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CLIMATE

OF

NEW SOUTH WALES:

DESCRIPTIVE, HISTORICAL, AND TABULAR.

BY

H. C. Russell
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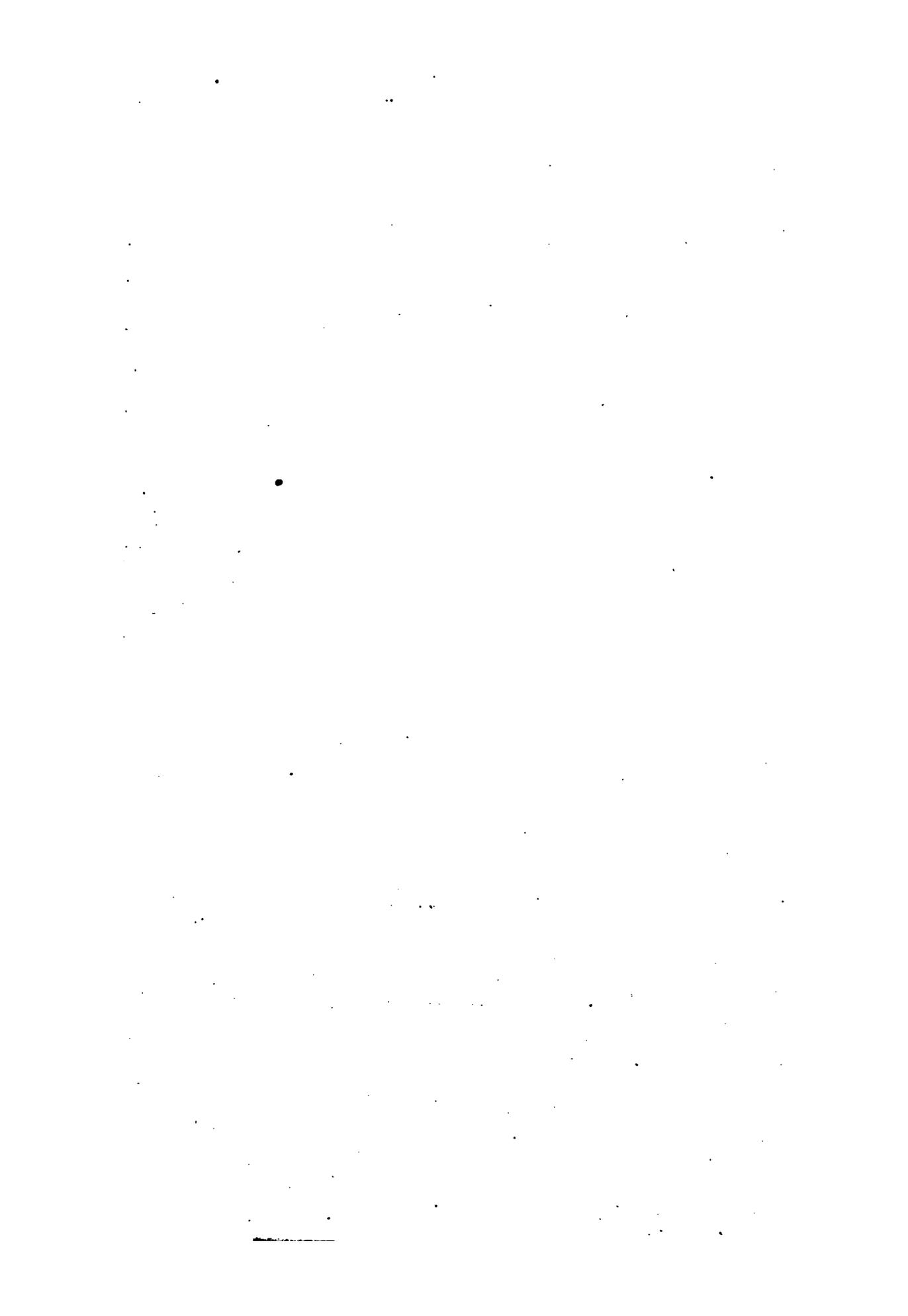
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CLIMATE OF NEW SOUTH WALES.

Introduction.

IN the following pages an attempt has been made to put into a form suitable for convenient reference, such facts concerning the climate of New South Wales as may be useful to the student of meteorology, as well as to the general public.

The historical part has been prepared under difficulties, and it is no exaggeration to say that "the facts were buried under a thousand times their bulk of other matter." A short abstract of some of these facts was first published by Mr. Jevons in his valuable work on "The Climate of New South Wales," but in many cases most important information was passed over; and in going over some of the same ground again, it has seemed better to give complete details, and a great many additional facts, which rewarded a diligent search, as well as to correct some mistakes caused by an error in Ford's Almanac. Many facts have been added derived from sources not made use of before, and from living authorities, who must, of course, pass away in time. The effort has been to make this so complete that it shall not be necessary to go over other works of reference, whenever it is thought desirable to re-open the important question of *periodicity* in our climatic changes, or to ascertain the state of the weather in any particular year, or period in the history of the Colony. How far I have succeeded others must judge; but I hope the following pages will at least be found to meet a want that has often been felt, viz., for a work of reference on the droughts, floods, and climatic condition of the past years of the Colony, as well as an answer to many book statements which have been published without sufficient inquiry.

As Lakes George and Bathurst form one of the best indexes to the state of the seasons, all the information that could be obtained about them has been given. I have, however, reason to believe that there are some persons unknown to me who could give valuable information about these lakes. Should they detect in the following accounts of the lakes an omission of any facts which they could supply, I hope they will make them public, or allow me to do so for the public information.

I desire to express my especial thanks to all who have assisted me in collecting this information; in several instances most valuable meteorological diaries kept in the country have been put into my hands for use. To have given here, however, a long list of names would not have been justice, and I have therefore given the names with the extracts. I may, however, be allowed to say, as some satisfaction to many correspondents, that the ready assistance I have received has enabled me to bring to light much valuable information heretofore lost to science. Much, however, is yet wanting to complete the history of the droughts, both as to their extent and effects; and I trust that those who may be in possession of a *fact* or facts will publish or send them to me, for by collecting isolated facts I have been able to make up many of the series in this work.

