10
9	83.6	67.0	16.6	75.3	92.2	61.0	3	1	6	4		6	84.0	68.6	15.4	77.3	91.7	56.4	30.041	30.278	29.680	29.980	29.680	29.980	29.680	11	9
10	84.5	67.6	16.9	76.0	90.5	60.5	5		5	3		5	84.5	67.6	16.9	76.0	90.5	60.5	30.041	30.278	29.680	29.980	29.680	29.980	29.680	11	9
11	84.4	67.6	16.8	76.0	90.8	63.7	4		6	2		7	84.2	67.4	16.8	75.8	92.2	60.5	29.990	30.278	29.680	30.012	29.663	30.012	29.663	11	9
12	86.1	67.5	18.6	76.8	96.6	61.8	6		4	2	1	7	84.2	67.4	16.8	75.8	92.2	60.5	29.990	30.278	29.680	30.012	29.663	30.012	29.663	10	10
13	85.2	68.8	16.4	77.0	94.8	64.1	3		4	3		4	86.2	68.4	17.8	77.3	96.6	61.8	30.017	30.254	29.652	30.001	29.652	30.001	29.652	8	11
14	87.4	68.9	18.5	78.1	92.1	64.6	6		4	6	1	3	86.2	68.4	17.8	77.3	96.6	61.8	30.017	30.254	29.652	30.001	29.652	30.001	29.652	11	9
15	86.5	69.2	17.3	77.8	93.4	63.6	5		5	6		4	86.5	68.9	17.6	77.7	93.4	63.2	29.962	30.234	29.617	30.011	29.617	30.011	29.617	16	4
16	86.8	69.0	17.8	77.9	92.1	66.1	6		4	6	1	3	86.5	68.9	17.6	77.7	93.4	63.2	29.962	30.234	29.617	30.011	29.617	30.011	29.617	9	11
17	86.2	68.6	17.6	77.4	91.7	63.2	6		4	5		5	86.5	68.9	17.6	77.7	93.4	63.2	29.962	30.234	29.617	30.011	29.617	30.011	29.617	9	11
18	86.1	68.0	18.1	77.0	93.5	56.4	5		4	6		4	86.5	68.9	17.6	77.7	93.4	63.2	29.962	30.234	29.617	30.011	29.617	30.011	29.617	9	11
19	86.5	69.9	16.6	78.3	98.2	65.4	6		4	7		3	86.5	68.9	17.6	77.7	93.4	63.2	29.962	30.234	29.617	30.011	29.617	30.011	29.617	8	12
20	85.3	70.9	14.4	78.1	91.0	65.9	5		5	8		2	86.0	69.6	16.4	77.8	98.2	56.4	30.000	30.292	29.684	29.990	29.684	29.990	29.684	7	13
21	85.1	68.9	16.2	77.0	91.6	63.4	7		4	7		3	86.0	69.6	16.4	77.8	98.2	56.4	30.000	30.292	29.684	29.990	29.684	29.990	29.684	11	9
22	85.2	68.5	16.7	76.8	91.2	63.4	7		3	4		6	86.2	68.9	17.3	77.5	98.2	56.4	30.000	30.285	29.670	30.000	29.670	30.000	29.670	10	10
23	88.2	69.4	18.8	78.8	98.2	64.6	7		3	5	2	2	86.2	68.9	17.3	77.5	98.2	56.4	30.000	30.285	29.670	30.000	29.670	30.000	29.670	11	9
24	85.4	69.5	15.9	77.5	90.0	65.5	5		5	6		4	85.6	68.5	17.1	77.0	90.0	63.2	30.063	30.248	29.770	30.080	29.770	30.080	29.770	13	6
25	85.9	67.6	18.3	76.7	89.4	63.2	6		4	3		7	85.6	68.5	17.1	77.0	90.0	63.2	30.063	30.248	29.770	30.080	29.770	30.080	29.770	11	9
26	85.5	68.5	17.0	77.0	89.7	64.3	7		3	6		4	85.6	68.5	17.1	77.0	90.0	63.2	30.063	30.248	29.770	30.080	29.770	30.080	29.770	14	6
27	85.4	67.6	17.8	76.5	92.1	61.4	6		4	3		6	86.7	67.7	19.0	77.2	93.7	61.4	30.001	30.328	29.770	30.018	29.770	30.018	29.770	9	11
28	86.7	67.7	19.0	77.2	93.7	61.4	6		1	2		1	86.0	67.9	18.1	77.0	93.7	61.4	29.923	29.968	29.680	30.018	29.680	30.018	29.680	0	6
29	86.1	69.9	16.2	78.0	89.7	66.3	2		1	2		1	86.0	67.9	18.1	77.0	93.7	61.4	29.923	29.968	29.680	30.018	29.680	30.018	29.680	0	6

TABLE 4.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT DURBAN, NATAL, 1888-1897.

April	M	m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	$\frac{M_3+m_3}{2}$	M' ₃	m' ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P-)
1	82.2	64.7	73.4	90.6	59.6	6		4	6		4	81.7	65.2	73.4	90.9	58.3	30.083	30.403	29.802	30.080	30.406	29.693	8	12
2	78.5	64.2	71.3	90.3	58.3	4		6	5		3						167	406	30.004	30.080	30.406	29.693	11	9
3	83.6	62.6	73.1	88.3	56.4	6	1		7		5						150	337	29.933				14	6
4	83.5	64.7	74.1	86.5	56.7	9		1	7	1							094	379	879				7	13
5	83.6	65.2	74.4	91.2	60.1	6	1		8		2						028	300	804	30.091	30.379	29.804	5	15
6	83.1	65.5	74.3	88.0	60.7	8		2	6		4						099	326	956				8	12
7	81.2	64.2	72.7	92.1	61.0	6		4	5	1							098	420	759				9	11
8	82.8	65.3	74.0	86.6	59.6	6	1		6		5						151	448	931	30.116	30.448	29.759	13	7
9	83.5	63.7	73.6	91.2	56.7	7		3	5		4						067	368	749				7	13
10	84.2	64.8	74.5	92.1	56.9	9		1	7		3						104	396	704				9	11
11	84.3	63.6	73.9	94.9	60.0	6		4	5	1							115	451	886	30.095	30.451	29.704	10	10
12	83.9	63.3	73.6	93.7	58.3	7	1		5		5						038	454	675				7	13
13	82.1	62.9	72.5	87.5	56.9	6		4	5		5						046	292	791				8	12
14	82.5	63.9	73.2	88.1	56.9	7		3	6	1	3						118	320	935	30.067	30.454	29.675	11	9
15	83.2	62.8	73.0	90.6	56.5	7		3	4	1	5						122	604	799				10	10
16	82.6	63.0	72.8	89.4	56.2	5		6	6	1	4						073	410	690	30.108	30.604	29.690	13	12
17	79.9	63.7	71.8	87.5	58.3	4		6	6		3						130	256	978				13	7
18	80.5	63.9	72.2	86.8	56.0	4		6	5		4						125	320	925				11	9
19	82.1	63.1	72.6	90.1	56.7	5		5	5		5						115	289	903				13	7
20	80.0	63.3	71.6	86.7	57.4	4		6	5		4						121	285	886	30.120	30.320	29.856	11	9
21	80.0	62.4	71.2	84.6	55.3	5		5	5		5						116	358	836				12	8
22	82.3	61.3	71.8	86.9	57.8	6		4	1		9						032	336	770				7	13
23	84.5	63.2	73.8	98.1	60.0	7		6	4	1	5						25	25	994	30.047	30.358	29.770	6	10
24	81.5	63.6	72.6	86.3	58.7	4		6	5		5						30.083	483	819				10	14
25	80.6	62.9	71.7	87.2	56.7	6		4	5		5						036	218	759				12	12
26	78.4	62.5	70.5	85.2	57.6	3		7	4	2							147	381	991	30.089	30.483	29.759	12	8
27	78.2	59.9	69.0	83.8	53.8	2	1		3		7						274	456	962				18	2
28	79.2	58.8	69.0	83.8	53.8	1		8	3	1	8						176	400	921	30.196	30.456	29.811	14	6
29	81.7	61.1	71.4	85.3	55.1	6		4	4		6						138	361	903				12	8
30	79.2	61.9	70.5	88.3	56.5	4		6	3		7						182						16	4

TABLE 5.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT DURBAN, NATAL, 1888-1897.

May	M	m	$M-m$	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	M_3-m_3	$\frac{M_3+m_3}{2}$	M ₃	m ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	81.9	61.8	20.1	71.8	86.3	57.4	10		0	8	2	2	81.2	61.9	19.3	71.5	88.3	56.5	30.105	30.316	29.789	inches	inches	inches	8		12
2	82.5	61	20.4	72.3	88.3	58.2	8		2	9	1	1							101	366	721	30.129	30.306	29.721	10		10
3	80.0	61.3	18.7	70.6	87.6	51.1	7		3	8	2	2							161	370	999				11		9
4	79.9	61.4	18.5	70.5	86.3	53.3	7		3	9	1	1							131	491	846				9		11
5	78.9	60.0	18.9	69.4	88.7	50.6	5		4	8	2	2							102	391	829	30.131	30.401	29.829	7		13
6	81.0	59.7	21.3	70.3	86.7	52.4	6	1	3	7	3	3							111	454	729				10		10
7	78.2	60.7	17.5	69.5	84.2	52.6	6		4	7	3	3							097	401	689				8		12
8	76.3	58.9	17.4	67.6	81.3	55.1	5		5	5	5	5							150	481	781	30.119	30.481	29.689	10		10
9	77.2	58.7	18.5	67.9	82.3	53.7	5		5	5	5	5							260	622	801	30.106	30.462	29.719	19		1
10	78.7	57.8	20.9	68.2	82.0	47.4	5		5	4	6	6							235	495	013				14		6
11	79.5	57.6	21.9	68.5	83.0	46.6	7		3	3	4	4							131	440	29.964	30.209	30.622	29.964	8		12
12	80.0	58.4	21.6	69.2	85.6	47.9	7		3	6	2	2							096	350	845				7		13
13	80.6	59.3	21.3	69.9	91.3	49.9	6		4	8	3	3							133	431	765	30.134	30.434	29.765	11		9
14	79.0	58.9	20.1	68.9	82.7	52.9	6		4	5	3	3							066	360	780				4		16
15	81.0	58.2	22.8	69.6	89.6	53.7	8		2	7	3	3							052	287	770				4		16
16	80.5	59.8	20.7	70.1	89.4	55.6	7		4	6	4	4							085	286	857	30.068	30.360	29.770	7		13
17	78.7	59.5	19.2	69.1	85.8	56.5	6		4	6	3	3							077	476	822				9		11
18	79.9	60.4	19.5	70.1	88.1	56.2	5		5	7	4	4							139	423	935				9		9
19	76.8	60.6	16.2	68.7	82.9	54.2	5		5	6	4	4							167	464	922	30.128	30.476	29.822	11		9
20	78.0	58.1	19.9	68.0	86.8	54.2	5		5	4	6	6							093	373	649				8		12
21	78.1	57.3	20.8	67.7	83.4	51.3	4	1	5	4	6	6							139	337	682				12		8
22	76.8	58.8	18.0	67.8	84.0	54.7	3		7	4	4	4							094	401	788	30.109	30.401	29.649	9		11
23	77.4	59.2	21.2	68.8	81.7	45.0	5		5	2	6	6							083	430	797				8		12
24	80.6	57.7	22.9	69.1	90.7	47.9	7		3	6	4	4							128	268	809				11		9
25	76.2	57.2	19.0	66.7	85.8	48.8	3		7	4	6	6							054	381	507	30.088	30.430	29.507	4		16
26	79.0	56.3	22.7	67.6	86.5	49.7	6		4	5	4	4							134	491	792				11		9
27	75.3	59.0	16.8	67.4	83.2	52.6	4		6	4	6	6							239	541	749				17		3
28	72.2	55.2	17.0	63.7	81.1	52.0	2		8	2	8	8							318	644	30.029	30.250	30.644	29.749	16		4
29	75.1	53.4	21.7	64.2	83.6	48.8	3		7	0	10	8*							264	610	126				18		1
30	76.5	55.0*	21.5*	65.7*	82.2	49.7*	3		7	1	9	9								472	079				17		3
31	76.9	55.4	21.5	66.1	82.7	49.9	3		7	1	9	9															

* Minimum Temperature not recorded May 30, 1890. † Pressure at 9 a.m. not recorded May 30, 1890.

TABLE 6.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT DURBAN, NATAL, 1888-1897.

June	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	$\frac{M_3+m_3}{2}$	M ₃	m ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	76.1	56.1	20.0	66.1	82.0	49.7	4	1	5	7	1	3	76.5	55.5	66.0	82.7	49.7	inches	30.577	29.945	30.273	30.610	29.948	12	8	
2	75.2	54.9	20.3	65.0	81.0	48.8	3	1	7	4	5	5	81.0	48.8	65.0	81.0	48.8	inches	30.599	29.903	30.610	29.948	7	13		
3	79.1	55.5	23.6	67.3	89.5	51.7	5	4	4	5	5	5	89.5	51.7	67.3	89.5	51.7	inches	30.618	29.780	30.618	29.780	9	9		
4	77.6	55.8	21.8	66.7	83.1	49.8	7	3	3	5	5	7	83.1	49.8	66.7	83.1	49.8	inches	30.618	29.780	30.618	29.780	4	1		
5	78.8	55.3	23.5	67.0	86.5	51.5	6	1	3	3	7	3	86.5	51.5	67.0	86.5	51.5	inches	30.618	29.780	30.618	29.780	10	15		
6	77.6	55.5	22.1	66.5	83.0	51.9	6	1	3	7	6	6	83.0	51.9	66.5	83.0	51.9	inches	30.618	29.780	30.618	29.780	4	10		
7	76.9	55.6	21.3	66.2	82.0	51.9	5	1	5	7	6	6	82.0	51.9	66.2	82.0	51.9	inches	30.618	29.780	30.618	29.780	6	14		
8	76.2	55.3	20.9	65.7	84.0	51.9	5	4	5	7	6	3	84.0	51.9	65.7	84.0	51.9	inches	30.618	29.780	30.618	29.780	11	9		
9	73.9	55.6	18.3	64.7	80.1	51.3	3	7	7	7	3	3	80.1	51.3	64.7	80.1	51.3	inches	30.618	29.780	30.618	29.780	16	4		
10	74.5	54.1	20.4	64.3	78.7	49.7	7	8	4	4	6	6	78.7	49.7	64.3	78.7	49.7	inches	30.618	29.780	30.618	29.780	7	8		
11	78.4	54.5	23.9	66.4	82.0	51.0	6	5	5	6	6	6	82.0	51.0	66.4	82.0	51.0	inches	30.618	29.780	30.618	29.780	9	11		
12	77.8	55.6	22.2	66.7	86.7	52.4	5	4	5	6	1	3	86.7	52.4	66.7	86.7	52.4	inches	30.618	29.780	30.618	29.780	6	14		
13	78.2	54.3	23.9	66.2	84.1	51.0	5	5	5	4	6	6	84.1	51.0	66.2	84.1	51.0	inches	30.618	29.780	30.618	29.780	7	13		
14	78.4	54.8	23.6	66.6	88.3	48.4	4	2	4	4	6	6	88.3	48.4	66.6	88.3	48.4	inches	30.618	29.780	30.618	29.780	8	12		
15	74.0	55.3	18.7	64.6	82.1	47.4	4	7	7	5	6	6	82.1	47.4	64.6	82.1	47.4	inches	30.618	29.780	30.618	29.780	12	12		
16	75.0	54.5	20.5	64.7	79.4	48.8	3	6	6	5	5	5	79.4	48.8	64.7	79.4	48.8	inches	30.618	29.780	30.618	29.780	9	11		
17	75.4	54.8	20.6	65.1	83.7	50.6	4	7	6	6	6	6	83.7	50.6	65.1	83.7	50.6	inches	30.618	29.780	30.618	29.780	16	9		
18	75.5	54.7	20.8	65.1	79.4	47.4	4	6	6	6	6	6	79.4	47.4	65.1	79.4	47.4	inches	30.618	29.780	30.618	29.780	4	5		
19	76.9	52.6	24.3	64.7	82.5	48.4	5	5	5	3	6	7	82.5	48.4	64.7	82.5	48.4	inches	30.618	29.780	30.618	29.780	15	10		
20	77.4	52.5	24.9	64.9	80.8	49.6	4	1	4	1	9	9	80.8	49.6	64.9	80.8	49.6	inches	30.618	29.780	30.618	29.780	10	10		
21	77.9	52.7	25.2	65.3	85.8	48.8	6	4	4	2	8	8	85.8	48.8	65.3	85.8	48.8	inches	30.618	29.780	30.618	29.780	8	12		
22	78.2	53.7	24.5	65.9	82.2	46.8	7	1	4	3	7	7	82.2	46.8	65.9	82.2	46.8	inches	30.618	29.780	30.618	29.780	5	15		
23	76.7	55.1	21.6	65.9	81.7	49.3	4	6	6	6	6	4	81.7	49.3	65.9	81.7	49.3	inches	30.618	29.780	30.618	29.780	6	14		
24	78.1	54.3	23.8	66.2	84.6	49.5	4	5	5	4	4	4	84.6	49.5	66.2	84.6	49.5	inches	30.618	29.780	30.618	29.780	14	6		
25	78.0	53.8	24.2	65.9	83.9	48.3	5	4	4	3	7	7	83.9	48.3	65.9	83.9	48.3	inches	30.618	29.780	30.618	29.780	12	8		
26	76.7	54.8	21.9	65.7	86.3	48.3	5	5	5	5	5	5	86.3	48.3	65.7	86.3	48.3	inches	30.618	29.780	30.618	29.780	8	12		
27	77.2	55.4	21.8	66.3	88.3	47.9	5	1	4	6	6	4	88.3	47.9	66.3	88.3	47.9	inches	30.618	29.780	30.618	29.780	11	9		
28	76.3	54.7	21.6	65.5	82.6	49.2	5	4	5	5	5	4	82.6	49.2	65.5	82.6	49.2	inches	30.618	29.780	30.618	29.780	12	8		
29	77.5	53.9	23.6	65.7	83.5	51.5	7	1	2	4	6	6	83.5	51.5	65.7	83.5	51.5	inches	30.618	29.780	30.618	29.780	7	13		
30	75.1	54.9	20.2	65.0	80.2	52.8	3	1	6	6	4	4	80.2	52.8	65.0	80.2	52.8	inches	30.618	29.780	30.618	29.780	14	6		

TABLE 8.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT DURBAN, NATAL, 1888-1897.