My best thanks are due to the Royal Society for allowing me to add to this book a paper on "Meteorological Periodicity," read before the Society in October, 1876.

Historical Notes on the Meteorological Observatories and Observations.

It is very much to be regretted that many valuable observations taken in this Colony have been lost to science. Even with first colonists came a young astronomer, Lieutenant Dawes, with observatory and instruments, to observe the comet then expected. He was sent out by the Board of Longitude, and the observatory was erected on Dawes' Point, somewhere near the site of the present Observatory. He no doubt recorded the state of the weather, but the record cannot be found.* For some years, observations of barometer, thermometer, and weather, were taken at Government House, but the rain does not appear to have been measured; and the remarks are so meagre that the amount cannot be estimated. In 1821 Sir Thomas Brisbane established an astronomical and meteorological observatory at Parramatta, at which valuable observations were taken, and it would appear continued till 1840. All these, with the exception of the first eighteen months, from October, 1822, to March, 1824, inclusive, are gone. This is the more to be regretted, since during this period some of the most important meteorological phenomena ever known in the Colony occurred.

In the year 1840 the Government first caused meteorological observations to be taken, but at only two places in New South Wales. Both of these were on the coast, and the results from one—Port Macquarie—were so peculiar that they were generally discredited; and the other, South Head, Port Jackson, on a narrow neck of land, with the sea washing both sides of it, can hardly be accepted as a place likely to give a correct idea of the climate of the whole Colony.

The observations were carried on at Port Macquarie until 1849—at South Head until 1855; the observer then left the Colony, and the instruments were lost, so that it is not possible now to test their quality. However, from the constant supervision exercised over the observatory by the Governor and by scientific men, it is probable that the instruments were good and the records faithfully kept. All that can now be learned of the instruments is contained in these remarks extracted from the observation sheets:—

Barometer—Is not described, but it appears in the history that it was a good mercurial barometer, and was compared by Mr. Dunlop, the Astronomer, with a Troughton and Simms' standard.

Elevation of the observatory—240 feet above the sea.

Internal thermometer—Attached to the barometer, and has the ball exposed.

External thermometer—Is in a southern exposure, five feet above the ground, placed against a stone wall in a small screen of wood, which protects it from direct or indirect radiation, rain, &c., and at the same time admits a free circulation of air.

Wet thermometer.—This observation is obtained by evaporation on the bulb of the instrument, which is moistened *pro tem.*, and the extreme depression is registered.

Rain gauge—Is cylindrical, ten inches in diameter, with sides two inches deep, then descending to a tubular hole of half an inch diameter, to prevent as much as possible evaporation and other decrease; it is placed on the ground in a perfectly open situation.

* Col. Collins, vol. i, page 15, Feby. 1788, says:—"Among the buildings that were undertaken shortly after our arrival must be mentioned an observatory, which was marked out on the western point of the cove, to which the astronomical instruments, which had been sent out by the Board of Longitude for the purpose of observing the comet which was expected to be seen about the end of this year. The construction of the building was placed under the direction of Lieut. Dawes, of the Marines, who, having made this science his peculiar study, was appointed by the Board of Longitude to make astronomical observations in this country.

Latitude of the observatory was 33° 52' 30" S.
Longitude from Greenwich, 151° 19' 30" E."

(The first gauge seems to have been six inches in diameter, and the change from six to ten inches was made between 1845 and 1849).

Observations were taken at 8:30 a.m., 2:30 p.m., sunset, and 9 p.m., and the results published in the *Government Gazette* every month.

These observations were continued until 1855, and official records ceased; but, fortunately for science, Mr. Jevons, in order to keep up the series of meteorological observations, then commenced and carried on at his own expense a most valuable series of observations until the arrival of the Rev. W. Scott, the first Astronomer for New South Wales.

Upon the arrival of the Rev. W. Scott, in 1856, twelve stations, Rockhampton, Brisbane, Casino, Armidale, Maitland, Bathurst, Parramatta, Sydney, Goulburn, Deniliquin, Albury, and Cooma, were selected and supplied with good instruments as soon as possible. Brisbane and Rockhampton were subsequently passed to the Government of Queensland; and the others, with some alterations and additions, have been retained ever since.

In 1863 Mr. Tebbutt, of Windsor, added to his other instruments a complete set of meteorological ones, and has ever since maintained a most valuable series of observations, adding to those usually taken those of max. wet and min. wet, which are not elsewhere recorded in the Colony.

Arrangements were made in 1870 for establishing a number of new stations for collecting observations of rain, evaporation, and temperature, &c., in connection with Sydney Observatory. The number of stations has in consequence been gradually increased, and now amounts to forty-four.

From all these sources, as well as the newspapers and histories, the information following has been collected.

The literature specially devoted to the subject of our climate is very small, though many notices about it may be found in works on the Colonies generally, and on New South Wales in particular; unfortunately many of them have been made on most imperfect information, and have given rise to grave misconceptions both as to droughts and floods. Of the former, it has been stated that not a drop of rain fell in Sydney for many months (Stokes), November 1838 to March 1839, and now newspaper and other extracts for this date show that rain fell several times during this period said to be without rain. It is worth while mentioning also that the actual measurements of rain now extend over thirty-six years, nearly half the period since the foundation of the Colony, and may fairly be taken as an index of possible weather. From these observations it appears that there never has been during those years one whole calendar month absolutely without rain—though in October 1848 it was only 0.070 in., and in April 1868 only 0.060 in. October, November, and December, in 1867, passed over with a total fall of only 1.26 in., and July, August, and September, 1871, with only 1.34 in.

So with regard to floods, which are stated to have been from 93 to 96 feet above the ordinary level, I have been able to prove that the highest of these floods was only about 50 feet (see great flood, March 1809).

In the few works that are specially devoted to the climate most valuable information is to be found—especially in Rev. W. B. Clarke's "Southern Gold Fields," contributions to the *Herald* in 1842, on Electrical Storms, and papers read before the Royal Society of Sydney.

July, 1788, page 37, an observatory, on the west point of the cove, is mentioned as being in progress this month.

"The observatory, which was erected on our first landing (page 75, July, 1788), being found small and inconvenient, as well for the purpose of observing as for the residence of Lieutenant Dawes and the reception of the astronomical instruments, the stone-cutters began preparing stone to construct another, the materials for which were found in abundance upon the spot, the west point of the cove."

Page 83, in same place as the magazine.

Page 89, Lieut. Dawes tries to get over the Blue Mountains, but was obliged to return without accomplishing his object.

Mr. Tebbutt has made valuable contributions to the Philosophical Society (now Royal Society) on Storms, and published two volumes of observations, 1863 to 1870 (Reading & Co., Sydney). Count Strezelecki also made valuable contributions to our knowledge on this subject; and, above all, Mr. Jevons' "Climate of Australia," published in Waugh's Almanac, 1859, and in pamphlet form, as well as some papers published in the Sydney Magazine of Science and Art.

Mr. Ranken, "Dominion of Australia," discusses the climate of the whole of Australia, in a valuable chapter.

Description of Sydney Meteorological Observatory.

At Sydney the observations are taken at 9 a.m., 3 p.m., and 9 p.m., but barometer, wind, and rain results are obtained from the hourly readings taken from the barograph, anemometer, and pluviometer sheets.

The thermometers are exposed in a shed 11 feet square, of which the sides are 5 ft. 6 in. high, and enclosed to within 18 inches of the ground with open lattice work. The roof is conical, rises to 13 feet above the ground, and is covered with louvres close enough to keep out rain which falls without wind. It is found to answer well, allowing free circulation of the air; but the minimum temperature is not so low on fine nights as in the Greenwich stand, where the instrument is exposed to the effect of radiation.

The instruments used are as follows:—

Two standard barometers; one by Newman, of which the tube is 0.550 inch diameter, the other by Negretti and Zambra.

Barograph. In this instrument the tube is 0.5 in diameter and fixed. The cistern is small, floats in mercury, and has free motion up and down, being fixed to the end of a jointed arm. If the mercury rises the cistern rises because it is lighter, and *vice versa*. Suitable mechanism transfers this motion of the cistern to paper on a scale of $3\frac{1}{2}$ inches for 1 inch of the barometer. The daily index error is determined from the mean of the three readings of the standard, compared with the readings of the barograph at the same hours; this error is applied to all the readings taken from the barograph sheets. For description see Metr. Obs., Sydney, 1873.

Dry bulb is a Kew standard.	} In the shed, and 4 ft. 6 in. from ground.
Wet bulb compared at Kew.	
Maximum, do.	
Minimum, do.	

Maximum sun, bright black in an exhausted bulb 4 ft. 9 in. from the ground; by Negretti. Compared with standard here.

Minimum on grass. Compared with standard here.

Thermometer with black bulb in black box; made by Negretti. Compared with standard here.

Water thermometer, made by Negretti. Compared with standard here.

Five earth thermometers, by Grimaldi. Compared with standard here.

Anemometer:—Records on paper the time, direction, and velocity of wind. Robinson's cups are used. The instrument also records the amount of rain as it falls. It is 65 feet above the ground.

Evaporator is a glass vessel, standing on the ground, 8 in. high and 8 in. in diameter, in which the water is usually about 6 in. deep; it is read by a vernier scale attached to a point, which is every morning to touch the water by screw motion.

ers:—By M. Jame, of Sedan, and exposed twelve hours.

Self-registering tide-gauges record the daily motion of the tides in Sydney Harbour and Newcastle. For description See vol. for 1873.

The amount of cloud is estimated in the usual way—0 representing clear sky, and 10 completely overcast.

The barograph results are corrected to 32° Fah. ; also for index error (if any) as described above.

The direction of the wind for the greatest number of hours, without reference to its force, is taken to be the *prevailing direction*. The greatest pressure is deduced from the greatest velocity, and this is obtained by assuming 4 miles as the amount of wind during the greatest velocity, and then after carefully measuring the shortest time in which 4 miles have been recorded $\frac{60 \text{ m.}}{\text{by shortest time}} \times 4$ gives velocity per hour. The construction of the anemometer gives great facility for determining the time occupied in recording each 4 miles space.

The mean temperature is in all cases taken to be the mean of the max. and minimum.

The highest and lowest shade temperatures are obtained from max. and min. in the thermometer shed.

The solar radiation, or highest in sun, is obtained from a blackened bulb thermometer, in an exhausted bulb, 4 ft. 9 in. from the ground.

The minimum radiation thermometer is mounted with the bulb touching the grass in the usual way.

The highest in sun in black box is obtained from a thermometer with blackened bulb kept in a thick wooden box lined with black wool. The bulb is placed near but not touching the wool, and then covered with a sheet of plate glass, which fits close enough to prevent air currents, but can be taken off to remove moisture. The box is made 1½ inch deep, 3 in. wide, and long enough for the thermometer.

The temperature of sea water is obtained in the open part of the harbour, and the thermometer is allowed to sink 3 feet and remain down long enough to take the temperature of the water. A little water is brought up with the thermometer and prevents any change before the reading is taken.

The humidity is obtained from the wet and dry bulb readings, by means of a set of curves, calculated from the Greenwich Dew Point Factors which show the amount by inspection. The amount agrees with that given by Glaishier's tables.

The rain-gauge is round, 8 inches in diameter, and with rim 15 inches above ground. The rain is measured at 9 a.m., and entered on the day it is measured ; it therefore is for twenty-four hours previous to 9 a.m. of the given date. The pluviometer results are from a gauge of the same size, 65 feet above ground, and connected with the anemometer.

The amount of dew is found from the rain-gauge. Smaller quantities than the rain-gauge will show are lost.

At the Country stations observations are taken at 9 a.m. only.

Mercurial barometers are used in all cases, and the results corrected for index error, temperature, and mean sea level. The index errors are determined by comparison with the standard barometer at Sydney.

All the thermometers have been carefully compared with the standard, and their index errors applied.