Aug.	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M-)	(M+)	(M-)	M ₃	m ₃	M ₃ -m ₃	$\frac{M_3+m_3}{2}$	M' ₃	m' ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P-)
		$^{\circ}$	$^{\circ}$	$^{\circ}$	$^{\circ}$	$^{\circ}$					$^{\circ}$	$^{\circ}$	$^{\circ}$	$^{\circ}$	$^{\circ}$	$^{\circ}$	inches	inches	inches	inches	inches	inches		
1	74.3	55.8	18.5	65.0	85.2	50.1	2	8	3	7	75.3	54.8	20.5	65.0	85.2	46.6	175	30.655	29.892	30.215	30.655	29.892	12	8
2	74.1	54.4	19.7	64.2	80.3	49.3	2	8	3	7	75.3	54.8	20.5	65.0	85.2	46.6	175	30.655	29.892	30.215	30.655	29.892	13	7
3	77.4	54.3	23.1	65.3	80.4	46.6	7	3	3	1	75.3	54.8	20.5	65.0	85.2	46.6	175	30.655	29.892	30.215	30.655	29.892	11	9
4	81.5	55.1	26.4	68.3	98.2	49.2	7	3	5	5	77.5	56.4	21.1	66.9	98.2	49.2	106	30.655	29.892	30.215	30.655	29.892	4	16
5	74.8	57.2	17.6	66.0	80.0	49.9	7	3	6	5	77.5	56.4	21.1	66.9	98.2	49.2	106	30.655	29.892	30.215	30.655	29.892	10	10
6	76.3	56.9	19.4	66.6	84.5	51.1	5	5	5	5	77.5	56.4	21.1	66.9	98.2	49.2	106	30.655	29.892	30.215	30.655	29.892	13	7
7	79.0	55.6	23.4	67.3	84.4	50.8	4	2	4	6	77.5	56.4	21.1	66.9	98.2	49.2	106	30.655	29.892	30.215	30.655	29.892	7	13
8	78.2	56.8	21.4	67.5	88.1	51.1	6	4	5	5	77.5	56.4	21.1	66.9	98.2	49.2	106	30.655	29.892	30.215	30.655	29.892	9	11
9	75.4	57.1	18.3	66.2	88.1	51.1	4	6	5	5	77.5	56.4	21.1	66.9	98.2	49.2	106	30.655	29.892	30.215	30.655	29.892	10	10
10	77.7	57.9	19.8	67.8	84.9	49.5	8	2	6	4	77.5	56.4	21.1	66.9	98.2	49.2	106	30.655	29.892	30.215	30.655	29.892	8	12
11	77.3	56.4	20.9	66.8	86.3	49.3	7	3	5	5	77.5	56.4	21.1	66.9	98.2	49.2	106	30.655	29.892	30.215	30.655	29.892	10	10
12	77.3	56.4	20.9	66.8	86.3	49.3	7	3	5	5	77.5	56.4	21.1	66.9	98.2	49.2	106	30.655	29.892	30.215	30.655	29.892	10	10
13	72.7	55.7	17.0	64.2	81.0	52.4	4	6	3	7	77.3	56.8	20.5	67.0	97.8	49.3	185	30.614	29.740	30.178	30.614	29.740	13	8
14	71.9	55.9	16.0	63.9	76.8	52.0	2	8	4	6	74.4	55.1	19.3	64.7	83.1	47.5	256	30.507	29.740	30.246	30.507	29.740	13	7
15	78.6	53.6	25.0	66.1	83.1	47.5	7	3	2	8	74.4	55.1	19.3	64.7	83.1	47.5	256	30.507	29.740	30.246	30.507	29.740	10	10
16	76.5	56.7	19.8	66.6	83.3	52.0	4	6	5	5	74.4	55.1	19.3	64.7	83.1	47.5	256	30.507	29.740	30.246	30.507	29.740	11	9
17	75.9	57.7	18.2	66.8	78.8	53.8	6	4	5	5	74.4	55.1	19.3	64.7	83.1	47.5	256	30.507	29.740	30.246	30.507	29.740	12	8
18	78.5	56.9	21.6	67.7	87.1	51.3	7	3	4	4	77.0	57.1	19.9	67.0	87.1	51.3	201	30.715	29.765	30.210	30.715	29.765	9	1
19	76.6	56.3	20.3	66.4	80.7	47.7	7	2	5	6	77.0	57.1	19.9	67.0	87.1	51.3	201	30.715	29.765	30.210	30.715	29.765	8	12
20	74.7	57.0	17.7	65.8	80.8	48.6	5	5	6	4	75.6	56.4	19.2	66.0	94.9	47.7	221	30.448	29.841	30.220	30.448	29.841	12	8
21	75.6	55.9	19.7	65.7	84.9	50.6	4	6	2	8	75.6	56.4	19.2	66.0	94.9	47.7	221	30.448	29.841	30.220	30.448	29.841	13	7
22	75.3	56.9	18.4	66.1	82.2	51.7	4	6	4	6	75.6	56.4	19.2	66.0	94.9	47.7	221	30.448	29.841	30.220	30.448	29.841	12	8
23	79.1	56.6	22.5	67.8	102.9	51.5	7	3	5	5	77.3	57.1	20.2	67.2	102.9	50.8	181	30.589	29.752	30.223	30.589	29.752	11	9
24	77.4	57.9	19.5	67.6	83.1	50.8	7	3	7	3	77.3	57.1	20.2	67.2	102.9	50.8	181	30.589	29.752	30.223	30.589	29.752	10	10
25	75.5	58.1	17.4	65.8	83.1	51.1	6	4	8	2	77.3	57.1	20.2	67.2	102.9	50.8	181	30.589	29.752	30.223	30.589	29.752	12	8
26	74.3	57.6	16.7	65.9	83.3	52.8	5	5	7	3	75.5	57.8	17.7	66.6	96.2	52.4	230	30.553	29.786	30.205	30.553	29.786	12	8
27	76.8	57.8	19.0	67.3	96.2	52.4	5	5	6	6	75.5	57.8	17.7	66.6	96.2	52.4	161	30.510	29.777	30.205	30.510	29.777	10	10
28	76.4	57.1	19.3	66.7	81.3	53.3	5	5	7	3	75.5	57.8	17.7	66.6	96.2	52.4	172	30.503	29.889	30.205	30.503	29.889	7	13
29	76.8	56.9	19.9	66.8	93.2	53.4	5	5	5	5	75.7	56.6	19.1	66.1	93.2	52.4	141	30.474	29.821	30.155	30.474	29.821	7	13
30	74.0	55.9	18.1	64.9	82.2	52.4	5	5	5	5	75.7	56.6	19.1	66.1	93.2	52.4	153	30.512	29.836	30.155	30.512	29.836	7	13
31	78.6	58.8	19.8	68.7	89.4	51.5	8	2	8	2	75.7	56.6	19.1	66.1	93.2	52.4	157	30.542	29.870	30.155	30.542	29.870	6	14

TABLE 9.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT DURBAN, NATAL, 1888-1897.

Sept.	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	M ₃ -m ₃	$\frac{M_3+m_3}{2}$	M' ₃	m' ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	77.8	57.3	20.5	67.5	°	°	6		4	3		7	°	°	°	°	°	°	inches 26.198	inches 30.376	inches 29.885	inches 30.231	inches 30.729	inches 29.812	13		7
2	72.7	54.4	18.3	63.5	79.5	46.5	3		7	2		8	76.4	56.8	19.6	66.6	89.4	46.5	.338	.729	.812	30.231	30.729	29.812	17		3
3	73.7	55.8	17.9	64.7	79.5	49.7	3		7	2		7						.285	.620	.899				15		5	
4	78.1	55.7	22.4	66.9	82.9	48.3	7		3	3		7						.137	.388	.966				9		11	
5	76.8	57.3	19.5	67.0	80.9	50.2	6		4	3	1		76.2	56.3	19.9	66.2	82.9	48.3	.139	.319	.772	30.187	30.620	29.772	10		10
6	77.4	58.0	19.4	67.7	90.0	51.5	5		4	4		6						.176	.498	.837				12		8	
7	75.9	59.2	16.7	67.5	84.0	53.7	5		5	6	1		76.5	59.3	17.2	67.9	90.0	51.5	.109	.420	.862				8		
8	76.1	60.7	15.4	68.4	85.8	56.0	5		6	6		3						.095	.444	.730	30.127	30.498	29.730	9		11	
9	73.2	57.6	15.6	65.4	80.0	50.8	4		6	6		7						.163	.359	.779				12		8	
10	74.2	57.8	16.4	66.0	78.5	51.5	4		6	6	1		74.6	56.9	17.7	65.7	90.9	50.1	.154	.526	.674				10		10
11	76.3	55.3	21.0	65.8	90.9	50.1	3		7	2		8						.213	.442	.856				12		8	
12	76.8	57.0	19.8	66.9	83.6	51.5	4		6	3		7						.183	.442	.856				12		8	
13	78.4	57.3	21.1	67.8	82.4	52.9	6		4	4		6						.107	.502	.812				10		10	
14	79.6	59.5	20.1	69.5	90.3	51.5	6		4	5		5	78.3	57.9	20.3	68.1	90.3	51.5	.184	.440	.852	30.158	30.502	29.812	11		9
15	77.1	59.7	17.4	68.4	87.4	51.7	6		3	6		4						.210	.446	.964				11		9	
16	80.1	59.0	21.1	69.5	95.4	51.7	5		5	6		4	79.0	59.4	19.6	69.2	100.1	51.7	.119	.509	.875	30.149	30.576	29.682	8		12
17	79.9	59.6	20.3	69.7	100.1	54.0	7		3	6		4						.182	.497	.802				6		14	
18	75.4	59.7	15.7	67.5	79.1	49.5	4		6	6		4						.096	.330	.29.813				9		11	
19	77.8	59.2	18.6	68.5	84.9	52.4	6		4	7		3						.125	.407	.834	30.134	30.497	29.813	7		13	
20	77.7	60.3	17.4	69.0	84.1	53.3	6		4	8		2	77.0	59.7	17.3	69.3	84.9	49.5	.034	.527	.607				8		12
21	84.9	59.8	25.1	72.3	110.6	53.7	6		4	8		2						.034	.527	.607				5		15	
22	80.0	60.2	19.8	70.1	94.8	51.3	8		2	7	1							.112	.452	.733	30.060	30.527	29.601	5		15	
23	76.1	60.2	15.9	68.1	87.3	53.7	6		4	7		4	80.3	60.1	20.2	70.2	110.6	51.3	? .249	? .610	.978				9		11
24	76.0	58.2	17.8	67.1	85.6	52.8	3		7	4		6						.157	.453	.868				16		4	
25	75.8	58.2	17.6	67.0	83.6	51.5	4		6	4		6						.149	.516	.845	30.185	30.610	29.845	10		10	
26	76.7	59.5	17.2	68.1	79.9	56.2	6	1	3	3	1		76.2	58.6	17.6	67.4	85.6	51.5	.123	.689	.765				9		11
27	77.0	59.8	17.2	68.4	87.3	55.8	6		4	6		4						.081	.394	.784				6		14	
28	76.8	60.4	16.4	68.6	84.5	52.9	6		4	7		3						.124	.475	.695	30.109	30.689	29.765	7		13	
29	76.9	50.5	17.4	68.2	87.9	52.8	5		5	4		6	76.9	59.9	17.0	68.4	87.9	52.8	.125	.426	.754				6		14
30	79.5	60.0	19.5	69.7	84.8	53.8	7	1	2	7		3												.9		11	

TABLE 10.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT DURBAN, NATAL, 1888-1897.

	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M-)	(M+)	(M-)	m ₃	M ₃ -m ₃	$\frac{M_3+m_3}{2}$	M' ₃	m' ₃	P	MP	mP	P ₃	M'P ₃	mP ₃	(P+)	(P-)
1	81.0	60.8	20.7	70.6	88.5	53.8	8				6			88.5	53.8	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	8	12
2	75.8	63.5	12.3	69.6	82.7	55.6	4	2	4	6	5			82.7	55.6	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	11	9
3	79.7	60.7	19.0	70.2	107.8	54.9	5	5	5	6	6			107.8	54.9	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	8	12
4	77.7	61.5	16.2	69.6	84.7	55.6	5	5	5	5	5			84.7	55.6	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	12	8
5	77.9	62.0	15.9	69.9	86.3	43.6	4	6	7	3	3			86.3	43.6	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	10	10
6	75.4	60.0	15.4	68.2	84.9	43.4	4	6	3	6	6			84.9	43.4	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	11	9
7	77.1	58.7	18.4	67.9	85.6	51.1	6	4	2	7	7			85.6	51.1	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	12	8
8	78.1	60.5	17.6	69.3	84.6	53.3	7	3	4	6	6			84.6	53.3	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	10	10
9	76.6	60.6	16.0	68.6	83.2	51.5	4	6	6	4	4			83.2	51.5	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	10	1
10	76.4	60.9	15.5	68.6	83.7	49.7	2	8	5	5	5			83.7	49.7	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	15	5
11	78.7	60.7	18.0	69.7	88.5	52.9	5	5	4	6	6			88.5	52.9	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	8	12
12	79.1	61.0	18.1	70.0	87.4	55.8	6	4	4	6	6			87.4	55.8	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	17	7
13	74.4	60.8	13.6	67.4	83.1	53.7	3	7	5	5	5			83.1	53.7	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	10	10
14	76.6	59.6	17.0	68.1	82.2	51.9	4	6	5	5	5			82.2	51.9	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	13	3
15	76.0	59.6	16.4	67.8	81.9	53.7	3	7	4	6	6			81.9	53.7	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	17	3
16	77.9	61.3	16.6	69.6	83.3	53.8	6	4	6	4	4			83.3	53.8	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	15	5
17	78.8	61.4	17.4	70.1	82.4	53.1	7	3	6	6	6			82.4	53.1	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	10	10
18	82.1	61.0	21.1	71.6	89.7	52.8	9	1	4	6	6			89.7	52.8	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	5	15
19	80.0	64.8	15.2	72.4	84.2	60.0	7	3	8	2	2			84.2	60.0	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	6	14
20	80.9	63.9	17.0	72.4	88.3	60.5	7	3	8	2	2			88.3	60.5	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	5	15
21	77.4	65.8	11.6	71.6	86.7	58.0	6	4	9	1	1			86.7	58.0	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	7	13
22	80.6	64.4	16.2	72.5	94.3	55.1	7	3	8	2	2			94.3	55.1	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	6	14
23	74.1	63.6	10.5	68.8	86.0	54.6	3	7	6	4	4			86.0	54.6	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	7	14
24	77.2	61.2	16.0	69.2	87.0	54.9	4	6	4	6	6			87.0	54.9	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	10	10
25	78.9	61.2	17.7	70.0	89.0	57.5	6	4	3	7	7			89.0	57.5	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	7	13
26	79.0	60.7	18.3	69.8	89.9	55.5	5	6	4	6	6			89.9	55.5	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	10	10
27	77.8	62.0	15.8	69.9	86.2	54.2	4	6	6	6	6			86.2	54.2	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	9	11
28	81.6	62.6	19.0	72.1	87.3	55.5	8	2	5	4	4			87.3	55.5	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	7	13
29	79.2	62.7	16.5	70.9	84.0	55.8	5	1	7	3	3			84.0	55.8	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	6	14
30	80.2	61.3	18.9	70.7	86.8	55.1	7	3	4	6	6			86.8	55.1	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	11	9
31	76.5	61.6	14.9	69.0	86.9	54.4	4	5	4	6	6			86.9	54.4	inches 30.076	inches 30.392	inches 29.760	inches 30.122	inches 30.471	inches 29.754	13	7

TABLE 12.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT DURBAN, NATAL, 1888-1897.

Dec.	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	$\frac{M_3+m_3}{2}$	$\frac{M_3}{M_3+m_3}$	M ₃	m ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	81.2	66.1	15.1	73.6	89.8	59.6	2		8	3		7	83.2	67.0	16.2	75.1	92.6	57.4	29.976	30.370	29.694	29.977	30.405	29.548	7		13
2	83.5	65.0	18.5	74.2	91.4	61.2	4		6	3		7				92.6	57.4	30.069	30.5	30.982				13		7	
3	85.7	64.6	21.1	75.1	92.9	58.2	6		4	3		7				92.6	57.4	29.998	30.989	30.750				9		11	
4	83.0	65.4	17.6	74.2	88.5	61.3	5		5	3		7				92.6	57.4	98.9	213	726	30.019	30.305	29.726	8		12	
5	85.6	66.1	19.5	75.8	94.1	60.5	6		4	5		7				92.6	57.4	98.9	213	726	30.019	30.305	29.726	7	1	12	
6	84.9	65.3	19.6	75.1	92.4	60.3	6		3	5		7				92.6	57.4	946	185	659				9		11	
7	85.2	66.8	18.4	76.0	94.0	63.2	5	1	4	6		4				92.6	57.4	946	185	659				15		5	
8	82.1	65.9	16.2	74.0	88.8	63.2	4		6	6		4				92.6	57.4	946	185	659				12		8	
9	82.3	65.8	16.5	74.0	88.9	60.9	6		4	5		5				92.6	57.4	946	185	659				12		8	
10	82.0	63.9	18.1	73.0	92.1	55.3	3	2	5	4		6				92.6	57.4	946	185	659				12		8	
11	85.9	65.6	20.3	75.7	98.4	60.1	5		5	4		6				92.6	57.4	946	185	659				8		12	
12	84.8	67.0	17.8	75.9	94.5	55.8	5		5	6		4				92.6	57.4	946	185	659				7		13	
13	84.5	67.2	17.3	75.8	93.9	62.3	5		5	6		4				92.6	57.4	946	185	659				8		12	
14	82.5	67.8	14.7	75.1	99.9	63.0	5		5	6		4				92.6	57.4	946	185	659				8		12	
15	85.3	65.4	19.9	75.3	93.0	56.0	6		4	5		5				92.6	57.4	946	185	659				8		12	
16	86.5	66.1	20.4	76.3	98.0	58.3	8		2	6		4				92.6	57.4	946	185	659				9		11	
17	82.6	66.4	16.2	74.5	95.1	58.0	5		5	6		4				92.6	57.4	946	185	659				11		9	
18	84.9	65.5	19.4	75.2	95.5	58.3	5		5	6		4				92.6	57.4	946	185	659				7		13	
19	86.5	66.9	19.6	76.7	96.6	60.9	7		3	6		4				92.6	57.4	946	185	659				7		13	
20	83.0	66.3	16.7	74.6	98.5	58.7	5		5	5		4				92.6	57.4	946	185	659				8		12	
21	84.7	67.6	17.1	76.1	96.2	57.2	6		4	7		3				92.6	57.4	946	185	659				12		8	
22	85.4	65.5	19.9	75.4	89.1	56.9	6		4	6		6				92.6	57.4	946	185	659				12		8	
23	85.6	68.0	17.6	76.8	90.9	55.6	8		2	9		1				92.6	57.4	946	185	659				10		10	
24	85.1	67.1	18.0	76.1	94.0	60.0	6		4	6		4				92.6	57.4	946	185	659				16		4	
25	85.2	65.5	19.7	75.3	96.3	58.5	5		6	6		5				92.6	57.4	946	185	659				13		7	
26	86.2	65.4	20.8	75.6	94.9	60.3	4		5	5		6				92.6	57.4	946	185	659				12		8	
27	84.9	67.5	17.4	76.2	95.3	63.7	6		4	7		3				92.6	57.4	946	185	659				7		13	
28	86.1	68.4	17.7	77.2	95.5	65.2	7		3	9		1				92.6	57.4	946	185	659				9		11	
29	86.3	68.7	17.6	77.5	95.5	64.6	6		4	9		1				92.6	57.4	946	185	659				5		15	
30	80.5	66.2	14.3	73.3	92.8	60.0	2		8	6		4				92.6	57.4	946	185	659				10		10	
31	82.9	63.7	19.2	73.3	91.3	60.5	4		6	2		8				92.6	57.4	946	185	659				12		8	

TABLE 13.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1887-1897.

Jan.	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	$\frac{M_3+m_3}{2}$	$\frac{M_3+m_3}{2}$	M ₃	m ₃	P	MP	P ₃	mP ₃	(P+)	(P=)	(P-)
1	91.1	59.2	31.9	75.1	100.4	52.8	5	5	5	5	5	5	0	0	0	0	0	0	inches 25.934	inches 26.194	inches 25.823	inches			10
2	91.4	60.2	31.2	77.8	99.5	54.0	6	6	6	6	6	6	0	0	0	0	0	0	inches 25.943	inches 26.162	inches 25.815	inches			11
3	93.0	61.1	31.9	77.0	98.5	56.0	4	4	4	4	4	4	91.8	60.2	31.6	76.0	100.4	52.8	inches 25.930	inches 26.086	inches 25.781	inches			7
4	91.7	61.9	29.8	76.8	102.8	55.3	5	5	5	5	5	5	91.8	60.2	31.6	76.0	100.4	52.8	inches 25.930	inches 26.086	inches 25.781	inches			11
5	92.3	60.9	31.4	76.6	101.5	55.3	6	6	6	6	6	6	91.5	60.9	30.6	76.2	102.8	54.8	inches 25.908	inches 25.992	inches 25.758	inches			9
6	90.5	60.0	30.5	75.2	101.7	54.8	4	4	4	4	4	4	91.5	60.9	30.6	76.2	102.8	54.8	inches 25.908	inches 25.992	inches 25.758	inches			10
7	89.0	58.4	30.6	73.7	101.2	48.7	3	3	3	3	3	3	91.5	60.9	30.6	76.2	102.8	54.8	inches 25.908	inches 25.992	inches 25.758	inches			11
8	90.4	58.6	31.8	74.5	98.0	52.0	4	4	4	4	4	4	90.4	58.7	31.7	74.5	101.2	48.7	inches 25.970	inches 26.041	inches 25.851	inches			7
9	91.8	59.1	32.7	75.4	98.3	51.2	4	4	4	4	4	4	90.4	58.7	31.7	74.5	101.2	48.7	inches 25.970	inches 26.041	inches 25.851	inches			9
10	95.8	60.3	35.5	78.0	101.0	55.5	9	9	9	9	9	9	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			6
11	93.3	61.1	32.2	77.2	103.0	50.3	7	7	7	7	7	7	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			9
12	93.8	62.9	30.9	78.3	102.7	50.5	6	6	6	6	6	6	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			6
13	92.5	61.7	30.8	77.1	100.0	57.3	6	6	6	6	6	6	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			10
14	93.7	61.9	31.8	77.8	102.1	56.3	6	6	6	6	6	6	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			11
15	95.1	62.8	32.3	78.9	102.3	57.6	6	6	6	6	6	6	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			8
16	93.3	60.8	32.5	77.0	102.5	51.0	5	5	5	5	5	5	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			5
17	92.2	61.8	30.4	77.0	103.3	51.5	4	4	4	4	4	4	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			5
18	92.9	60.9	32.0	76.9	100.9	56.0	7	7	7	7	7	7	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			8
19	87.6	60.7	26.9	74.1	101.6	48.3	3	3	3	3	3	3	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			7
20	89.5	58.8	30.7	74.1	101.6	48.3	3	3	3	3	3	3	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			7
21	87.6	60.5	27.1	74.0	101.0	56.5	4	4	4	4	4	4	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			7
22	89.2	60.5	28.7	74.8	102.0	53.3	4	4	4	4	4	4	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			5
23	89.3	59.4	29.9	74.3	105.6	52.7	3	3	3	3	3	3	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			5
24	89.9	61.0	28.9	75.5	102.0	57.0	4	4	4	4	4	4	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			8
25	89.6	59.7	29.9	74.6	100.2	48.5	6	6	6	6	6	6	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			9
26	91.7	59.7	32.0	75.7	102.7	49.0	4	4	4	4	4	4	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			5
27	94.4	59.6	34.8	77.0	105.0	53.0	6	6	6	6	6	6	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			11
28	95.1	61.1	34.0	78.1	103.2	56.8	6	6	6	6	6	6	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			9
29	95.3	60.7	34.6	78.0	106.0	52.3	6	6	6	6	6	6	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			7
30	94.2	62.4	31.8	78.3	107.2	57.7	5	5	5	5	5	5	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			6
31	95.3	61.9	33.4	78.6	108.5	56.3	7	7	7	7	7	7	94.3	61.4	32.9	77.8	103.0	50.3	inches 25.943	inches 26.062	inches 25.801	inches			5

TABLE 14.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

Feb.	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	M ₃ -m ₃	$\frac{M_3+m_3}{2}$	M' ₃	m' ₃	P	MP	inches	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	92.7	62.1	30.6	77.4	106.2	53.0			4	7		3	92.2	61.9	30.3	77.0	108.5	56.0	.965	.172	.764	25.907	25.764	9		7
2	88.7	61.6	27.1	75.1	98.5	57.3		4	4	7		3							.943	.110	.718			6		10
3	87.7	59.9	27.8	73.8	96.6	54.8		6	6	5		5							.941	.083	.803			5		11
4	89.8	61.2	28.6	75.5	98.2	57.5		5	5	6		4							.944	.079	.832	25.943	26.110	7		9
5	83.1	61.3	21.8	72.2	95.3	58.5		4	6	6		5	86.9	60.8	26.1	73.8	98.2	54.8	.933	.076	.769			4		12
6	86.4	60.2	26.2	73.3	97.0	56.3		3	7	6		4							.944	.097	.836			5		11
7	85.1	59.8	25.3	72.4	95.0	51.5		3	7	5		5							.930	.078	.835	25.986	26.097	4		12
8	87.0	57.9	29.2	72.5	96.4	48.7		3	7	5		5	86.2	59.3	26.9	72.7	97.0	48.7	.955	.113	.853			5		11
9	86.0	60.3	25.7	73.1	96.0	54.0		3	7	5		5							.945	.085	.841			6		10
10	87.5	59.2	28.3	73.3	96.7	56.2		4	6	2		8							.936	.030	.834	25.945	26.113	5	1	10
11	89.8	59.8	30.0	74.8	100.1	56.7		5	5	2		8	87.8	59.8	28.0	73.8	100.1	54.0	.965	.105	.866			4		12
12	88.5	59.5	29.0	74.0	99.2	52.2		6	4	6		4							.959	.082	.863			5		11
13	88.1	58.0	30.1	73.0	96.3	50.5		6	4	6		4							.991	.060	.916	25.972	26.105	5		11
14	89.9	59.8	30.1	74.8	102.5	55.4		7	3	5		5	88.8	59.1	29.7	73.9	102.5	50.5	26.009	.092	.890			11		4
15	90.9	60.1	30.8	75.5	100.3	55.0		7	3	6		4							25.981	.138	.758			8		8
16	90.4	61.3	29.1	75.8	99.3	59.5		8	2	7		3	91.5	60.7	30.8	76.1	100.5	55.0	.936	.069	.675	25.975	26.138	8		8
17	93.1	60.6	32.5	76.8	100.5	56.0		9	1	6		4							.951	.079	.781			8		9
18	91.8	61.4	30.4	76.6	101.0	57.0		7	3	6		4							.982	.193	.828			7		8
19	91.7	58.6	33.1	75.1	103.0	52.5		7	3	6		4							.998	.177	.890	25.977	26.193	8		8
20	90.9	60.5	30.4	75.7	100.5	52.0		6	4	6		4	91.5	60.2	31.3	75.8	103.0	52.0	.998	.151	.862			8		8
21	87.4	59.6	27.8	73.5	98.0	48.5		4	6	5		5							.985	.108	.863			9		7
22	90.4	58.7	31.7	74.5	99.8	51.8		6	4	4		6							.982	.106	.865			8		8
23	91.5	59.8	31.7	75.6	98.5	52.0		6	4	4		6	89.8	59.4	30.4	74.2	99.8	48.5	.988	.151	.862	25.985	26.151	8		8
24	89.1	60.2	28.9	74.6	97.3	50.0		4	6	5		5							26.032	.147	.982			16		0
25	87.0	59.8	27.2	73.4	97.5	51.7		3	7	4		6							.038	.143	.935			14		2
26	88.3	60.1	28.2	74.2	100.0	53.2		5	5	6		4	88.1	60.0	28.1	74.0	100.0	50.0	.013	.108	.928	26.028	26.147	11		5
27	91.9	59.7	32.2	75.8	100.4	53.4		8	4	4		6							.016	.157	.887			11	1	4
28	87.1	61.6	25.5	74.3	100.0	58.0		2	6	6		4							.014	.141	.924			10		6
29	85.0	61.0	24.0	73.0	92.8	59.8		1	1	2		1	88.9	60.7	28.2	74.8	100.4	53.4	25.944	25.960	.917	26.007	26.157	0		4

TABLE 15.
MEAN DAILY TEMPERATURE AND PRESSURE ON THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

Mar.	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	M ₃ -m ₃	$\frac{M_3+m_3}{2}$	M' ₃	m' ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	86.6	60.0	26.6	73.3	0	0	7		3	9			0	0	0	73.3	0	0	inches 26.008	inches 26.124	inches 25.830	inches 25.830	inches 25.830	inches 25.830	9		7
2	87.4	59.2	28.2	73.3	0	0	7	1	2	6			87.2	59.3	27.9	73.2	0	0	.044	.137	.914			11		5	
3	87.7	58.6	29.1	73.1	0	0	8		2	5									.052	.183	.953	26.035	26.183	25.890	10		6
4	87.9	57.3	30.6	72.6	0	0	9		1	5									.051	.180	.921			10		6	
5	89.2	60.8	28.4	75.0	0	0	8		1	8									.043	.182	.911			10		6	
6	88.3	61.6	26.7	74.9	0	0	8		2	9			88.5	59.9	28.6	74.2	0	0	.026	.159	.863	26.040	26.180	25.863	7		9
7	88.2	60.5	27.7	74.3	0	0	9		1	8									.002	.213	.842			6		6	
8	88.2	58.1	30.1	73.1	0	0	6	1	3	7			87.1	59.3	27.8	73.2	0	0	.003	.185	.904			5		11	
9	85.0	59.2	25.8	72.1	0	0	6		4	3									.025	.148	.848	26.010	26.213	25.842	11		5
10	87.0	59.4	27.6	73.2	0	0	6		4	7									.002	.129	.813			6		10	
11	85.2	59.6	25.6	72.4	0	0	6		4	7									.004	.149	.895			6		10	
12	86.5	59.2	27.3	72.8	0	0	6	2	4	6			86.2	59.4	26.8	72.8	0	0	.013	.119	.933	26.006	26.149	25.813	5		11
13	85.8	58.7	27.1	72.2	0	0	6		3	6									25.997	.090	.916			6		10	
14	84.3	59.1	25.2	71.7	0	0	6		3	7									.099	.112	.868			5		11	
15	83.3	59.2	24.2	71.3	0	0	5		3	6			84.5	59.0	25.5	71.7	0	0	26.024	.157	.868	26.007	26.157	25.868	8		8
16	83.3	57.6	25.7	70.4	0	0	6		6	7									.041	.179	.887			8		7	
17	81.4	57.8	23.6	69.6	0	0	4		6	6									.050	.211	.893			9		7	
18	82.3	56.7	25.6	69.5	0	0	5		6	5			82.3	57.4	24.9	69.8	0	0	.062	.199	.953	26.053	26.211	25.893	11		5
19	82.8	58.4	24.4	70.6	0	0	4		6	4									.033	.143	.914			7		9	
20	82.6	59.8	22.8	71.0	0	0	5		5	7									.013	.140	.927			7		9	
21	81.9	56.4	25.5	69.1	0	0	4	1	6	3			82.4	58.2	24.2	70.3	0	0	.020	.130	.942	26.022	26.143	25.914	7		9
22	82.1	56.2	25.9	69.1	0	0	4		6	3									.029	.113	.891			9		7	
23	83.7	54.9	28.8	69.3	0	0	4		6	4									.031	.110	.870			10		6	
24	80.4	54.6	25.8	67.5	0	0	3		7	2			82.1	55.2	26.9	68.6	0	0	.043	.154	.839	26.034	26.154	25.839	12		4
25	78.0	54.5	23.5	66.3	0	0	3		7	2									.021	.118	.810			9		7	
26	80.2	55.5	24.7	67.8	0	0	4		5	5			80.2	55.2	25.0	67.7	0	0	.031	.138	.839	26.029	26.140	25.810	11		5
27	82.3	55.5	26.8	68.9	0	0	4	1	5	6									.041	.132	.948			10		6	
28	80.3	56.3	24.0	68.3	0	0	4	1	5	2									.047	.194	.966			8		8	
29	80.4	55.4	25.0	67.9	0	0	4		5	1									.041	.194	.966			7		9	
30	79.1	54.5	24.6	66.8	0	0	3		7	1			79.9	55.4	24.5	67.7	0	0	.023	.225	.903	26.037	26.225	25.903	7		9
31	81.8	54.2	27.6	68.0	0	0	3	1	6	2									.026	.149	.856			10		6	