The round 8-in. rain-gauge, with rim 15 in. above the ground, is used at all stations, except where the height above the ground is given.

The force of wind at Country stations is estimated on the scale 0 calm, 6 a hurricane.

Physical Characteristics of New South Wales.

Within the Colony of New South Wales may be found all climates, from the cold of Kiandra, where the thermometer sometimes falls eight degrees below zero, and frost and snow hold everything in wintry bonds for months at a stretch, and where upwards of 8 feet of snow sometimes falls in a single month, to the more than tropical heat and extreme dryness of our inland plains, where frost is never seen, and the thermometer in summer often for days together reads from 100° to 116° , and sometimes in hot winds reaches 130° , and where the average annual rainfall is only 12 to 13 inches, and sometimes nil for a whole year.

This great meteorological district, containing such extremes, has for the most part a very moderate climate, and is probably the most healthy in the world. It is included within the parallels 28° and 37° south latitude, and 141° and $153\frac{1}{2}^{\circ}$ east longitude. The east coast has a general trend to N.N.E., and is washed throughout its whole length by the great Pacific Ocean. There are no large inlets in the coast line, but there are many rivers with bar-harbours, some of which are remarkable for safety, extent, and beauty. Along the coast runs a warm equatorial current, setting south. The Revd. W. B. Clarke, F.R.S., has recorded one instance in which a ship was set by this current 60 miles south in twenty-four hours. The velocity is generally stated at from 1 to 2 miles per hour, but it is also asserted that a strong southerly wind will stop it. This however seems improbable, and it is more likely that the strong southerly wind brings up the cold current found at the south, and so turns the warm one to the eastward. This meeting is known to take place at various distances south of Sydney, and the two bodies of waters seem to keep distinct most of the distance over to New Zealand, as is shown by the valuable water-temperatures taken by the "Edinburgh" when laying the New Zealand cable. (See Table 28.) Within 3 or 4 miles of the coast the current may be found setting north or south, as it is affected by the tides and other causes, but beyond that distance the current off Sydney nearly always sets southward.

Flinders, "Terra Australis," vol. 2, page 283, says :—

It is a fact difficult to be reconciled, that whilst the most prevailing winds blow from s.e. in summer and s.w. in winter upon this extra-tropical part of the East Coast, the current should almost constantly set to the south at a rate which sometimes reaches two miles an hour. Its greatest strength is exerted near the points which project most beyond the general line of the coast, but the usual limits of its force may be reckoned at from 4 to 20 leagues from the land. Further out there seems to be no constancy in the current, and close in shore, especially in the bights, there is commonly an eddy setting to the northward from a quarter to 1 mile an hour. It is in the most southern parts that the current runs strongest, and towards Cape Howe it takes a direction to the eastward of south, whereas in other places it usually follows the line of the coast.

Generally parallel to the coast, but varying in distance from 20 to 120 miles, runs the Dividing Range or Blue Mountains, the altitude of which varies from 1,500 to 7,000 feet, but is generally between two and three thousand feet. The highest point is Mount Kosciusko, in lat. $36^{\circ} 23'$ south, and long. $148^{\circ} 19'$, which is the highest known mountain in Australia. Snow may be found in sheltered places all the year round, though the altitude, 7300 feet, is far below the snow-line for that latitude. In winter snow lies on a large part of the range near this elevated peak, many feet thick, and before the severity of the climate was known many cattle caught in snow-storms in the mountains perished. The mountains generally are well wooded, but owing to bush fires and strong winds the timber is often poor, and a few peaks are bare. In the valleys abundance of fine timber may be found.

By this mountain range the Colony is divided into two great districts, the meteorological characteristics of which are very diverse.

On the *east* side the face of the country falls very rapidly, and is everywhere well watered by small rivers. In many places rich alluvial flats intervene between the base of the mountains and the sea, through which wind the most considerable of the eastern rivers. The course of these streams is slow, and from the little fall they have in the flat country, they are quite inadequate to carry off the heavy tropical rains which often fall in the autumn and spring. Being also just at the base of the mountains, and for the most part fed by mountain torrents, floods are sometimes produced by a few hours' rain, and the rivers have been known to rise at the rate of 3 and even 4 feet per hour during the first stages of a flood. In several instances great floods have taken place at Windsor without a sign of rain there; these of course were caused by storm-rains on the heads of the river Hawkesbury.

The climate of the eastern or coast districts is mild and pleasant, and not subject to the extreme droughts of the interior. The prevailing winds here are sea (easterly) and land (westerly) breezes in summer, with westerly and southerly winds in winter. Rain comes from the seaward, and south with flood or heavy rains, nearly always from E. to S.E. At times these come with great storms of wind, and upwards of 20 inches of rain have been known to fall in twenty-four hours on more than one occasion.

The annual average rainfall for the whole Colony is necessarily taken from the observations of the last five years, because the number of inland stations before that was too small to afford a good average. The average of the rainfall of these years is however very close to the average of thirty-six years, and may be taken to afford a fair general average; it gives us, 34.677 inches and 92 days. If now we take the average for the same period for the eastern watershed only, we get 39.938 inches and 102 days; and for the western stations only 24.111 inches and seventy-one days. This last result however is subject probably to considerable reduction, as the stations on the plain country are few compared with those on the western slopes of the mountains; 24 inches is probably about the rainfall of these districts.

The heat in summer and the cold in winter are both less than in the western watershed, but the summer heat is to some persons more trying, because it is a moist heat; the sea breeze being quite tropical in character, and with perhaps more than tropical moisture which it obtains from the warm coast current. In winter however the climate is remarkably mild, and the same warm current then helps to temper the cold and cutting winds which come from west and south-west, and no doubt is one of the main causes at work in producing our balmy winter days, for at this season its temperature is from six to eight degrees warmer than that of the air.

On the *west* side of the mountains the surface falls very slowly from the table-lands the altitude of which is from two to three thousand feet; to the great interior plains through which the Murray, Murrumbidgee, Lachlan, and Darling run their tardy courses to the sea. This part of Australia is from four to five hundred feet above the sea, and the plains are like a great ocean spread out for hundreds of miles on all sides.