TABLE 16.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

April	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	M_3-m_3	$\frac{M_3+m_3}{2}$	M ₃	m ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	78.6	51.7	26.9	65.1	91.3	41.2	6		4	7		3	0	0	26.4	65.6	91.3	41.2	26.065	26.231	25.899	26.064	26.270	25.856	6		10
2	76.1	51.3	24.8	63.7	90.5	42.5	6		4	5		5	78.8	52.4	26.4	65.6	91.3	41.2	.102	.270	.988	26.064	26.270	25.856	10		6
3	79.3	52.1	27.2	65.7	89.4	37.0	8		2	5		5	0	0	26.4	65.6	91.3	41.2	.131	.252	.964	26.064	26.270	25.856	14		2
4	81.6	53.4	28.2	67.5	90.5	42.0	8		2	8		2	80.4	53.0	27.4	66.7	92.2	37.0	.098	.245	.008	26.064	26.270	25.856	9		7
5	80.3	53.6	26.7	66.9	92.2	44.3	9		1	7		3	80.4	53.0	27.4	66.7	92.2	37.0	.058	.167	.259	26.096	26.252	25.925	7		9
6	78.8	53.7	25.1	66.2	89.6	49.0	7		3	8		2	78.8	52.8	25.8	65.7	91.0	44.5	.068	.180	.968	26.064	26.252	25.925	10		10
7	78.6	53.2	25.4	65.9	91.0	46.3	7	1	2	8		2	78.6	52.8	25.8	65.7	91.0	44.5	.082	.235	.996	26.064	26.252	25.925	7		9
8	78.5	51.4	27.1	64.9	87.2	44.5	7		3	5		4	78.6	52.8	25.8	65.7	91.0	44.5	.071	.218	.934	26.077	26.255	25.934	6		10
9	80.1	53.0	27.1	66.5	89.3	43.2	7		3	9		1	77.8	53.2	24.6	65.5	89.3	40.3	.087	.217	.830	26.064	26.255	25.934	5		11
10	78.2	52.9	25.3	66.5	88.5	40.3	5		5	7		3	77.8	53.2	24.6	65.5	89.3	40.3	.058	.234	.793	26.064	26.255	25.934	8		8
11	75.0	53.8	21.2	64.4	85.0	45.3	6		4	7		3	77.8	53.2	24.6	65.5	89.3	40.3	.060	.256	.800	26.052	26.256	25.793	6		10
12	74.9	52.3	22.6	63.6	82.3	46.8	5		5	5		4	75.3	50.3	25.0	62.8	88.5	40.0	.050	.265	.816	26.064	26.256	25.793	5		11
13	74.4	49.3	25.1	61.8	84.3	40.0	6		4	5		5	75.3	50.3	25.0	62.8	88.5	40.0	.074	.203	.954	26.064	26.256	25.793	8		8
14	76.5	49.3	27.2	62.9	88.5	41.0	6		4	3		7	75.3	50.3	25.0	62.8	88.5	40.0	.091	.193	.950	26.072	26.265	25.816	10		6
15	76.0	52.0	26.0	65.0	86.3	43.5	8		2	6		4	76.8	51.3	25.5	64.0	86.3	36.5	.084	.237	.890	26.072	26.265	25.816	8		6
16	76.8	51.5	25.3	64.1	84.5	42.8	7		3	6		3	76.8	51.3	25.5	64.0	86.3	36.5	.067	.228	.899	26.075	26.267	25.890	7		9
17	75.7	50.5	25.2	63.1	85.4	36.5	7		3	7		3	76.8	51.3	25.5	64.0	86.3	36.5	.075	.143	.26.008	26.075	26.267	25.890	8		8
18	74.3	51.1	23.2	62.7	84.0	38.0	4		6	7		3	76.8	51.3	25.5	64.0	86.3	36.5	.094	.218	.25.980	26.075	26.267	25.890	11		10
19	72.7	49.9	22.8	61.3	79.0	40.0	5		5	6		4	72.9	50.3	22.6	61.6	84.2	38.0	.086	.197	.952	26.075	26.267	25.890	6		8
20	71.8	49.9	21.9	60.8	84.2	42.4	3		7	5		5	72.9	50.3	22.6	61.6	84.2	38.0	.102	.207	.933	26.097	26.218	25.933	12		5
21	74.6	49.3	25.3	61.9	82.8	41.8	4		6	4		6	74.2	49.0	25.2	61.6	83.4	38.0	.084	.191	.937	26.097	26.218	25.933	9		7
22	74.0	48.3	25.7	61.1	80.6	38.0	6		4	4		6	74.2	49.0	25.2	61.6	83.4	38.0	.045	.187	.906	26.097	26.218	25.933	7		9
23	74.1	49.3	24.8	61.7	83.4	39.3	4		6	4		6	74.2	49.0	25.2	61.6	83.4	38.0	.031	.179	.864	26.053	26.191	25.864	8		11
24	71.8	50.6	21.2	61.2	80.1	41.3	3		7	5		4	69.5	48.2	21.3	58.8	80.3	37.3	.042	.207	.857	26.053	26.191	25.864	8		8
25	69.0	47.7	21.3	58.3	80.3	39.6	2		8	2		4	69.5	48.2	21.3	58.8	80.3	37.3	.066	.203	.896	26.053	26.191	25.864	7		9
26	67.7	46.7	21.0	57.2	75.3	37.3	0		10	2		8	69.5	48.2	21.3	58.8	80.3	37.3	.127	.238	.26.017	26.078	26.228	25.857	12		4
27	69.6	44.7	24.9	57.1	81.0	35.0	1		9	2		8	71.8	46.5	25.3	59.1	84.0	35.0	.151	.228	.25.952	26.078	26.228	25.857	14		2
28	72.1	47.3	24.8	59.7	84.0	37.0	2		8	4		6	71.8	46.5	25.3	59.1	84.0	35.0	.148	.277	.979	26.148	26.278	25.952	12		4
29	73.6	47.4	26.2	60.5	79.6	40.3	5		5	3		7	71.8	46.5	25.3	59.1	84.0	35.0	.146	.278	.964	26.148	26.278	25.952	12		4
30	74.2	47.8	26.4	61.0	78.2	39.5	3		7	2		8	71.8	46.5	25.3	59.1	84.0	35.0	.126	.219	.965	26.148	26.278	25.952	13		3

TABLE 17.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

May	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	$\frac{M_3+m_3}{2}$	M ₃	m ₃	P	MP	mP	F ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	76.0	48.5	27.5	62.2	80.5	43.3	10		0	10		0	0	0	0	0	0	inches	inches	inches	inches	inches	inches	7		9
2	74.5	49.7	24.8	62.1	80.3	43.0	9		1	10.		0	74.9	48.7	61.8	80.5	39.5	.182	.276	26.001	26.120	26.276	25.909	10		6
3	70.1	48.0	22.1	59.0	78.3	31.0	8		2	8		2						.130	.231	.027				8		8
4	70.9	47.1	23.8	59.0	77.4	36.5	8		2	8		2						.079	.256	25.918				6		10
5	68.3	46.5	21.8	57.4	82.7	33.3	6		4	7		4	69.8	47.2	58.5	82.7	31.0	.095	.292	.922	26.101	26.292	25.918	5		11
6	66.8	44.9	21.9	55.8	73.8	34.7	6		4	6		4						.106	.287	.832				8		8
7	66.4	40.3	26.1	53.3	78.3	33.0	5		5	3		7	66.6	42.2	54.4	79.3	33.0	.128	.273	.999				8		8
8	66.7	41.5	25.2	54.1	79.3	34.5	5		5	3		5						.150	.293	26.005	26.128	26.293	25.832	11		5
9	67.0	43.0	24.0	55.0	78.0	35.5	3		7	5		5						.179	.436	.064				10		6
10	68.0	43.4	24.6	55.7	73.7	37.0	7		3	4		6						.163	.377	.032				7		9
11	71.3	43.7	27.6	57.5	76.6	36.6	8		2	6		4	68.8	43.4	56.1	78.0	35.5	.112	.342	25.990	26.151	26.436	25.990	4		12
12	68.5	44.4	24.1	56.4	78.3	36.3	5		5	6		4						.092	.217	.907				7		9
13	68.8	42.7	26.1	55.7	79.0	36.0	6		4	4		6						.110	.246	.934				9		7
14	71.4	43.7	27.7	57.5	76.0	34.0	9		1	6		4	69.6	43.6	56.6	79.0	34.0	.087	.220	.892	26.100	26.246	25.892	7		9
15	69.0	46.4	22.6	57.7	78.6	39.0	6		4	7		3						.069	.244	.849				7		9
16	66.4	42.3	24.1	54.3	76.0	37.0	5		5	5		5	67.9	44.0	56.0	78.6	37.0	.076	.191	.999				3		13
17	68.2	43.2	25.0	55.7	78.0	38.5	5		5	5		5						.056	.194	.980	26.067	26.244	25.849	3		13
18	67.6	42.3	25.3	54.9	75.7	34.2	6		4	6		4						.077	.244	.936				5		11
19	66.5	41.4	25.1	53.9	74.2	28.5	4		5	4		6	67.0	41.4	54.2	81.0	28.5	.102	.267	.962	26.097	26.276	25.920	6		10
20	66.8	40.6	26.2	53.7	81.0	35.3	4		6	4		6						.112	.267	.920	26.097	26.276	25.920	8		8
21	67.4	42.0	25.4	54.7	77.7	36.2	6		4	6		4						.104	.268	.938				7		9
22	64.7	40.1	24.6	52.4	77.8	28.0	5		4	5		5						.099	.259	.975				7		9
23	65.9	40.4	25.5	53.1	78.8	29.3	6		4	5		5						.069	.231	.902	26.091	26.268	25.902	4		12
24	63.7	40.6	23.1	52.1	79.4	30.5	5		5	4		6						.122	.259	.994				8		8
25	64.1	38.9	25.2	51.5	80.0	27.3	4		6	2		7						.111	.266	.930	26.111	26.266	25.930	7		9
26	63.4	38.8	24.6	51.1	78.6	28.5	3		7	4		6	63.7	39.4	51.5	80.0	27.3	.157	.297	.985				11	1	4
27	61.6*	38.6	23.0*	50.1	73.2*	29.0	1		8	4		6						.224	.336	26.109				15		1
28	62.3	37.0	25.3	49.6	67.3	31.5	0		10	1		9	62.8	37.5	50.1	73.2	29.0	.238	.423	.154	26.206	26.423	25.985	16		0
29	64.6	37.0	27.6	50.8	69.4	30.3	3		7	1		9						.220	.374	.094				15		1
30	65.7	39.0	26.7	52.3	69.7	31.8	5	1	4	1		8						.192	.296	.028				14		2
31	67.2	39.9	27.3	53.5	73.0	35.3	5		5	2		8														

* Nine days : maximum temperature not recorded May 27, 1891.

TABLE 18.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

June	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	M ₃ -m ₃	$\frac{M_3+m_3}{2}$	M' ₃	m' ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	66.7	41.6	25.1	54.1	73.6	35.3	8		2	9		1	66.5	40.2	26.4	53.4	73.6	31.8	inches 26.179	inches 26.359	inches 26.003	inches 26.197	inches 26.374	inches 23.003	7		9
2	65.3	41.0	24.3	53.1	74.2	33.5	7		3	8		2							inches 154	inches 411	inches 25.870				5		11
3	62.5	37.9	24.6	50.2	68.6	28.0	5	1	4	4	1	5	64.2	39.0	25.2	51.6	74.2	28.0	inches 161	inches 355	inches 366				6		10
4	64.8	38.1	26.7	51.4	70.4	34.0	7		4	4		6						inches 154	inches 266	inches 26.022	inches 26.156	inches 26.411	inches 25.870	7		9	
5	64.1	37.3	26.8	50.7	76.6	31.3	7		3	4	1	5						inches 154	inches 254	inches 25.958				8		8	
6	63.9	37.7	26.2	50.8	68.8	28.5	6		4	5		5	63.5	37.3	26.2	50.4	76.6	28.5	inches 155	inches 318	inches 999				7		9
7	62.4	37.0	25.4	49.7	69.5	28.8	4		6	5		5						inches 167	inches 321	inches 26.009	inches 26.159	inches 26.321	inches 25.958	8		8	
8	62.5	37.5	25.0	50.0	70.2	31.2	5		5	5		5						inches 198	inches 328	inches 002				10		6	
9	65.0	37.8	27.2	51.4	71.0	31.2	7		3	5		5	63.5	38.2	25.3	50.8	71.4	31.2	inches 212	inches 368	inches 014				12		4
10	63.0	39.2	23.8	51.1	71.4	33.3	6		4	6		4						inches 167	inches 368	inches 25.938	inches 26.192	inches 26.368	inches 25.938	8		8	
11	62.9	39.7	23.2	51.3	72.5	32.7	4		6	6		4	63.5	38.2	25.3	50.8	71.4	31.2	inches 156	inches 377	inches 915				5		11
12	63.6	38.1	25.5	50.8	74.0	30.5	6		4	6		4						inches 173	inches 420	inches 26.023				6		10	
13	63.7	38.3	25.4	51.0	72.0	28.2	5		5	5		5	63.4	38.7	24.7	51.0	74.0	28.2	inches 193	inches 415	inches 022	inches 26.174	inches 26.420	inches 25.915	7		9
14	61.0	36.5	24.5	48.7	71.2	26.3	4		6	4		6						inches 217	inches 477	inches 093				10		6	
15	62.5	35.7	26.8	49.1	69.0	27.0	4		6	3		7	62.4	36.6	25.8	49.5	71.2	26.3	inches 178	inches 443	inches 25.990				10		6
16	63.8	37.5	26.3	50.6	69.0	26.5	7	1	2	6		4						inches 130	inches 314	inches 915	inches 26.175	inches 26.477	inches 25.915	6	1	9	
17	62.7	37.4	25.3	50.0	71.0	27.5	5		5	4		6						inches 229	inches 295	inches 858				9		7	
18	61.2	35.7	25.5	48.4	69.5	27.4	3		7	3		7						inches 229	inches 367	inches 26.016				12		4	
19	62.8	36.8	26.0	49.8	69.7	25.0	6		4	4		6	62.2	36.6	25.6	49.4	71.0	25.0	inches 219	inches 389	inches 077	inches 26.203	inches 26.389	inches 25.858	10		7
20	63.1	36.2	26.9	49.6	68.2	29.7	5		5	4		6						inches 197	inches 317	inches 060				9		6	
21	63.6	35.9	27.7	49.7	68.8	30.3	6		4	4		6	63.5	36.2	27.3	49.8	70.0	29.7	inches 144	inches 280	inches 25.997				7		9
22	63.8	36.6	27.2	50.2	70.0	30.5	5		5	5		5						inches 125	inches 245	inches 26.006	inches 26.155	inches 26.317	inches 25.997	6		10	
23	63.4	37.3	26.1	50.3	72.8	31.5	5		5	5		5						inches 160	inches 307	inches 041				4		12	
24	61.9	36.1	25.8	49.0	70.6	29.0	5		5	3		6						inches 192	inches 340	inches 041				9		7	
25	62.8	37.0	25.8	49.9	71.7	29.5	3	1	7	5		5	62.7	36.8	25.9	49.7	72.8	29.0	inches 201	inches 349	inches 25.999	inches 26.184	inches 26.349	inches 26.999	11		5
26	63.0	36.7	26.3	49.8	70.7	31.0	4		6	4		6						inches 178	inches 346	inches 919				8		8	
27	63.1	36.8	26.3	49.9	71.8	32.5	6		4	3		7	63.2	36.8	26.4	50.0	71.8	29.9	inches 170	inches 319	inches 916				9		7
28	63.6	36.8	26.8	50.2	69.8	29.9	6		4	4		6						inches 172	inches 288	inches 26.101	inches 26.173	inches 26.346	inches 25.916	8		8	
29	63.7	37.5	26.2	50.6	74.0	30.5	6	1	4	4		7	63.2	36.8	26.4	50.0	71.8	29.9	inches 172	inches 261	inches 100				6		10
30	62.3	36.5	25.8	49.4	70.0	29.5	5		5	3		7						inches 186	inches 342	inches 25.983				8		8	

TABLE 19.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

July	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	M ₃ =m ₃	$\frac{M_3+m_3}{2}$	M ₃	m ₃	P	MP	mP	P ₃	MT ₃	mP ₃	(P+)	(P=)	(P-)
1	61.7	36.4	25.3	49.0	72.7	26.8	4		6	5		5	62.6	36.8	25.8	49.7	74.3	26.8	inches 26.164	inches 26.338	inches 25.930	inches 26.174	inches 26.342	inches 25.920	8		8
2	63.4	37.5	25.9	50.4	73.7	32.0	7		3	4		4							.185	.310	.086				7		9
3	65.9	39.1	26.8	52.5	72.8	33.3	7		3	6		2							.220	.349	.086				11		5
4	66.5	38.4	28.1	52.4	72.7	32.0	6		4	7		3	65.3	38.3	27.0	51.8	73.7	32.0	.220	.423	.053	26.208	26.423	26.021	11		5
5	64.1	38.0	26.1	51.0	71.6	32.5	7		3	7		3							.199	.470	.047				6	1	9
6	63.3	38.1	25.2	50.7	69.4	31.0	4		6	6		4	63.1	37.1	26.0	50.1	72.8	29.0	.158	.435	.25.980				6		10
7	61.9	35.3	26.6	48.6	72.8	29.0	2	1	7	4		6							.166	.371	.26.055	26.174	26.470	25.980	5		11
8	62.6	34.1	28.5	48.3	72.3	26.8	4		6	3		7							.194	.335	.25.950				11		5
9	65.1	34.8	30.3	49.9	76.6	28.6	5		4	5		5	63.5	34.9	28.6	49.2	76.6	26.8	.200	.357	.996				10	1	5
10	62.9	35.7	27.2	49.3	71.2	30.3	5		5	5		5							.202	.299	.939	26.199	26.357	25.950	11		5
11	62.2	35.8	26.4	49.0	69.8	20.0	4		6	5		5							.198	.374	.908				11		5
12	63.4	35.0	29.6	49.4	72.9	26.4	4		6	6		4	63.1	35.8	27.3	49.4	72.9	20.0	.207	.389	.971				9		7
13	64.6	35.0	29.6	49.8	72.9	26.4	6		4	5		5							.170	.369	.923	26.192	26.389	25.908	9		7
14	62.9	37.4	25.5	50.1	71.3	30.0	3		7	4		6							.123	.274	.896				6		10
15	59.0	34.2	24.8	46.6	70.8	30.3	3		7	3		7							.117	.301	.934				3		13
16	59.2	32.9	26.3	46.0	70.4	27.5	3		7	2		8	60.4	34.8	25.6	47.6	71.3	27.5	.141	.294	.961	26.127	26.301	25.896	9		7
17	57.2	32.1	25.1	44.6	71.1	25.3	1		9	3		6							.213	.394	.26.035				10		6
18	61.7	32.2	29.5	46.9	73.8	26.0	2		8	2		8							.220	.385	.021				9		7
19	62.7	35.5	27.2	49.1	72.9	27.0	4		6	3	1		60.5	33.3	27.2	46.9	73.8	25.3	.221	.422	.25.937	26.218	26.422	25.937	10		6
20	63.0	34.7	28.3	48.8	76.4	25.3	4		6	2		8							.231	.508	.963				12		4
21	65.9	35.6	30.3	50.7	74.0	27.3	6		4	5		5	65.6	35.9	29.7	50.7	80.0	25.3	.191	.460	.26.002				8		7
22	67.8	37.5	30.3	52.6	80.0	32.7	8		2	5		5							.168	.336	.050	26.197	26.508	25.963	10	1	9
23	68.0	38.1	29.9	53.0	78.3	32.0	8		2	5		5	67.0	37.5	29.5	52.2	78.3	27.0	.170	.288	.25.963				6		6
24	65.5	37.3	28.2	51.4	76.7	32.3	6		4	4		6							.201	.322	.26.075				10		6
25	67.5	37.1	30.4	52.3	74.8	27.0	8		4	4		5							.214	.357	.048	26.195	26.357	25.963	8		6
26	69.4	37.4	32.0	53.4	74.9	29.7	8	1	1	7		5							.175	.313	.25.954				10		6
27	67.4	38.7	28.7	53.0	78.0	27.5	8		2	7		3	68.3	37.9	30.4	53.1	78.0	22.3	.133	.259	.980	26.150	26.313	25.954	7		9
28	68.0	37.7	30.3	52.8	77.7	22.3	6		4	7		2							.131	.233	.947				4		12
29	69.3	40.0	29.3	54.6	79.0	28.5	8		2	8		2							.093	.233	.947				5		11
30	65.6	37.2	28.4	51.4	76.7	25.5	5		5	5		5	67.0	37.0	30.0	52.0	79.0	25.0	.141	.330	.26.019				5		11
31	66.2	33.8	32.4	50.0	74.4	25.0	7		3	3		7							.164	.392	.041	26.133	26.392	25.947	5		11