Near the range the country is well watered and undulating, with here and there open well grassed and fertile plains. Timber is abundant and of good quality. Proceeding westerly, the plains increase and the country becomes more level; it is well grassed pasture land, with little timber and many small streams of water. On the plains timber and water are very scarce, and nearly all the latter, except the rivers, has to be artificially preserved for the stock. The rainfall in this immense district is, as we have seen, much smaller than in the coast districts, and from the mountains gets gradually less towards the inland plains, the driest part of New South Wales. Here, as far as can yet be ascertained, the annual rainfall ranges from 10 to 14 inches, and perhaps 13 inches may be given as a probable mean rainfall for the Darling

District. Some places on the high land have an average annual fall of about 40, and the average amount over the whole watershed varies between these limits, but on the plains a whole year or more sometimes passes without any rain.

As a necessary consequence of these conditions, the rivers are comparatively small and few in number. Near the mountains they are often more considerable than further on in their course. They all eventually discharge their waters into the Murray, and find the ocean at Port Elliot in South Australia. Not infrequently, many of them cease running in the summer, and in times of drought dry up for many miles except in the deep waterholes. This is not surprising, if the rapidity of evaporation in that dry climate is taken into account; in the heat of summer, it takes place at the rate of about 12 inches per month.

Near the mountains the rivers are subject to floods, but by no means to the same extent as on the coast. In very wet seasons the Murray and the Darling are sometimes flooded, and the back water extends over the plains, a perfect sea of shallow water, which takes many weeks, sometimes several months, to run off, as during the great flood in the Murray in 1870; and when the rivers were first explored in 1817. The rain-bearing winds are for the most part from south and east; but as these have to rise over the Blue Mountains and deposit rain there for the eastern watershed, they have as a rule comparatively little moisture left to deposit on the western slopes. Westerly winds deposit some rain, and at times the effect of the monsoon rain appears to be felt in the north-western parts of the Colony. The extreme dryness of the climate may be judged from the following:—In October, 1876, it was stated on good authority that at one station on the Darling no rain had fallen for thirty months, and Mr. L. S. Donaldson, who took meteorological observations at Cowga, on the Bogan River, 80 miles above Gongolgan, from 1864 to 1868 inclusive, says—

In these five years, thirty-seven months have been absolutely without rain, unless perhaps five or ten minutes; eleven months have been distinguished by only one or two good showers, or perhaps a day or two very light rain, leaving only twelve months in which there has been good rain. The river has only run five times in five years through to the Darling; two other slight freshes have only gone part of the way down.

It has been remarked that floods on the coast districts are simultaneous with droughts inland, but this is not always the case; and during the year 1870 we have had the rain and floods on the coast which have extended to the interior.

The heavy rains coming in both places with winds from eastward, it is not surprising that in some years, when the amount of moisture is not very abundant, it should all be intercepted by the mountains, while in others, with an abundant supply, it should pass the mountains and fall inland as well.

Winds.

It is difficult to give in a short space a clear account of our winds, because, living on the margin of the trades and subject to the uncertainties which such a latitude brings, we have, as a rule, variable winds; there are, however, some marked features which belong to our position, and we will attempt to trace these.

A general view of our wind *causes* may help to a clearer knowledge of the effects, and it will facilitate this if we look first at what we know would follow if water flowed over the whole of the Australian continent; the trade wind would then blow steadily over the northern portions from the s.e., and above it the like steady return current would blow to the s.e., while the "brave west winds," and southerly would hold sway over the other half,—conditions which now exist a short distance from the coast. Into this

system Australia introduces an enormous disturbing element, of which the great interior plains, and the main chain of mountains running along the east coast, form the most active agencies in changing the directions of wind currents. The former, almost treeless and waterless, acts in summer like a great oven with more than tropical heating power, and becomes the great motor force on our winds, by causing an uprush, and consequent inrush on all sides, especially on the N.W., where it has power sufficient to draw the N.E. trade over the equator, and into a N.W. monsoon, in this way wholly obliterating the S.E. trade belonging to the region, and bringing the monsoon with full force on to Australia, where, being warmed, and receiving fresh masses of heated air, it rises and forms part of the great return current from the equator to the south.

That there is a constant, overhead current may be traced day after day and month after month, by the small clouds which mark its lower limit, passing in ceaseless streams to S.E. On the south coast the sea breezes are drawn in by the same force, and help to feed the inland demand for uprushing wind; on the east coast there is a similar inrushing tendency. Here, however, we have the mountain chain to modify the direction of these currents setting in to central Australia, and to a great extent it limits the sea breeze, which seldom gets past this barrier, and only reaches the eastern sides of it late in the day. Partly by the direction of the mountains, and partly by the friction of the N.W. wind overhead, the sea breeze is usually deflected from its easterly or south-easterly direction to north-easterly, where it blows with fine weather and a high barometer, but when the trades blow stronger the N.E. wind is drawn off to supply the want. A loss of pressure or low barometer follows at and about this latitude, and the north-westerly or southerly currents rush in to fill it, the barometer rising all the time, and getting high as the wind reaches S.E. Here the gale usually dies out, and fine weather brings the sea breeze again; but in winter the gale sometimes backs to the westward, and, contrary to ordinary experience, and our summer experience, the gale clears up at S.W. or W. In favourable seasons the wind veers nominally from N.E. through N., W., and S., but the change practically is from N.E. or northerly to S. at once, and we feel but little of the N.W. wind. If, however, the demand at the tropics, which takes off our N.E. wind comes when the upper return current from N.W. is in full force over our heads, this hot wind is drawn down to supply the immediate want of air, and after blowing a few hours, or at most one or two days, the southerly wind rushes up and takes its place. Thunder and lightning generally attend these changes, and the great majority (probably 99 per cent.) of our thunder-storms come from W. or N.W., following indeed the same law which is so marked in our barometrical depressions, which all move from W. to E.