TABLE 20.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

Aug.	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	M ₃ -m ₃	$\frac{M_3+m_3}{2}$	M ₃	m' ₃	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	64.5	35.3	29.2	49.9	0	0	0		8	0		10	0	0	0	51.1	66.0	0	26.181	26.423	26.055	inches	inches	inches	12		4
2	65.1	36.0	29.1	50.5	0	0	3		8	3		7	66.0	36.3	29.7	51.1	66.0	0	161	367	25.929	inches	inches	inches	9		7
3	68.5	37.7	30.8	53.1	0	0	3		7	3		7	66.0	36.3	29.7	51.1	66.0	0	135	344	25.929	inches	inches	inches	8		8
4	69.3	36.6	32.7	52.9	0	0	3		7	1		9	69.3	37.6	31.7	53.4	69.3	0	120	323	25.929	inches	inches	inches	8		8
5	68.1	38.4	29.7	53.2	0	0	3		6	3		7	69.3	37.6	31.7	53.4	69.3	0	119	290	25.929	inches	inches	inches	8		8
6	70.6	37.9	32.7	54.2	0	0	3		4	3		7	69.3	37.6	31.7	53.4	69.3	0	124	293	25.929	inches	inches	inches	9		7
7	70.6	40.5	30.1	55.5	0	0	3		4	4		6	70.6	40.5	30.1	55.5	70.6	0	110	261	25.929	inches	inches	inches	7		9
8	70.1	40.4	29.7	55.2	0	0	3		3	4		6	70.6	40.5	30.1	55.5	70.6	0	092	266	25.929	inches	inches	inches	5		11
9	70.9	41.3	29.6	56.1	0	0	3		3	6		1	70.6	40.5	30.1	55.5	70.6	0	122	310	25.929	inches	inches	inches	8		8
10	72.0	39.8	32.2	55.9	0	0	3		3	5		5	70.6	40.5	30.1	55.5	70.6	0	132	308	25.929	inches	inches	inches	8		8
11	71.3	41.4	29.9	56.3	0	0	3		4	6		4	70.6	40.5	30.1	55.5	70.6	0	119	266	25.929	inches	inches	inches	8		8
12	68.7	39.2	29.5	53.9	0	0	3		7	4		6	70.6	40.5	30.1	55.5	70.6	0	125	298	25.929	inches	inches	inches	9		7
13	68.0	39.4	29.6	53.2	0	0	3		5	4		6	70.6	40.5	30.1	55.5	70.6	0	158	305	25.929	inches	inches	inches	11		5
14	69.3	39.0	30.3	54.1	0	0	3		5	5		5	69.3	40.1	29.6	54.9	69.3	0	128	311	25.929	inches	inches	inches	12		4
15	71.7	43.0	28.7	57.3	0	0	3		5	5		5	69.3	40.1	29.6	54.9	69.3	0	095	241	25.929	inches	inches	inches	10		6
16	72.1	43.7	28.4	57.9	0	0	3		3	7		3	69.3	40.1	29.6	54.9	69.3	0	110	232	25.929	inches	inches	inches	5		10
17	70.5	44.2	26.3	57.3	0	0	3		4	8		2	71.2	43.5	27.7	57.3	71.2	0	111	247	25.929	inches	inches	inches	9		7
18	71.1	42.7	28.4	56.9	0	0	3		4	7		3	71.2	43.5	27.7	57.3	71.2	0	096	219	25.929	inches	inches	inches	10		9
19	71.9	41.0	30.9	56.4	0	0	3		3	7		3	71.2	43.5	27.7	57.3	71.2	0	126	310	25.929	inches	inches	inches	6		9
20	70.0	39.5	30.5	54.7	0	0	3		3	5		6	71.2	43.5	27.7	57.3	71.2	0	154	372	25.929	inches	inches	inches	10		6
21	71.8	40.2	31.6	56.0	0	0	3		4	3		1	71.2	43.5	27.7	57.3	71.2	0	126	301	25.929	inches	inches	inches	6		6
22	74.2	42.7	31.5	58.4	0	0	3		3	5		5	73.3	42.9	30.4	58.1	73.3	0	113	265	25.929	inches	inches	inches	9		7
23	73.8	43.3	30.5	58.5	0	0	3		2	6		4	73.3	42.9	30.4	58.1	73.3	0	118	320	25.929	inches	inches	inches	7		7
24	71.8	42.8	29.0	57.3	0	0	3		3	7		3	73.3	42.9	30.4	58.1	73.3	0	136	314	25.929	inches	inches	inches	9		7
25	73.1	43.8	29.3	58.4	0	0	3		2	7		3	73.3	42.9	30.4	58.1	73.3	0	150	326	25.929	inches	inches	inches	8		8
26	71.7	42.4	29.3	57.0	0	0	3		3	6		2	72.2	43.4	28.8	57.8	72.2	0	118	312	25.929	inches	inches	inches	7		9
27	71.7	44.0	27.7	57.8	0	0	3		4	8		2	72.2	43.4	28.8	57.8	72.2	0	077	244	25.929	inches	inches	inches	5		11
28	71.4	42.5	28.9	56.9	0	0	3		3	5		5	70.2	42.1	28.1	56.1	70.2	0	108	251	25.929	inches	inches	inches	5		11
29	69.7	42.0	27.7	55.8	0	0	3		7	6		4	70.2	42.1	28.1	56.1	70.2	0	079	251	25.929	inches	inches	inches	6		10
30	69.4	41.7	27.7	55.5	0	0	3		6	6		4	70.2	42.1	28.1	56.1	70.2	0	108	318	25.929	inches	inches	inches	6		10
31	71.9	40.9	31.0	56.4	0	0	3		5	6		4	70.2	42.1	28.1	56.1	70.2	0	129	345	25.929	inches	inches	inches	6		10

TABLE 21.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

Sept.	M'	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	$\frac{M_3+m_3}{2}$	M' ₃	m' ₃	P	MP	mP	F ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)	
1	71.4	41.7	29.7	56.5	82.2	33.5	2		8	2		8	71.9	40.1	31.8	56.0	86.3	28.7	inches 26.125	inches 26.276	inches 25.941	inches 26.137	inches 26.385	inches 25.915	11		5
2	72.5	37.6	34.9	55.0	86.3	29.3	3		7	3		7				86.3	28.7	156	385	915	26.137	26.385	25.915	12		4	
3	74.4	42.1	32.3	58.2	88.0	34.7	3		7	5		5						144	396	26.005				11		5	
4	75.1	42.2	32.9	58.6	88.7	31.0	4		6	2	2	2						149	359	25.960				13		3	
5	76.9	41.9	35.0	59.4	89.5	36.5	4		6	2		8	75.5	42.1	33.4	58.8	89.5	31.0	109	242	958	26.134	26.396	25.958	11		5
6	77.6	43.8	33.8	60.7	87.0	36.2	6		4	3		7						089	253	936				8		8	
7	76.2	46.8	29.4	61.5	89.0	35.3	5		5	7		3						072	258	895				6		10	
8	72.8	43.2	29.6	58.0	87.0	36.5	3		7	3		7	75.5	44.6	30.9	60.0	89.0	35.3	048	164	850	26.070	26.258	25.850	6		10
9	74.0	42.2	31.8	58.1	88.6	25.5	4		6	3	1	6						051	183	726				9	1	6	
10	73.3	40.6	32.7	56.9	87.6	32.0	4		6	3		7						103	218	934				10		5	
11	75.1	42.5	32.6	58.8	85.0	31.5	3		7	3		6	74.1	41.8	32.3	57.9	88.8	25.5	116	221	993	26.090	26.218	25.726	13		3
12	76.6	42.5	34.1	59.5	88.3	31.5	6		4	4		6						088	213	816				10		6	
13	78.4	44.3	34.1	61.3	94.0	33.0	6		4	4		6						086	234	921				9		7	
14	78.7	44.7	34.0	61.7	93.8	36.0	5		5	4		6	77.9	43.8	34.1	60.8	94.0	31.5	107	239	990	26.094	26.239	25.816	10		6
15	81.2	46.8	34.4	64.0	94.8	32.7	7		3	7		3						092	231	903				6		10	
16	83.6	48.3	34.3	65.9	93.4	41.5	8		2	8		2						055	216	919				6		10	
17	79.7	47.7	32.0	63.7	94.3	34.7	6		4	7		3	81.5	47.6	33.9	64.5	94.8	32.7	071	206	944	26.073	26.231	25.903	7		9
18	80.4	46.3	34.1	63.3	93.3	37.0	5		5	6		4						057	234	905				6		10	
19	80.3	48.3	32.0	64.3	94.5	40.0	6		4	6		3						060	174	942				6	1	9	
20	81.0	47.3	33.7	64.1	96.0	39.5	7		3	6		4	80.6	47.3	33.3	63.9	96.0	37.0	064	252	833	26.060	26.252	25.833	6		10
21	81.7	46.9	34.8	64.3	93.4	34.5	8		2	5	1	4						039	323	772				4	1	11	
22	77.0	46.5	30.5	61.7	92.2	29.7	4		6	6		4						048	268	857				7		9	
23	75.2	43.3	31.9	59.2	89.7	33.0	3		7	3	1	6	78.0	45.6	32.4	61.8	93.4	29.7	076	297	856	26.054	26.323	25.772	11		5
24	78.0	43.0	35.0	60.5	92.6	32.7	5		5	3		3						090	259	962				9	1	7	
25	79.9	45.9	34.0	62.9	90.0	32.0	5		5	7		3						055	213	920				6		9	
26	83.8	49.0	34.8	66.4	91.0	38.0	7		3	8		2	80.6	46.0	34.6	63.3	92.6	32.0	018	256	801	26.054	26.259	25.801	4		12
27	83.7	50.3	33.4	67.0	92.8	39.8	7		7	9		1						008	246	740				4		12	
28	81.5	47.1	34.4	64.3	92.3	38.3	6		4	6		4						020	189	857				4		12	
29	82.5	48.0	34.5	65.2	94.8	33.7	7		3	7		3	82.6	48.5	34.1	65.5	94.8	36.7	050	229	861	26.026	26.246	25.740	6		10
30	85.5	48.4	37.1	66.9	96.6	34.3	8		2	7		3						015	150	851				3		13	

TABLE 22.
THE DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

Oct.	M	m	M-m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	$\frac{M_3+m_3}{2}$	M ₃ -m ₃	$\frac{M_3+m_3}{2}$	M ₃	m ₃	P	mP	P ₃	mP ₃	(P+)	(P=)	(P-)
1	84.8	49.6	35.2	67.2	97.7	43.3	6		4	2		8	84.4	49.1	35.3	66.7	97.7	34.3	inches	26.009	26.114	25.910	inches	8		8
2	82.9	49.2	33.7	66.0	96.4	39.0	4		6	4		6							inches	.127	.957	26.150	25.851	10		6
3	83.8	49.0	34.8	66.4	96.3	39.2	4		6	4		6							inches	.127	.957	26.150	25.851	10		6
4	81.3	49.6	31.7	65.4	95.7	40.0	4		6	2		8							inches	.057	.839			11		5
5	83.1	47.5	35.6	65.3	91.4	30.3	5		5	2		8							inches	.038	.809			9		7
6	84.0	47.7	36.3	65.8	91.3	40.5	4		6	1	1	8	82.7	48.7	34.0	65.7	96.3	30.3	inches	.034	.851	26.043	25.809	6		10
7	82.8	48.5	34.3	65.6	93.8	39.5	6		4	4		6							inches	.030	.915			5		11
8	82.4	50.0	32.4	66.2	97.2	35.5	4		4	4		4	83.1	48.7	34.4	65.9	97.2	35.5	inches	.048	.867	26.088	25.807	12		4
9	83.1	51.1	32.0	67.1	92.0	38.0	4		6	7		3							inches	.037	.883			8		8
10	84.8	50.6	34.2	67.7	89.7	43.0	6		4	2		3							inches	.066	.867			10		6
11	86.9	51.1	35.8	69.0	94.5	43.8	7		3	5	1	7	84.9	50.9	34.0	67.9	94.5	38.0	inches	.058	.908	26.041	25.799	8	1	7
12	87.2	53.3	33.9	70.2	93.6	44.5	6		4	6		5							inches	.183	.799			7		9
13	84.6	49.3	35.3	66.9	98.5	36.0	5		5	4		6							inches	.080	.821	26.004	25.764	6		10
14	84.2	49.9	34.3	67.0	99.2	37.2	6		4	7		3	85.3	50.8	34.5	68.0	99.2	36.0	inches	.153	.764			7		9
15	86.6	50.8	35.8	68.7	99.4	37.7	7		4	7		3							inches	.027	.919	26.004	25.764	8		8
16	86.6	55.2	31.4	70.9	102.4	46.5	6		4	7		3							inches	.129	.862			9		7
17	84.9	53.8	31.1	69.3	98.8	48.3	4		6	7		3	86.0	53.3	32.7	69.6	102.4	37.7	inches	.041	.905	26.224	25.860	10		6
18	89.9	53.4	36.5	71.6	101.9	46.7	7		3	7		3							inches	.223	.877	26.050	25.860	11		5
19	86.6	57.0	29.6	71.8	102.0	49.3	7		3	6		3							inches	.061	.862			9		7
20	87.6	55.0	32.6	71.3	102.0	46.3	8		3	9	1	1	88.0	55.1	32.9	71.5	102.0	46.3	inches	.119	.846	25.997	25.846	6		10
21	88.1	56.2	31.9	72.1	103.0	43.0	7		3	9		3							inches	.095	.849			4		12
22	87.9	53.7	34.2	70.8	100.9	43.0	6		4	7		3							inches	.116	.901	26.166	25.846	5		11
23	85.5	51.0	34.5	68.2	101.7	43.4	4		6	4		6	87.2	53.6	33.6	70.4	103.0	43.0	inches	.097	.876	25.998	25.876	7		9
24	85.4	52.6	32.8	69.0	97.6	47.0	5		5	3		7							inches	.067	.844			5		11
25	84.1	51.2	32.9	67.6	99.6	41.3	4		6	5		5							inches	.130	.902			4		12
26	88.5	52.8	35.7	70.6	99.7	41.2	4		3	5		5							inches	.259	.829	25.986	25.829	7		9
27	88.5	55.7	32.8	72.1	96.0	46.5	7		3	8		2							inches	.269	.847			5		11
28	80.7	54.6	26.1	67.6	102.0	48.0	4		6	7	1	2							inches	.021	.857			8		8
29	83.6	52.0	31.6	67.8	97.0	42.2	5		5	4		5							inches	.015	.886	26.015	25.847	9		7
30	84.6	52.5	32.1	68.5	99.6	41.3	4		6	5	1	5	84.3	54.1	30.2	69.2	102.0	42.2	inches	.029	.919			7		9
31	82.6	50.8	31.8	66.7	99.8	36.0	3		7	6		4							inches	.077	.921			11		5

TABLE 23.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

Nov.	M	m	M-m	M+m 2	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	M ₃ -m ₃	M ₃ +m ₃ 2	M'	m'	P	MP	mP	P ₃	MP ₃	mP ₃	(P+)	(P=)	(P-)
1	88.7	51.9	36.8	70.3	96.3	45.0	3			3		7	85.3	51.7	33.6	68.5	99.8	36.0	inches 26.035	inches 26.196	inches 25.893	inches 26.047	inches 26.196	inches 25.893	12		4
2	92.4	54.4	38.0	73.4	101.3	45.8	7			3		7							25.972	122	.792				9		7
3	90.0	54.8	35.2	72.4	100.3	46.5	5			3		6							.969	101	.776				8		8
4	88.2	53.6	34.6	70.9	97.8	45.4	6			4		7	90.2	54.3	35.9	72.2	101.3	45.4	.976	133	.835	25.972	26.133	25.776	8		8
5	87.7	53.8	33.9	70.7	101.4	37.6	4			5		5							26.018	.086	.814				11		5
6	85.1	53.1	32.0	69.1	97.0	39.0	3			4		4							.032	123	.950				13		3
7	88.1	53.9	34.2	71.0	99.0	43.2	4			6		6	87.0	53.6	33.4	70.3	101.4	37.6	.024	135	.939	26.025	26.135	25.814	12	1	4
8	90.4	54.6	35.8	72.5	99.5	45.5	5			4		6							.032	185	.862				12		2
9	89.0	56.3	32.7	72.6	97.0	49.8	6			5		5							.051	269	.930				13		4
10	88.1	55.8	32.3	71.9	97.0	44.3	4			6		6	89.2	55.6	33.6	72.4	99.5	44.3	.040	142	.834	26.034	26.263	25.862	12		4
11	90.3	55.1	35.2	72.7	100.1	43.8	5			5		5							25.995	126	.862				10		6
12	89.6	56.1	33.5	72.8	100.9	47.5	3			5		5							.977	221	.821				9		7
13	90.1	55.7	34.4	72.9	101.4	49.3	6			4		5							.967	157	.834	25.980	26.221	25.821	5		11
14	91.2	56.2	35.0	73.7	101.3	45.0	5			5		5							26.007	133	.902				9	1	5
15	92.2	56.8	35.4	74.5	101.4	47.3	6			5		5							.023	142	.852	26.012	26.142	25.852	12		4
16	92.8	57.2	35.6	75.0	107.3	50.5	7			6		4	92.1	56.7	35.4	74.4	107.3	45.0	.007	114	.889	26.012	26.142	25.852	6		10
17	89.9*	57.6	32.3*	73.7	103.4	41.0	6			6		5							25.974	.061	.914				4		12
18	86.2	54.9	31.3	70.5	106.2	42.9	4			5		5							.945	.077	.854	25.946	26.083	25.778	2		14
19	89.0	55.3	33.7	72.1	104.9	47.3	5			5		5							.920	.083	.818	25.946	26.083	25.778	2		11
20	88.2	53.9	34.3	71.0	103.0	45.3	4			6		6							.966	.190	.818				5		10
21	98.1	53.8	34.3	70.9	99.6	47.2	5			2		8							.984	.202	.809				6		8
22	91.1	54.2	36.9	72.6	102.0	49.6	5			4		6	89.1	54.0	35.1	71.5	103.0	45.3	.989	.139	.816	25.980	26.202	25.809	8		9
23	93.0	58.6	34.4	75.8	107.5	53.0	8			7		3							.974	.072	.787				7		8
24	89.6	57.6	32.0	73.6	102.4	50.7	5			5		5							.975	.191	.859				8		8
25	91.5	56.9	34.6	74.2	98.7	43.7	6			4		2							.980	.080	.888	25.976	26.091	25.787	8		10
26	90.1	60.2	29.9	75.1	101.7	53.0	7			3		3	91.4	57.7	33.7	74.5	107.5	43.7	.956	.087	.834				6		12
27	90.8	57.4	33.4	74.1	101.0	49.5	6			4		4							.926	.122	.807				4		12
28	90.4	58.2	32.2	74.3	100.0	51.5	5			6		3	93.4	58.6	31.8	74.5	101.7	49.5	.939	.132	.764	25.940	26.132	25.764	5		11
29	90.9	57.8	33.1	74.3	99.9	52.5	7			3		3							.948	.093	.665				8		8
30	93.6	58.2	35.4	75.9	105.8	48.8	7			7		3							.973	.182	.847				5		11

* Nine days : maximum temperature not recorded November 17, 1892.

TABLE 24.
MEAN DAILY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

Dec.	M	m	M-m	$\frac{M-m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	M ₃	m ₃	$\frac{M_3+m_3}{2}$	M' ₃	m' ₃	P	MP	mP	P ₃	MP ₃	(P+)	(P=)	(P-)
1	89-159-5	29-6	74-3	102-0	47-2	3	3	1	6	5	5	5	91-2	58-5	74-8	105-8	47-2	26-002	26-140	25-886	25-974	25-665	13	3	3
2	90-556-4	34-1	73-4	99-2	47-3	4	4	6	6	3	3	7	92-6	57-2	74-9	103-6	47-3	25-966	25-974	25-900	25-974	25-665	12	4	4
3	93-057-5	35-5	75-2	103-6	49-7	6	6	4	4	3	3	7	92-6	57-2	74-9	103-6	47-3	25-966	25-974	25-900	25-974	25-665	9	7	7
4	94-457-8	36-6	76-1	101-0	51-2	7	7	3	3	3	3	6	92-6	57-2	74-9	103-6	47-3	25-966	25-974	25-900	25-974	25-665	6	10	10
5	95-558-7	36-8	77-1	104-8	54-0	7	7	3	3	3	3	6	92-6	57-2	74-9	103-6	47-3	25-966	25-974	25-900	25-974	25-665	4	12	12
6	95-657-6*	38-0*	76-6*	106-3	53-0	7	7	3	3	2	2	6	95-7	58-8	77-2	106-4	52-2	25-966	25-974	25-900	25-974	25-665	4	12	12
7	96-060-2	35-8	78-1	106-4	52-2	5	5	5	5	6	6	4	95-7	58-8	77-2	106-4	52-2	25-966	25-974	25-900	25-974	25-665	10	1	1
8	93-959-7	34-2	76-8	105-4	51-7	6	6	4	4	4	4	6	94-9	60-0	77-4	105-6	48-7	25-966	25-974	25-900	25-974	25-665	9	7	7
9	95-660-9	34-7	78-2	105-3	54-5	6	6	3	3	6	6	4	94-9	60-0	77-4	105-6	48-7	25-966	25-974	25-900	25-974	25-665	11	5	5
10	95-259-3	35-9	77-2	105-6	48-7	6	6	4	4	6	6	4	94-9	60-0	77-4	105-6	48-7	25-966	25-974	25-900	25-974	25-665	12	4	4
11	94-461-3	33-1	77-8	103-4	51-5	5	5	5	5	7	3	3	94-9	60-0	77-4	105-6	48-7	25-966	25-974	25-900	25-974	25-665	10	6	6
12	92-259-3	32-9	75-6	107-3	53-8	5	5	5	5	4	4	6	92-4	60-0	76-2	107-3	50-5	25-966	25-974	25-900	25-974	25-665	7	9	9
13	90-559-4	31-1	75-0	104-8	50-5	5	5	6	6	4	4	6	92-4	60-0	76-2	107-3	50-5	25-966	25-974	25-900	25-974	25-665	5	11	11
14	88-150-3	28-8	73-7	103-3	52-5	5	5	5	5	6	4	4	88-5	58-6	73-5	103-3	45-3	25-966	25-974	25-900	25-974	25-665	6	10	10
15	89-059-3	29-7	74-1	100-0	50-0	2	2	8	8	6	6	4	88-5	58-6	73-5	103-3	45-3	25-966	25-974	25-900	25-974	25-665	7	9	9
16	88-457-1	31-3	72-7	101-8	45-3	3	3	7	7	4	4	4	90-7	58-2	74-4	101-0	43-5	25-966	25-974	25-900	25-974	25-665	8	8	8
17	90-658-2	32-4	74-4	100-0	43-5	3	3	7	7	4	4	4	90-7	58-2	74-4	101-0	43-5	25-966	25-974	25-900	25-974	25-665	7	9	9
18	89-957-0	32-9	73-4	96-8	48-5	2	2	8	8	4	4	6	90-7	58-2	74-4	101-0	43-5	25-966	25-974	25-900	25-974	25-665	3	13	13
19	91-559-4	32-1	75-4	101-0	46-8	5	5	5	5	6	6	6	90-7	58-2	74-4	101-0	43-5	25-966	25-974	25-900	25-974	25-665	3	13	13
20	90-458-7	31-7	74-5	99-5	49-3	7	7	3	3	4	4	6	91-4	59-3	75-3	100-8	42-5	25-966	25-974	25-900	25-974	25-665	9	7	7
21	91-159-5	31-6	75-3	98-0	43-0	6	6	4	4	6	6	6	91-4	59-3	75-3	100-8	42-5	25-966	25-974	25-900	25-974	25-665	11	4	4
22	92-759-7	33-0	76-7	100-8	42-5	6	6	4	4	6	6	6	91-4	59-3	75-3	100-8	42-5	25-966	25-974	25-900	25-974	25-665	10	6	6
23	94-158-4	35-7	76-2	105-3	46-5	6	6	4	4	4	4	4	93-5	59-1	76-3	105-3	46-5	25-966	25-974	25-900	25-974	25-665	7	9	9
24	92-958-5	34-4	75-7	104-8	51-0	4	4	6	6	4	4	6	93-5	59-1	76-3	105-3	46-5	25-966	25-974	25-900	25-974	25-665	8	8	8
25	93-560-4	33-1	76-9	101-8	48-0	6	6	4	4	7	7	3	93-5	59-1	76-3	105-3	46-5	25-966	25-974	25-900	25-974	25-665	10	6	6
26	94-960-2	34-7	77-5	104-4	49-0	7	7	3	3	6	6	3	93-5	59-1	76-3	105-3	46-5	25-966	25-974	25-900	25-974	25-665	10	6	6
27	95-662-6	33-0	79-1	102-3	57-2	8	8	3	3	8	1	1	96-3	61-6	78-9	105-6	49-0	25-966	25-974	25-900	25-974	25-665	11	5	5
28	98-462-0	36-4	80-2	105-6	56-3	9	9	1	1	9	9	1	96-3	61-6	78-9	105-6	49-0	25-966	25-974	25-900	25-974	25-665	7	9	9
29	94-162-3	31-8	78-2	101-0	58-2	6	6	4	4	4	4	5	92-1	60-1	76-1	103-7	53-5	25-966	25-974	25-900	25-974	25-665	5	11	11
30	91-159-2	31-9	75-1	97-0	55-0	6	6	4	4	5	5	6	92-1	60-1	76-1	103-7	53-5	25-966	25-974	25-900	25-974	25-665	8	8	8
31	91-158-7	32-4	74-9	103-7	53-5	7	7	3	3	4	4	4	92-1	60-1	76-1	103-7	53-5	25-966	25-974	25-900	25-974	25-665	8	8	8

* Nine days: minimum temperature not recorded December 6, 1892.

TABLE 25.
MEAN MONTHLY TEMPERATURE AND PRESSURE OF THE AIR AT DURBAN, NATAL, 1888-1897.

	M	m	M - m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	P	MP	mP	(P+)	(P=)	(P-)	Cloud %	Moisture.
Jan.....	85.6	67.7	17.8	76.6	105.2	56.7	173	2	135	160	9	141	29.997	30.347	inches	319	1	300	60.2	85
Feb.....	85.7	68.6	17.1	77.1	98.2	56.4	160	3	120	144	14	125	30.010	30.358	29.518	287	2	277	59.6	7.2
March.....	84.4	67.2	17.2	75.8	97.1	56.5	174	5	131	159	6	145	30.059	30.460	29.617	310	1	309	51.8	7.6
April.....	81.8	63.2	18.6	72.5	98.1	53.8	166	5	129	148	11	141	30.107	30.604	29.580	308	0	292	42.4	7.3
May.....	78.5	58.5	20.0	68.5	91.3	45.0	169	3	138	159	2	148	30.145	30.644	29.675	313	0	306	33.5	5.3
June.....	76.8	54.7	22.1	65.7	89.5	46.8	144	11	145	139	2	159	30.219	30.676	29.742	296	1	303	25.9	4.6
July.....	76.1	54.0	22.1	65.0	93.6	42.3	157	3	150	138	9	163	30.241	30.801	29.688	305	2	313	26.9	4.4
Aug.....	76.4	56.5	19.9	66.5	102.9	46.6	172	1	137	151	1	158	30.201	30.715	29.577	314	1	305	37.0	4.9
Sept.....	77.2	58.5	18.6	67.9	110.6	46.5	158	4	138	143	6	146	30.151	30.729	29.601	291	0	309	51.2	5.6
Oct.....	82.0	61.6	16.6	69.9	107.8	48.4	164	2	144	158	3	149	30.107	30.661	29.612	294	1	325	65.5	6.0
Nov.....	82.2	64.3	17.9	73.2	104.7	52.2	154	1	145	154	3	143	30.023	30.534	29.550	299	2	299	64.1	6.5
Dec.....	84.4	66.2	18.2	75.3	99.9	55.3	163	4	143	164	0	146	30.003	30.417	29.524	309	1	310	63.8	7.0
Year.....	80.6	61.8	18.8	71.2	110.6	42.3	1954	44	1655	1822	66	1764	30.105	30.801	29.507	3645	12	3648	48.4	6.0

MEAN MONTHLY TEMPERATURE AND PRESSURE OF THE AIR AT KIMBERLEY, CAPE COLONY, 1888-1897.

	M	m	M - m	$\frac{M+m}{2}$	M'	m'	(M+)	(M=)	(M-)	(m+)	(m=)	(m-)	P	MP	mP	(P+)	(P=)	(P-)	Cloud %	Humidity %
Jan.....	92.0	60.6	31.4	76.3	108.5	45.5	161	2	147	161	1	148	25.941	26.194	inches	239	3	254	30.2	56
Feb.....	88.9	60.1	28.7	74.5	106.2	48.5	150	1	132	143	0	140	25.972	26.193	25.720	219	2	231	35.3	56
March.....	84.0	57.7	26.3	70.8	100.6	41.5	168	8	134	162	1	147	26.027	26.225	25.810	261	0	235	33.4	62
April.....	75.4	50.5	24.9	62.9	92.2	35.0	157	1	142	159	5	136	26.085	26.278	25.793	258	0	222	25.7	63
May.....	67.4	42.4	25.0	54.9	82.7	27.3	169	2	138	153	1	156	26.123	26.436	25.832	253	1	242	22.9	63
June.....	63.3	37.5	25.8	50.4	76.6	25.0	162	2	136	139	4	157	26.175	26.477	25.858	238	1	241	18.4	62
July.....	64.3	36.3	28.0	50.3	80.0	20.0	163	3	144	153	2	155	26.179	26.508	25.896	251	4	241	14.2	55
Aug.....	70.5	40.7	29.8	55.6	85.6	26.5	172	0	138	155	2	153	26.123	26.423	25.843	245	2	249	21.3	54
Sept.....	78.3	45.0	33.3	61.6	96.6	25.5	157	0	143	150	5	145	26.075	26.396	25.726	238	5	237	16.3	48
Oct.....	85.1	51.8	33.3	68.4	103.0	30.3	166	0	144	158	5	147	26.022	26.351	25.764	237	1	258	27.3	46
Nov.....	89.9	55.8	34.1	72.8	107.5	37.6	159	0	140	156	1	143	25.985	26.269	25.665	247	3	230	25.6	48
Dec.....	92.7	59.3	33.4	76.0	107.3	42.5	168	2	140	160	1	148	25.956	26.156	25.680	251	2	243	25.7	51
Year.....	79.3	49.8	29.5	64.5	108.5	20.0	1952	21	1678	1849	28	1775	26.055	26.508	25.665	2937	24	2883	24.7	55

TABLE 26.
VALUES OF y IN THE SIMPLE SINE CURVE OF TEMPERATURE.
Durban.

x	M	$\frac{M+m}{2}$	m
$^{\circ}$		$^{\circ}$	$^{\circ}$
0	Oct. 31 80.6	Oct. 24 71.2	Oct. 16 61.8
15	Nov. 15 81.9	Nov. 9 72.8	Nov. 1 63.7
30	30 83.0	24 74.2	16 65.4
45	Dec. 15 84.0	Dec. 9 75.4	Dec. 1 67.0
60	31 84.8	24 76.4	16 68.1
75	Jan. 15 85.2	Jan. 9 77.0	Jan. 1 68.9
90	31 85.4	24 77.2	16 69.1
105	Feb. 15 85.2	Feb. 9 77.0	Feb. 1 68.9
120	29 84.8	24 76.4	16 68.1
135	Mar. 15 84.0	Mar. 9 75.4	Mar. 1 67.0
150	31 83.0	24 74.2	16 65.4
165	April 15 81.9	April 9 72.8	April 1 63.7
180	30 80.6	24 71.2	16 61.8
195	May 15 79.3	May 9 69.6	May 1 59.9
210	31 78.2	24 68.2	16 58.2
225	June 15 77.2	June 9 67.0	June 1 56.6
240	30 76.4	24 66.0	16 55.5
255	July 15 76.0	July 9 65.4	July 1 54.7
270	31 75.8	24 65.2	16 54.5
285	Aug. 15 76.0	Aug. 9 65.4	Aug. 1 54.7
300	31 76.4	24 66.0	16 55.5
315	Sept. 15 77.2	Sept. 9 67.0	Sept. 1 56.6
330	30 78.2	24 68.2	16 58.2
345	Oct. 15 79.3	Oct. 9 69.6	Oct. 1 59.9

Kimberley.

x	M	$\frac{M+m}{2}$	m
$^{\circ}$		$^{\circ}$	$^{\circ}$
0	Sept. 20 79.3	Sept. 28 64.5	Oct. 4 49.8
15	Oct. 4 83.1	Oct. 12 67.9	20 52.9
30	20 86.6	28 71.0	Nov. 4 55.9
45	Nov. 4 89.7	Nov. 12 73.7	20 58.4
60	20 92.0	28 75.8	Dec. 4 60.3
75	Dec. 4 93.5	Dec. 12 77.1	20 61.5
90	20 94.0	28 77.5	Jan. 4 61.9
105	Jan. 4 93.5	Jan. 12 77.1	20 61.5
120	20 92.0	28 75.8	Feb. 4 60.3
135	Feb. 4 89.7	Feb. 12 73.7	20 58.4
150	20 86.6	28 71.0	Mar. 4 55.9
165	Mar. 4 83.1	Mar. 12 67.9	20 52.9
180	20 79.3	28 64.5	April 4 49.8
195	April 4 75.5	April 12 61.1	20 46.7
210	20 72.0	28 58.0	May 4 43.7
225	May 4 68.9	May 12 55.3	20 41.2
240	20 66.6	28 53.2	June 4 39.3
255	June 4 65.1	June 12 51.9	20 38.1
270	20 64.6	28 51.5	July 4 37.7
285	July 4 65.1	July 12 51.9	20 38.1
300	20 66.6	28 53.2	Aug. 4 39.3
315	Aug. 4 68.9	Aug. 12 55.3	20 41.2
330	20 72.0	28 58.0	Sept. 4 43.7
345	Sept. 4 75.5	Sept. 12 61.1	20 46.7

TABLE 27.