With the southerly wind the barometer rises, and when the void is filled the north-easters and fine weather return, until a like disturbance takes place. The barometer usually falls for some five or six days before a north-westerly wind, but sometimes the fall only lasts one or two. The duration of the north-west wind also is very various, but in the great majority of cases it is displaced by the S. wind within twenty-four hours. It is interesting to inquire the thickness of the wind currents which blow under the great north-westerly stream, and though the facts are few they have great significance. That these cool currents are of no great thickness is evident, for at times it is possible in Sydney to fly a kite so that it rises through the N.E. and is carried away by the N.W. current. The Rev. W. B. Clarke has shown that the N.E. is only about 5,000 feet thick:—"Southern Gold Fields," p. 150. "I have been enabled to discover that though the sea breeze finds its way nearly as far W. as the snows of Muniong it does not generally attain a thickness above the sea of more than 5,000 feet." I have myself observed, when going up the mountains from Penrith, on a cloudy but otherwise fine

morning, that soon as we got near Blue Mountain Station, elevation of 2,400 feet, at about noon clouds appeared in the trees, and soon after leaving the station we encountered tremendous showers of rain, which continued at intervals nearly to Mount Victoria (3,400 feet), when we had evidently passed through the clouds, and I afterwards ascertained that at Sydney a steady N.E. wind was blowing under an overcast sky. On enquiry the engine-driver told me it was a common thing to meet rain and clouds on the line about the same place.

At the Kurrajong I have seen a southerly come on, and the clouds strike the hills at 1,500 feet. In Van Diemen's Land Strzelecki found the hot wind at an elevation of 5,000 feet, and it was not felt on the same mountain at an elevation of 3,000 feet."

From observations made on the small cumulus clouds which so often mark the lower limit of the N.W. wind, I find that they travel from the western to the eastern horizon in from one and a half to two hours. If the altitude of these clouds is taken at only 4,000 feet, which they would have to be to clear the mountains, and which from Strzelecki's and Rev. W. B. Clarke's observations would appear to be a small estimate, the velocity up above must be 80 miles per hour, while on the surface, when this wind is felt, it seldom reaches a velocity of 40 miles; and these facts pointing to a probable thickness of about 4,000 feet for the N.E. wind, accord well with the thickness (9,000 feet) of the trade at Teneriffe, where it is in full force, while we are on its margin. That the N.E. winds are deflected trade winds is evident, because going north, along the coast, the direction changes to S.E.; and this is a frequent wind at Port Macquarie and northwards. Even at Sydney, as in January, 1871, the trade wind cloud is sometimes unmistakable, while in Queensland the trade wind blows well home, as may be seen by the following facts, extracted from Mr. E. Macdonnell's valuable returns:—"At Brisbane, from October to March, the prevailing winds are N.E. and S.E. At Toowoomba, 1,960 feet high and 80 miles from the coast, the S.E. is the prevailing direction from October to March. At Warwick on the table-land it is S.E. the year through, the month of August excepted."

In winter, the great heating influence of central Australia is gone, and its effect is then to cool the westerly winds that blow over it by its great radiation; and as the trades move northwards, westerly winds prevail, and storms and rain from south.

Table 17, derived from nine years' continuous records of the anemometer, give a much better idea of the distribution of the winds than any general description. The records have been distributed into the four seasons, and the mean numbers at the foot of each represent the relative prevalence of wind from each point of the compass. Taking the summer—December, January, and February—the great prevalence of southerly and easterly winds compared with westerly is shown by the numbers 105 S. 95 E.N.E., and only 27 W. In autumn—March, April, May—however, things are changed, and chiefly by the great prevalence of westerly wind in May; the average westerly prevalence is now 112, as compared with 59 S. and 32 E.; and in winter—June, July, and August—the westerly hold still more decided sway, for we have 191 westerly, only 23 S. and 11 E.; and in spring—September, October, November—we have a general distribution of wind all round the compass; W. has a slight preponderance, being 78, compared with 67 S. and 46 E., or rather 73 N.E., which is then the prevailing easterly direction.

Of the general characteristics of our winds and storms, it may be said that inland the prevailing winds are from N. and W. These winds sometimes bring tropical rains, but the heavy rains come from E., S.E., or S., in fact from the same directions as they come on the coast, but as the winds have to pass the range and descend on the other side, it is not to be wondered at that the rainfall steadily diminishes going to the west.

In Sydney, from October to March, with barometer at 30 in., we have fresh N.E. winds during the day; they generally begin between 8 and 10 a.m. in the forenoon, and gradually increase to their maximum about 4 p.m., and die away about sunset; occasionally they last till 10 or 11 p.m., and in some cases all night, continuing day and night for several days, constituting a "black north-easter"; the barometer then falls rapidly for one or more days, and the wind changes to the opposite quarter, S.W. If N.E. wind is very strong, the change to S.W. will be all the more sudden, and it will blow hard from that quarter also; rain in some cases follows after a day or two of the S.W. wind. These gales occur nearly always in January, but occasionally in December, and the force is greatest late in the afternoon and early part of the night.

If, during a fine day, with N.E. wind, light clouds be seen rising in S.W., spreading over the sky, and getting thicker as the day goes on, rain is sure to follow within twenty-four hours, and generally before next morning.

When the wind is N.E. and the barometer falls gradually it will veer to N.N.W. and W., where it will blow for one or more days; as the barometer rises it will veer to S. and die at S.E. or E., with high barometer; to begin another circle from N.E.

If in fine hot N.E. weather the barometer falls fast in the forenoon, a southerly wind (burster) may be expected before night; if the day is very hot the change will come sooner; and if the barometer is falling very fast and clouds be seen in W., a thunder-storm may be expected in the afternoon.

Sometimes the thunder-storm bursts first, and the wind sets in from S. afterwards; if only the storm comes it will probably be hot again next day.

Southerly bursters are generally to be expected from November to the end of February; they are always attended with strong electrical excitement, a stream of sparks being sometimes produced for an hour at the electrometer.

The approach of the true burster is indicated by a peculiar roll of clouds, which, when once seen, cannot be mistaken; it is just above the south horizon, and extends on either side of it 15° or 20° , and looks as if a thin sheet of cloud were being rolled up like a scroll by the advancing wind.

That such is really the case may be seen when it is close too, and it looks as if the clouds were rolling up from out of the advancing wind. That much of the force of the gale is expended in this uprush and battle with opposing winds is proved by the fact that the progress of the gale is usually only about two-thirds of the velocity of the wind.

Clouds of dust, which penetrate everywhere, announce the arrival of the wind; scud flies by overhead with great rapidity, being sometimes less than 2,000 feet high; rain may follow, but, if so, thunder and lightning come first.

The velocity of the wind is in most cases greatest within the first two hours, and varies from 30 to 70 miles per hour, but is usually from 50 to 60, and the rate of progress along the coast about 40 miles per hour.

The change of wind is sometimes very sudden; it may be fresh N.E. and in ten minutes a gale from S.; hence vessels not on the look-out are sometimes caught unprepared, and suffer accordingly.

When a southerly wind commences anywhere south of Sydney it is at once telegraphed to the principal coast towns, and a signal put up indicating its approach.

When the wind is light these storms are often carried to sea by the general westerly tendency of the atmosphere, and may be seen passing by, the peculiar clouds indicating unmistakably their position.

In autumn the wind begins to change to westerly, and brings unse^l weather, the character of which varies in different years. In some th wind is below and the west above; then much rain falls on the coast

others the east is above and the west below, with much cloudy weather and little rain. In some rare cases this cloudy weather has been known to last three months, and ships on the coast then find it impossible to get observations. In other years the two winds seem to meet and form small electrical cyclones, varying from a few hundred feet to many miles in diameter. These may be seen often for weeks together passing by to eastward, their track being indicated by a cluster of electrical clouds. Some days they may pass every hour, or oftener; on others none can be seen. Rain usually falls from the larger ones, with sometimes lightning and thunder; and in the largest which have been observed, the downpour of rain on both sides, with a lull in the centre, can be distinctly traced. The thunder and lightning manifested by these is terrific, but it is only in the clouds, and does not reach the earth. It seems for the time like the change of monsoon in India.

Two of these, rather earlier in the season than usual, were recorded by the anemometer and pluviometer in February, 1869.

The first came up against a N.E. wind, on the 10th of February, 1869, and lasted two hours, from 8 to 10 p.m.; the lightning was extremely vivid and almost incessant amongst the clouds, with an occasional down-stroke. It rained a perfect torrent—2·355 inches fell in the two hours; and during part of the time it fell at the rate of 1 in two minutes, or 3 inches per hour. For about twenty minutes (5 before and 15 after 9 o'clock) the rain almost ceased, and then came on again slowly at first, and from 9·25 to 9·35 p.m. (ten minutes) 0·46 inch of rain fell. The storm then cleared away to E., with the scud driving overhead from W.

On the following night (February 11th) another similar storm occurred; it began at 9 p.m., with moderate rain and almost incessant lightning in all parts of the heavens; at 10 p.m. the rain became a perfect torrent—0·7 inch fell in thirty minutes; it then almost ceased for thirty minutes, and began again with a heavy squall of wind from W.N.W.; the rain was even heavier than before—0·7 inch fell in eight minutes, or at the rate of 5·25 inches per hour, or taking a shorter time, 0·5 inch fell in four minutes, or at the rate of 7½ inches per hour. There could be no mistake about these results, for the pluviometer was watched while it recorded them.

In winter the prevailing wind is from the west, with storms of wind and rain from eastward in June, July, or August, and sometimes southerly wind with rain. The easterly gales come on without warning, instrumental or of any kind. They are by far the most dangerous upon our coast, bringing with them in nearly all cases thick weather, torrents of rain, and a very high sea on a lee shore, from which none but the best found vessels can get away. In one of the worst of these—that known as the "Cawarra gale"—no less than fourteen vessels were lost on the coast, and a description of it from Observatory records may convey an idea of their character.

The 10th July, 1866, was fine, with light W. and S.W. winds; cloudy in the morning, but clearing at night; barometer 30·3 and 30·2, inclined to fall. At 6·45 p.m. lightning was observed in a bank of clouds low down in S.S.E. Next morning (the 11th) was fine with light W. and W.S.W. winds up to noon, when it veered to N. for about two hours, and then to S.E.; by 2 p.m., very light. The morning was cloudy, but not entirely overcast; barometer 30·2, and at night 30·1. After 2 p.m. the wind very gradually increased; at 3 p.m. it was cloudy and dull, wind only 8 miles per hour; at 5·45 p.m. lightning began in S.S.E., and spread all over the heavens, the force of wind gradually increasing; at 9 p.m. wind 21 miles per hour, very cloudy and raining. The rain continued all night, with increasing wind, which, by 6 a.m., was 40 miles per hour, with gusts from 50 to 60 miles per hour. By 9 a.m. of the 12th, 3 inches of rain had fallen; it blew hard and rained in showers all day of the 12th from S.E., and at 8 p.m. the wind began to draw to S. very slowly and decrease in force; by 9 a.m. of the 13th it

was s., and the velocity only 25 miles per hour, cloudy without rain; the wind continued from s. with occasional showers all that day, and at midnight began to veer to w., and was w. at 4 a.m. on the 14th; continued from w. all that day, clouds clearing away, and no return of bad weather.

During the height of this gale four men-of-war in Farm Cove, Sydney Harbour, dragged their anchors, and were compelled to get up steam to prevent driving on the rocks. These storms sometimes come in the autumn and are the cause of nearly all our floods; very heavy rains also, and the strongest winds come from s.s.w., that is along the main range, and are no doubt from the true s.w. wind deflected by the coast.

In spring, westerly, southerly, and light easterly winds prevail, with fine weather and moderate rainfall, and occasionally some unsettled weather like the autumn.