VALUES OF y IN THE SIMPLE SINE CURVE OF MINIMUM
TEMPERATURE DIFFERENCES.

x		y	Observed temp. diff.	Deviation.
^o 0	Sept. 30	^o 12.0	^o 11.7	^o -0.3
30	Oct. 31	9.3	9.2	-0.1
60	Nov. 30	7.3	7.7	+0.4
90	Dec. 31	6.6	7.0	+0.4
120	Jan. 31	7.3	7.8	+0.5
150	Feb. 29	9.3	9.0	-0.3
180	Mar. 31	12.0	11.8	-0.2
210	April 30	14.7	14.5	-0.2
240	May 31	16.7	16.7	0.0
270	June 30	17.4	17.5	+0.1
300	July 31	16.7	16.8	+0.1
330	Aug. 31	14.7	14.7	0.0

TABLE 28.

NUMERICAL COEFFICIENTS IN LAMBERT'S FORMULA.

Durban.

	Max. Temp.	Mean Temp.	Min. Temp.	Pressure.
	^o	^o	^o	inches
p	+ 80·6000	+ 71·2000	+ 61·8000	+ 30·105000
p_1	+ 4·9309	+ 6·0655	+ 6·9268	— 0·117244
q_1	+ 1·1193	+ 0·9785	+ 0·7186	+ 0·006410
p_2	+ 0·3667	— 0·0333	— 0·7417	+ 0·008580
q_2	+ 0·2598	+ 0·7667	+ 1·0536	+ 0·004474
p_3	— 0·2333	0·0000	— 0·1333	— 0·005000
q_3	— 0·3167	— 0·2667	— 0·2000	+ 0·004166
p_4	— 0·1833	0·0000	— 0·1083	+ 0·007500
q_4	0·0000	+ 0·0866	+ 0·2165	— 0·007650

Kimberley.

	Max. Temp.	Mean Temp.	Min. Temp.	Pressure.
	^o	^o	^o	inches
p	+ 79·3000	+ 64·5000	+ 49·8000	+ 26·055000
p_1	+ 13·8658	+ 13·0145	+ 12·1587	— 0·108570
q_1	— 5·1024	— 3·0640	— 0·4455	+ 0·029990
p_2	— 1·0500	— 1·0833	— 1·1333	+ 0·003500
q_2	+ 1·2124	+ 1·2124	+ 1·2990	— 0·006062
p_3	— 0·0833	— 0·1833	— 0·2167	— 0·008667
q_3	— 0·2167	— 0·2000	— 0·1833	+ 0·000833
p_4	— 0·1167	— 0·0667	+ 0·0333	+ 0·001500
q_4	— 0·2309	— 0·1443	— 0·1443	— 0·005000

TABLE 29.
EVALUATING THE COSINE CURVE FOR KIMBERLEY IN
S. LAT. 28° 42'.

Mean Date.	Sun's Declination.	Sun's Zenith Distance. Z	Sun's Semi-diameter.	Cos Z.	Heat Coefficient S ₂ .	Temp. y	Differences C-O
	° ' "	° ' "	"			°	°
Jan. 16	20 53 8 S	7 49	977.6	.991	.955702	92.3	+ 0.3
Feb. 15	12 34 34 S	16 7	973.3	.961	.947307	89.6	+ 0.7
Mar. 16	1 37 46 S	27 4	966.3	.890	.931736	83.7	- 0.3
April 16	9 51 50 N	38 34	958.1	.782	.917956	75.5	+ 0.1
May 16	19 9 54 N	47 52	951.1	.671	.903591	67.3	+ 0.1
June 16	23 19 59 N	52 2	946.7	.615	.896241	63.3	0.0
July 16	21 20 34 N	49 3	946.4	.655	.895673	65.8	+ 1.5
Aug. 16	13 40 30 N	42 22	950.2	.739	.902880	71.8	+ 1.3
Sept. 16	2 56 4 N	31 38	957.0	.851	.915849	80.0	+ 1.7
Oct. 16	8 59 27 S	19 43	965.4	.941	.931997	87.2	+ 2.1
Nov. 16	19 34 16 S	10 8	973.0	.984	.946729	91.3	+ 1.4
Dec. 16	23 20 57 S	5 21	977.5	.996	.955506	92.7	0.0

TABLE 30.
SOME OTHER VALUES IN THE COSINE FORMULA.

Mean Date.	Bloemfontein.			Aliwal North.				
	Z	y	M	C - O = y - M	Z		M	C - O = y - M
	° ' "	°	°	°	° ' "	°	°	°
Jan. 16	8 12	86.3	86.3	0.0	9 48	83.5	83.3	+ 0.2
Feb. 15	16 32	84.2	85.3	- 1.1	18 6	81.4	82.9	- 1.5
Mar. 16	27 29	79.6	80.7	- 1.1	29 3	76.8	78.3	- 1.5
April 16	38 59	73.3	75.0	- 1.7	40 33	70.6	72.1	- 1.5
May 16	48 17	67.0	67.5	- 0.5	49 53	64.4	65.6	- 1.2
June 16	52 27	64.1	64.1	0.0	54 1	61.5	61.5	0.0
July 16	49 28	65.9	64.2	+ 1.7	51 2	63.4	61.7	+ 1.7
Aug. 16	42 47	70.5	69.1	+ 1.4	44 21	67.8	66.1	+ 1.7
Sept. 16	32 3	76.9	75.6	+ 1.3	33 37	74.0	72.4	+ 1.6
Oct. 16	20 8	82.3	80.6	+ 1.7	21 42	79.5	77.2	+ 2.3
Nov. 16	10 33	85.4	83.5	+ 1.9	12 7	82.7	80.4	+ 2.3
Dec. 16	5 46	86.6	86.6	0.0	7 20	83.8	83.8	0.0

TABLE 31.

MONTHLY VARIATIONS IN THE COSINE FORMULA.

	<i>Kimberley.</i>		<i>Bloemfontein.</i>	
	Formular Variation.	Observed Variation.	Formular Variation.	Observed Variation.
Jan.-Feb.	⁰ -2.7	⁰ -3.1	⁰ -2.1	⁰ -1.0
Feb.-Mar.	-5.9	-4.9	-4.6	-4.6
Mar.-April	-8.2	-8.6	-6.3	-5.7
April-May	-8.2	-8.0	-6.3	-7.5
May-June	-4.0	-4.1	-2.9	-3.4
June-July	+2.5	+1.0	+1.8	+0.1
July-Aug.	+6.0	+6.2	+4.6	+4.9
Aug.-Sept.	+8.2	+7.8	+6.4	+6.5
Sept.-Oct.	+7.2	+6.8	+5.4	+5.0
Oct.-Nov.	+4.1	+4.8	+3.1	+2.9
Nov.-Dec.	+1.4	+2.8	+1.2	+3.1
Dec.-Jan.	-0.4	-0.7	-0.3	-0.3

	<i>Alinal North.</i>		<i>Mean Table-Land.</i>	
	Formular Variation.	Observed Variation.	Formular Variation.	Observed Variation.
Jan.-Feb.	⁰ -2.1	⁰ -0.4	⁰ -2.3	⁰ -1.5
Feb.-Mar.	-4.6	-4.6	-5.0	-4.7
Mar.-April	-6.2	-6.2	-6.9	-6.8
April-May	-6.2	-6.5	-6.9	-7.3
May-June	-2.9	-4.1	-3.3	-3.9
June-July	+1.9	+0.2	+2.1	+0.4
July-Aug.	+4.4	+4.4	+5.0	+5.2
Aug.-Sept.	+6.2	+6.3	+6.9	+6.9
Sept.-Oct.	+5.5	+4.8	+6.0	+5.5
Oct.-Nov.	+3.2	+3.2	+3.5	+3.6
Nov.-Dec.	+1.1	+3.4	+1.2	+3.1
Dec.-Jan.	-0.3	-0.5	-0.3	-0.5

TABLE 32.

SOME HOURLY VALUES IN THE COSINE FORMULA.

1. *Winter*: JUNE AND JULY.

	Z		y (diurnal)	y (annual)	Observed Temp.
	$^{\circ}$	'	$^{\circ}$	$^{\circ}$	$^{\circ}$
VII.	88	49	37.0	24.1	37.0
VIII.	77	34	44.4	36.2	41.6
IX.	67	31	51.7	47.9	49.4
X.	59	17	56.9	56.4	54.7
XI.	53	45	60.2	61.7	58.9
Noon.....	51	46	61.4	63.5	61.4

2. *Summer*: DECEMBER AND JANUARY.

	Z		y (diurnal)	y (annual)	Observed Temp.
	$^{\circ}$	'	$^{\circ}$	$^{\circ}$	$^{\circ}$
VII.	66	37	67.7	50.6	67.7
VIII.	53	44	73.5	64.3	72.3
IX.	40	39	78.6	76.0	76.6
X.	27	30	82.4	85.0	80.3
XI.	14	23	84.8	90.6	83.6
Noon.....	5	34	85.6	92.5	85.6

TABLE 33.
COMPARATIVE TABLE OF MAXIMUM TEMPERATURES.

1. *Coast Stations.*

	Durban.	East London.	Port Elizabeth.	Mossel Bay.	Cape L'Agulhas	Simons- town.	Average.
Jan.	85·6	76·3	75·7	76·0	72·9	78·9	77·6
Feb.	85·7	75·9	76·1	75·8	72·9	78·5	77·5
Mar.	84·4	75·2	74·7	74·1	70·9	77·3	76·1
April	81·8	73·6	71·8	71·0	67·4	71·7	72·9
May	78·5	71·2	69·5	68·5	65·0	67·5	70·0
June	76·8	71·0	68·0	67·8	62·7	64·2	68·4
July	76·1	69·2	65·8	65·3	60·8	63·3	66·7
Aug.	76·4	69·2	66·3	65·8	61·1	64·0	67·1
Sept.	77·2	69·5	66·6	66·6	62·7	67·0	68·3
Oct.	78·2	70·4	68·3	68·3	64·8	69·5	69·9
Nov.	82·2	72·6	70·8	70·9	67·9	72·1	72·7
Dec.	84·4	75·7	73·6	73·8	70·9	75·6	75·7
Year	80·6	72·5	70·6	70·3	66·6	70·8	71·9

2. *Middle Stations.*

	Umtata.	Queens- town.	Somerset East.	Graaff Reinet.	Prince Albert.	Wor- cester.	Average.
Jan.	79·1	82·9	84·4	88·0	82·6	86·1	83·9
Feb.	80·1	82·1	84·0	87·6	79·6	86·1	83·2
Mar.	79·1	79·0	80·3	82·8	73·0	83·7	79·7
April	75·8	74·0	75·2	76·2	69·1	75·2	74·2
May	71·7	67·8	69·5	71·0	64·4	68·5	68·8
June	70·0	65·0	67·1	68·6	61·9	64·6	66·2
July	70·0	64·5	66·4	67·2	61·5	63·2	65·5
Aug.	72·2	66·9	69·7	69·7	64·9	65·0	68·1
Sept.	73·1	72·6	73·1	74·9	70·8	69·7	72·4
Oct.	73·3	76·2	76·2	79·1	73·9	74·0	75·5
Nov.	77·6	80·1	79·3	82·6	80·0	79·3	79·8
Dec.	79·4	82·3	81·9	86·7	81·6	83·1	82·5
Year	75·1	74·4	75·6	77·9	71·9	74·9	75·0

3. *Table-Land Stations.*

	Kimberley.	Bloemfontein.	Aliwal North.	Philippolis.	Average.
Jan.	92·0	86·3	83·3	83·9	86·4
Feb.	88·9	85·3	82·9	82·2	84·8
Mar.	84·0	80·7	78·3	76·9	80·0
April	75·4	75·0	72·1	69·8	73·1
May	67·4	67·5	65·6	62·9	65·9
June	63·3	64·1	61·5	59·6	62·1
July	64·3	64·2	61·7	60·6	62·7
Aug.	70·5	69·1	66·1	65·5	67·8
Sept.	78·3	75·6	72·4	71·7	74·5
Oct.	85·1	80·8	77·2	76·2	79·8
Nov.	89·9	83·5	80·4	79·8	83·4
Dec.	92·7	86·6	83·8	82·5	86·4
Year	79·3	76·6	73·8	72·6	75·6

TABLE 34.
COMPARATIVE TABLE OF MINIMUM TEMPERATURES.

1. *Coast Stations.*

	Durban.	East London.	Port Elizabeth.	Mossel Bay.	Cape L'Agulhas.	Simons- town.	Average.
	°	°	°	°	°	°	°
Jan.	67·7	64·3	63·9	63·9	62·6	63·8	64·4
Feb.	68·6	64·7	64·2	64·0	63·2	64·2	64·8
Mar.	67·2	62·9	62·0	61·9	61·2	62·4	62·9
April	63·2	59·0	57·9	57·4	57·6	58·3	58·9
May	58·5	53·5	53·9	53·6	54·2	55·2	54·8
June	54·7	50·3	51·3	50·8	51·5	53·0	51·9
July	54·0	48·3	49·0	48·7	50·0	51·5	50·2
Aug.	56·5	51·3	50·9	49·9	50·6	51·7	51·8
Sept.	58·5	54·6	53·2	52·2	52·2	53·4	54·0
Oct.	61·6	57·3	55·8	55·2	55·2	56·1	56·9
Nov.	64·3	59·9	58·5	57·9	57·8	58·8	59·5
Dec.	66·2	62·9	61·5	61·2	60·3	61·4	62·3
Year	61·8	57·4	56·8	56·4	56·4	57·5	57·7

2. *Middle Stations.*

	Umtata.	Queens- town.	Somerset East.	Graaff Reinet.	Prince Albert.	Wor- cester.	Average.
	°	°	°	°	°	°	°
Jan.	60·0	58·0	57·3	58·2	59·8	58·5	58·6
Feb.	60·3	58·7	58·1	60·0	54·7	59·6	58·6
Mar.	58·6	55·6	56·1	56·8	51·1	57·3	55·9
April	51·7	48·7	50·5	50·3	47·4	51·2	50·0
May	42·9	41·5	45·1	44·4	44·1	46·7	44·1
June	36·9	38·0	41·9	40·1	40·4	43·0	40·0
July	36·2	36·3	39·7	36·9	38·9	40·3	38·0
Aug.	42·0	40·1	42·5	39·8	40·6	42·3	41·2
Sept.	47·3	44·9	45·4	45·2	46·3	46·2	45·9
Oct.	51·6	49·0	48·4	49·6	51·1	49·7	49·9
Nov.	55·4	52·9	51·9	53·2	57·6	53·2	54·0
Dec.	58·4	56·1	55·2	57·0	59·0	56·2	57·0
Year	50·1	48·3	49·3	49·6	49·2	50·4	49·5

3. *Table-Land Stations.*

	Kimberley.	Bloemfontein.	Aliwal North.	Philippolis.	Average.
	°	°	°	°	°
Jan.	60·6	59·2	55·9	56·5	58·1
Feb.	60·1	58·7	55·9	56·9	57·9
Mar.	57·7	54·4	52·0	54·2	54·6
April	50·5	46·5	43·7	45·9	46·7
May	42·4	37·6	36·0	38·2	38·6
June	37·5	31·7	29·4	32·2	32·7
July	36·3	30·0	28·2	32·1	31·7
Aug.	40·7	35·7	33·9	36·4	36·7
Sept.	45·0	42·6	40·2	40·7	42·1
Oct.	51·8	48·7	46·0	46·2	48·2
Nov.	55·5	53·3	50·0	51·7	52·6
Dec.	59·3	57·1	54·5	54·8	56·4
Year	49·8	46·3	43·8	45·5	46·4

TABLE 35.
COMPARATIVE TABLE OF MEAN TEMPERATURE.

1. *Coast Stations.*

	Durban.	East London.	Port Elizabeth.	Mossel Bay.	Cape L'Agulhas.	Simons- town.	Average.
Jan.	76·6	70·3	69·8	70·0	67·7	71·3	71·0
Feb.	77·1	70·3	70·2	69·9	68·0	71·4	71·2
Mar.	75·8	69·0	68·3	68·0	66·0	69·8	69·5
April	72·5	66·3	64·9	64·2	62·5	65·0	65·9
May	68·5	62·3	61·7	61·0	59·6	61·4	62·4
June	65·7	60·7	59·6	59·3	57·1	58·6	60·2
July	65·0	58·7	57·4	57·0	55·4	57·4	58·5
Aug.	66·5	60·3	58·6	57·8	55·9	57·8	59·5
Sept.	67·9	62·1	59·9	59·4	57·5	60·2	61·2
Oct.	69·9	63·8	62·0	61·8	60·0	63·8	63·5
Nov.	73·2	66·2	64·6	64·4	62·8	65·5	66·1
Dec.	75·3	69·3	67·5	57·5	65·6	68·5	69·0
Year	71·2	65·0	63·7	63·4	61·5	64·2	64·8

2. *Middle Stations.*

	Umtata.	Queens- town.	Somerset East.	Graff Reinet.	Prince Albert.	Wor- cester.	Average.
Jan.	69·5	70·5	70·8	73·1	71·2	72·3	71·2
Feb.	70·2	70·4	71·1	73·8	67·2	72·9	70·9
Mar.	68·8	67·3	68·2	69·8	62·0	70·5	67·8
April	63·7	61·3	62·8	63·2	58·2	63·2	62·1
May	57·3	54·6	57·3	57·7	54·3	57·6	56·5
June	53·5	51·5	54·5	54·3	51·1	53·8	53·1
July	53·1	50·4	53·1	52·1	50·2	51·7	51·8
Aug.	57·1	53·5	56·1	54·8	52·8	53·7	54·7
Sept.	60·2	58·8	59·2	60·0	58·5	58·0	59·1
Oct.	62·5	62·6	62·3	64·3	62·5	61·8	62·7
Nov.	66·5	66·5	65·6	67·9	68·8	66·3	66·9
Dec.	68·9	69·2	68·5	71·8	70·3	69·7	69·7
Year	62·6	61·3	62·5	63·8	60·5	62·7	62·2

3. *Table-Land Stations.*

	Kimberley.	Bloemfontein.	Aliwal North.	Philippolis.	Average.
Jan.	76·3	72·8	69·6	70·2	72·2
Feb.	74·5	72·0	69·4	69·6	71·4
Mar.	70·8	67·5	65·2	65·5	67·3
April	62·9	60·7	57·9	57·9	59·9
May	54·9	52·6	50·8	50·5	52·2
June	50·4	47·9	45·4	45·9	47·4
July	50·3	47·1	45·0	46·3	47·2
Aug.	55·6	52·4	50·0	51·0	52·3
Sept.	61·6	59·1	56·3	56·2	58·3
Oct.	68·4	64·8	61·6	61·2	64·0
Nov.	72·8	68·4	65·1	65·7	68·0
Dec.	76·0	71·8	69·2	68·7	71·4
Year	64·5	61·5	58·8	59·0	61·0

TABLE 36.
COMPARATIVE TABLE OF RANGE OF TEMPERATURE.

1. *Coast Stations.*

	Durban.	East London.	Port Elizabeth.	Mossel Bay.	Cape L'Agulhas.	Simons- town.	Average.
	°	°	°	°	°	°	°
Jan.	17·8	12·0	11·8	12·1	10·3	15·1	13·2
Feb.	17·1	11·2	11·9	11·8	9·7	14·3	12·7
Mar.	17·2	12·3	12·7	12·2	9·7	14·9	13·2
April	18·6	14·6	13·9	13·6	9·8	13·4	14·0
May	20·0	17·7	15·6	14·9	10·8	12·3	15·2
June	22·1	20·7	16·7	17·0	11·2	11·2	16·5
July	22·1	20·9	16·8	16·6	10·8	11·8	16·5
Aug.	19·9	17·9	15·4	15·9	10·5	12·3	15·3
Sept.	18·6	14·9	13·4	14·4	10·5	13·6	14·2
Oct.	16·6	13·1	12·5	13·1	9·6	13·4	13·0
Nov.	17·9	12·7	12·3	13·0	10·1	13·3	13·2
Dec.	18·2	12·8	12·1	12·6	10·6	14·2	13·4
Year	18·8	15·1	13·8	13·9	10·2	13·3	14·2

2. *Middle Stations.*

	Umtata.	Queens- town.	Somerset East.	Graff Reinet.	Prince Albert.	Wor- cester.	Average.
	°	°	°	°	°	°	°
Jan.	19·1	24·9	27·1	29·8	22·8	27·6	25·2
Feb.	19·8	23·4	25·9	27·6	24·9	26·5	24·7
Mar.	20·5	23·4	24·2	26·0	21·9	26·4	23·7
April	24·1	25·3	24·7	25·9	21·7	24·0	24·3
May	28·8	26·3	24·4	26·6	20·3	21·8	24·7
June	33·1	27·0	25·2	28·5	21·5	21·6	26·2
July	33·8	28·2	26·7	30·3	22·6	22·9	27·4
Aug.	30·2	26·8	27·2	29·9	24·3	22·7	26·9
Sept.	25·8	27·7	27·7	29·7	24·5	23·5	26·5
Oct.	21·7	27·2	27·8	29·5	22·8	24·3	25·5
Nov.	22·2	27·2	27·4	29·4	22·4	26·1	25·8
Dec.	21·0	26·2	26·7	29·7	22·6	26·9	25·5
Year	25·1	26·1	26·3	28·3	22·7	24·5	25·5

3. *Table-Land Stations.*

	Kimberley.	Bloemfontein.	Aliwal N.	Philippolis.	Average.
	°	°	°	°	°
Jan.	31·4	27·1	27·4	27·4	28·3
Feb.	28·7	26·6	27·0	25·3	26·9
Mar.	26·3	26·3	26·3	22·7	25·4
April	24·9	28·5	28·4	23·9	26·4
May	25·0	30·1	29·6	24·7	27·4
June	25·8	32·4	32·1	27·4	29·4
July	28·0	34·2	33·5	28·5	31·0
Aug.	29·8	33·4	32·2	29·1	31·1
Sept.	33·3	33·0	32·2	31·0	32·4
Oct.	33·3	32·1	31·2	30·0	31·7
Nov.	34·1	30·2	30·4	28·1	30·7
Dec.	33·4	29·5	29·3	27·7	30·0
Year	29·5	30·3	30·0	27·1	29·2

TABLE 37.

COMPARATIVE TEMPERATURES OF MOUNT ABU AND KARACHI.

	<i>Mount Abu.</i>			<i>Karachi.</i>		
	Max.	Min.	Mean.	Max.	Min.	Mean.
Jan.	68	52	58	77	54	65
Feb.	69	53	60	79	57	68
Mar.	79	62	69	86	67	76
April	85	67	75	89	72	80
May	89	71	79	93	79	85
June	84	69	75	93	82	87
July	75	66	70	90	81	84
Aug.	73	65	68	88	79	82
Sept.	76	65	69	88	77	82
Oct.	79	64	70	91	72	80
Nov.	74	57	64	86	62	72
Dec.	70	53	59	79	56	67
Year			68			77

TABLE 38.

COMPARATIVE BAROMETRIC PRESSURES AT DURBAN AND KIMBERLEY
(S. AFRICA), AND AT KARACHI AND MOUNT ABU (INDIA).

	Durban.	Kimberley.	Diff.	Karachi.	Mount Abu.	Diff.
	inches	inches	inches	inches	inches	inches
Jan.	29·990	25·927	4·063	30·02	26·15	3·87
Feb.	30·003	25·963	4·040	29·98	26·10	3·88
Mar.	30·050	26·011	4·039	29·88	26·08	3·80
April	30·115	26·070	4·045	29·79	26·03	3·76
May	30·164	26·111	4·053	29·65	25·96	3·69
June	30·216	26·163	4·053	29·52	25·86	3·66
July	30·235	26·169	4·066	29·49	25·82	3·67
Aug.	30·200	26·109	4·091	29·57	25·86	3·71
Sept.	30·138	26·055	4·083	29·69	25·96	3·73
Oct.	30·101	25·998	4·103	29·86	26·09	3·79
Nov.	30·029	25·968	4·061	29·96	26·13	3·83
Dec.	30·001	25·940	4·061	30·03	26·14	3·89
Year	30·103	26·040	4·063	29·79	26·02	3·77
Range of Monthly Mean	0·245	0·242		0·54	0·33	

Pressure and Temperature Results for the Great Plateau. 315

TABLE 39.

COMPARATIVE PRESSURES AT SELECTED STATIONS.

	Durban. 1890-9 D	Umtata. 1890-9 U	Aliwal N. 1890-9 A	Philippolis. 1891-9 P	D-U 1890-9	D-A 1890-9	D-P 1891-9
	inches	inches	inches	inches	inches	inches	inches
Jan.	30.006	27.602	25.676	25.491	2.404	4.330	4.515
Feb.	30.036	27.628	25.710	25.537	2.408	4.326	4.508
Mar.	30.077	27.664	25.743	25.573	2.413	4.334	4.501
April	30.153	27.710	25.805	25.613	2.443	4.348	4.541
May	30.208	27.762	25.841	25.660	2.446	4.367	4.552
June	30.264	27.812	25.895	25.712	2.452	4.369	4.546
July	30.272	27.814	25.889	25.714	2.458	4.383	4.562
Aug.	30.248	27.783	25.848	25.672	2.465	4.400	4.579
Sept.	30.180	27.728	25.794	25.611	2.452	4.386	4.563
Oct.	30.129	27.681	25.734	25.558	2.448	4.395	4.562
Nov.	30.060	27.634	25.700	25.525	2.426	4.360	4.524
Dec.	30.030	27.613	25.681	25.511	2.417	4.349	4.518
Year	30.139	27.703	25.777	25.598	2.436	4.362	4.540
Range of Monthly Mean	0.266	0.212	0.219	0.223	0.052	0.047	0.047

TABLE 40.

INCREASES OF BAROMETRIC PRESSURE MONTH BY MONTH.

	Durban.	Umtata.	Aliwal N.	Philippolis.	Kimberley.
	inches	inches	inches	inches	inches
J—F	+ .030	+ .026	+ .046	+ .046	+ .036
F—M ...	+ .041	+ .036	+ .033	+ .036	+ .048
M—A ...	+ .076	+ .046	+ .062	+ .040	+ .059
A—M ...	+ .055	+ .052	+ .036	+ .047	+ .041
M—J	+ .056	+ .050	+ .054	+ .052	+ .052
J—J	+ .008	+ .002	— .006	+ .002	+ .006
J—A	— .024	— .031	— .041	— .042	— .060
A—S	— .068	— .055	— .054	— .061	— .054
S—O	— .051	— .047	— .060	— .053	— .057
O—N	— .069	— .047	— .034	— .033	— .030
N—D	— .030	— .021	— .019	— .014	— .018
D—J	— .024	— .011	— .005	— .020	— .013

TABLE 41.

TEMPERATURES AND PRESSURES CHARACTERISTIC OF THE
HOT WINDS OF DURBAN.*Durban.**A. Temperatures.*

	Aug. 23, 1897.	Sept. 17, 1896.	Sept. 21, 1896.	Sept. 21, 1890.	Oct. 3, 1896.	Dec. 26, 1899.	Average.
3rd day before ...	— 4·9	+ 0·3	+ 2·7	— 5·3	— 2·3	+ 0·4	— 1·5
2nd „ „ ...	+ 0·7	+ 3·0	+ 3·0	+ 5·6	+ 2·1	+ 4·9	+ 3·2
1st „ „ ...	+ 5·1	+ 15·3	+ 2·9	+ 6·4	+ 6·1	+ 0·3	+ 5·9
	+ 23·8	+ 20·3	+ 24·7	+ 25·7	+ 28·1	+ 15·5	+ 23·0
1st day after.....	— 2·0	+ 2·7	+ 4·4	— 11·5	+ 6·2	+ 6·3	+ 1·0
2nd „ „	— 8·4	+ 3·0	+ 3·6	+ 4·3	+ 7·2	— 1·7	+ 1·3
3rd „ „	— 1·6	+ 2·9		— 1·9	+ 0·4	— 2·4	— 0·5

B. Pressures.

	inch.	inch.	inch.	inch.	inch.	inch.	inch.
3rd day before ...	+ ·147	+ ·039	+ ·010	+ ·315	— ·133	+ ·179	+ ·093
2nd „ „ ...	+ ·051	+ ·095	+ ·153	+ ·028	+ ·034	+ ·076	+ ·073
1st „ „ ...	— ·150	— ·121	+ ·095	— ·036	— ·009	+ ·160	— ·009
	— ·242	— ·158	— ·170	— ·036	— ·214	— ·163	— ·169
1st day after.....	+ ·054	+ ·010	+ ·008	+ ·240	+ ·014	— ·006	+ ·053
2nd „ „	+ ·125	+ ·153	— ·199	+ ·152	— ·112	— ·030	+ ·015
3rd „ „	— ·035	+ ·095		+ ·115	+ ·009	— ·303	— ·024

*Kimberley.**A. Temperatures.*

	°	°	°	°	°	°	°
3rd day before ...	+ 1·6	+ 15·1	+ 12·9	+ 2·1	— 0·8	+ 5·5	+ 6·1
2nd „ „ ...	+ 8·2	+ 13·6	+ 14·2	+ 7·5	+ 4·6	+ 9·2	+ 9·5
1st „ „ ...	+ 10·6	+ 9·8	+ 15·0	+ 5·4	+ 13·5	+ 5·0	+ 9·9
	+ 9·9	+ 14·6	+ 11·7	+ 5·6	+ 12·5	+ 0·6	+ 9·1
1st day after.....	— 4·8	+ 12·9	+ 15·2	— 6·3	+ 14·4	— 6·4	+ 4·2
2nd „ „	+ 5·9	+ 14·2	— 7·9	+ 1·8	+ 8·3	— 10·6	+ 2·0
3rd „ „	+ 1·2	+ 15·0		+ 5·0	— 0·3	— 10·9	+ 2·0

B. Pressures.

	inch.	inch.	inch.	inch.	inch.	inch.	inch.
3rd day before ...	+ ·054	+ ·026	+ ·100	+ ·130	+ ·035	+ ·169	+ ·086
2nd „ „ ...	+ ·017	+ ·070	+ ·114	+ ·098	+ ·078	+ ·208	+ ·098
1st „ „ ...	— ·000	+ ·100	+ ·108	+ ·026	— ·017	+ ·191	+ ·068
	— ·091	+ ·051	+ ·010	+ ·028	+ ·040	+ ·150	+ ·022
1st day after.....	+ ·039	+ ·100	— ·074	+ ·102	+ ·039	+ ·081	+ ·048
2nd „ „	+ ·023	+ ·114	— ·049	+ ·082	+ ·057	+ ·027	+ ·042
3rd „ „	— ·049	+ ·108		+ ·045	+ ·075	— ·158	+ ·004

TABLE 42.

BAROMETER READINGS AT 32° F. DURING THE ANNUAL
DEPRESSION OF JULY.*Durban, 9 a.m.*

July	10	11	12	13	14	15	16	17	18
	inches	inches	inches	inches	inches	inches	inches	inches	inches
1885	30·485	30·452	30·273	30·291	30·352	30·083	29·970	30·485	30·448
6	·374	·085	·016	29·918	·323	·485	30·255	·159	·164
8	·150	·632	·537	30·194	·166	·042	·331	·478	·553
9	29·965	·120	·106	·094	·051	·276	·114	·390	·561
1890	30·517	·515	·425	·341	·324	·175	29·903	·211	·444
1	·445	·248	·264	·149	·105	·411	30·373	·388	·476
2	·258	·467	·619	·274	·042	29·983	·249	·508	·503
3	·354	·578	·487	·430	·251	30·304	·397	·383	·231
4	·054	·234	29·995	·225	·325	·398	·295	·204	·160
5	·090	·043	30·326	·152	·036	·147	·156	·174	·450
6	·277	·334	·440	·471	·380	·278	·093	·013	·448
7	·234	·196	·106	·095	29·834	·050	·268	·142	·082
8	·404	·312	·129	·154	30·012	·200	·052	·481	·424
1899	·497	·466	·304	·302	·222	·040	·248	·236	·289

Kimberley (or Kenilworth), 8 a.m.

1890	26·283	26·314	26·307	26·290	26·269	26·155	25·961	26·091	26·154
1	·294	·224	·190	·104	·057	·172	26·236	·284	·325
2	·272	·329	·370	·302	·125	25·934	·220	·394	·385
3	·296	·374	·389	·369	·271	26·200	·226	·245	·157
4	·129	·064	·129	·240	·274	·301	·289	·214	·178
5	·051	25·908	·004	25·966	25·986	25·987	·002	·194	·308
6	·208	26·217	·261	26·298	26·247	30·151	·045	·172	·317
7	·261	·213	·164	·056	25·896	·122	·207	·172	·128
8	·360	·319	·250	·236	26·173	·245	·177	·345	·405
9	·403	·356	·327	·283	·213	·155	·211	·240	·284
1900	·251	·292	·312	·325	·052	·148	·237	·226	·271

TABLE 43.

COMPARATIVE MEAN JULY PRESSURES AND TEMPERATURES
FOR A SINGLE STATION IN EACH OF THE THREE
SOUTHERN CONTINENTS.

A. *Pressure.*B. *Temperature.*

July	Kimberley.	Cordoba.	Adelaide.	Kimberley.	Cordoba.	Adelaide.
	inches	inches	inches	°	°	°
1	26·182	28·546 ±	30·187 ±	49·6	51·9 ±	51·5 ±
2	·190	28·537	30·206	50·6	52·2	52·0
3	·208	·532	·211	51·8	52·6	52·5
4	·213	·537	·164	52·0	52·4	52·7
5	·192	·559	·118	51·4	51·2	52·5
6	·174	·576	·098	50·1	50·1	51·7
7	·173	·587	·110	49·2	49·2	50·7
8	·187	·588	·124	48·9	48·8	50·4
9	·199	·597	·118	49·2	47·7	50·3
10	·200	·636	·131	49·4	46·7	50·2
11	·202	·671	·157	49·2	46·0	50·0
12	·192	·684	·203	49·4	46·4	50·1
13	·167	·649	·245	49·8	48·0	50·8
14	·137	·623	·270	48·8	49·8	50·9
15	·127	·601	·268	47·6	50·8	51·4
16	·157	·570	·257	45·7	51·5	51·5
17	·191	·568	·224	45·8	51·9	51·9
18	·218	·578	·189	46·9	52·8	51·6
19	·224	·565	·143	48·3	54·2	51·5
20	·214	·546	·111	49·5	55·1	51·0
21	·197	·549	·101	50·7	54·8	50·8
22	·176	·616	·131	52·1	53·2	50·8
23	·180	·659	·160	52·3	51·5	51·0
24	·195	·646	·199	52·2	51·7	51·5
25	·197	·604	·214	52·4	51·7	51·3
26	·181	·566	·231	52·9	52·6	51·3
27	·150	·561	·214	53·1	52·0	51·1
28	·122	·573	·196	53·5	52·4	51·3
29	·118	·580	·163	52·9	52·5	51·8
30	·133	·569	·151	52·0	54·3	51·8
31	·162	28·528 ±	30·155 ±	50·4	56·5 ±	51·3 ±