The quantity of rain which sometimes falls in these storms is almost incredible, but there are some cases of extreme falls which are beyond doubt, and two or three instances may be given in addition to the above. The heaviest downpour of rain that has ever been recorded for one day at Sydney Observatory fell on 25th February, 1873, 8·900 inches, and nearly the whole of this fell between 12·30 a.m. and 9 a.m., or 8½ hours. Of this, the heaviest part, as shown by the self-recording pluviometer, was between 2 and 3 a.m., when 1·600 inches fell, and for a few minutes between 7 and 8 a.m. rain fell at the rate of ½ an inch in 10 minutes, or 3 inches per hour. At 9 a.m. however this torrent of rain was not over, and we saw in the clearing up shower, lasting from 10 to 11 a.m., 2·200 inches fall, and part of this time, viz., from 10·35 a.m. to 10·55 a.m., 20 minutes, no less than 1·500 of the 2·200 inches fell, a rate of 4½ inches per hour, and far in excess of the great rain-storm at South Head of which an account is given below extracted from official papers. At Newcastle, however, the heaviest downpour of rain ever recorded in Australia occurred, on the 18th March, 1871. On that morning the sea was going down, and the southerly gale that had been blowing from the 15th was waning at s.e.; by 2·30 p.m., however, the wind backed to south, with barometer at 29·736; at 1·30 p.m. a fearful squall of wind and rain came on with thunder and lightning, and lasted to 4 p.m., when the rain was measured and found to be 10·610 inches for the 2½ hours.

The following is extracted from the Records of South Head Observatory:—

Sir,

For the information of His Excellency Sir George Gipps, who may be curious to know the quantity of rain which fell during the late gale, I beg to transmit memoranda made by me during its progress.

Your most obedient humble servant,

South Head Meteorological Station,
17 October, 1844.

J. F. PEACOCK,
Observer.

Extract from the Meteorological Journal for Tuesday, 15th October, 1844.

Hour.	Barometer.	Thermometer.		Rain.	Wind.	
		Attached.	Detached.			
8·30 a.m.	29·826	61	57	.....	s.e. half s.	s.e. by s.
2·30 p.m.	29·715	60	54	.....	s.s.e.	s. by e.
3 "	29·706	60	54	3·48	s.s.w.	s.w. by s.
5 "	29·677	60	54	5·40	s.w. half s.	s. w.
Sun set	29·664	58	54	.....	s.w. by w.	
6·30 p.m.	29·660	58	52	1·36	s.w. by w.	s.w.
9 "	29·704	58	52	1·53	s.w. by s.	
10·30 "	29·708	57	52	2·68	s. by w.	
7 a.m., 16th	29·657	54	52	5·96	"	
8·30 "	29·730	55	53		"	
2·30 p.m.	29·820	57	55	20·41		

REMARKS.

Blowing strong and wildly from about S.E. all morning, atmosphere densely charged with nimbus and fog. 11 a.m. stormy-looking, followed by heavy rain. Noon, a gale and violent rain from E. of S. lasted till about 2.45 p.m. accompanied by storm of thunder and lightning, thunder barely audible through roar of gale; a lull in fury of storm about 3 p.m., a deluging rain continued; gale soon burst with renewed and terrific force S.W. by W. to S.W., rain in torrents driving furiously until 5 p.m., giving 5.40 inches in two hours; sunset, continued heavy rain; 6.30 p.m. no perceptible change; 9 o'clock gale increased; 10.30 p.m. furious gale S.W.; continued rain until midnight, when it moderated, gale still continued during night. 16th. 7 a.m. the rain much lighter, and at intervals gale continuing until midday and gradually died away by 3 p.m., then after one squall it ceased and the weather became fine.

I ought to observe that on measuring the rain gauge at 7 o'clock, I found the instrument within $\frac{1}{8}$ th of an inch of being full, and my impression was that it had been overflowing, inasmuch as the space occupied by the funnel proved to be equal to nearly $\frac{1}{8}$ th of an inch. How much, if any had overflowed, is a problem not easily solved.

Rain measured 8h. 30m. a.m. of 15th to 7h. a.m.; 16th = 20.41 inches during 22 $\frac{1}{2}$ hours; up to 10h. 30m. on 15th, there could not be more than $\frac{1}{8}$ th inch, the period may be taken at 20 $\frac{1}{2}$ hours, and quantity 20.30 inches—about 1 inch per hour.

Had I not proof of this fact by ocular demonstration, and moreover carrying in my recollection the equally astonishing and very similar quantity (20.12) which fell at this spot on the 29th April, 1841) I could not have credited it, because no other record of rain which I have had to make during four and a half years will bear the least comparison with either of these. On that occasion the wind varied between E.N.E. and E.S.E., blowing in stormy gusts, but not near so violent as the present gales have been.

South Head Meteorological Station,
17th October, 1844.

J. F. PEACOCK,
Observer.

In connection with these fearful downpours of rain one curious observation must be added. On the 27th April, 1871, a very sudden depression of the barometer was recorded at 9.30 a.m.; at the same time the clouds were observed coming from all directions to a point over the Observatory and there ascending; at 10 a.m. a water-spout was seen at sea a little south of the light-house; the column gradually increased in thickness especially at the top, and after a few moments it seemed to burst at the top, and so disappeared: it was showery at Sydney all day, and the wind changed from N. at 3 p.m. to S. at 9 p.m.

List of some of the greatest wind-pressures recorded since the erection of the anemometer in 1863. Particulars of these are found in the monthly publications.

	lbs.	Greatest velocity.
Greatest force of wind, 4 Oct., 1872	35.3	84 miles.
„ 25 Feb., 1873	34.4	83 „
„ 7 Aug., 1873	42.3	92 „
„ 8 Oct., 1873	37.8	87 „
„ 5 Nov., 1873	34.4	83 „
„ 6 Sept. 1874	38.7	88 „ Doing a great deal of damage at Observatory, by blowing over and smashing one of the Transit of Venus houses.
„ *10 Sept., 1876	117.0	153 miles per hour.
„ 11 Sept., 1876	32.8	81 „

* Greatest velocity and force on record. It seems almost incredible, but the instrument was most carefully examined, and cannot have recorded too much; if any error is here, the velocity given is less than the truth. In this gale the Dandenong steamer was lost, and much damage done along the coast. In Sydney roofs and chimneys suffered considerable damage; the roof of one Church at Balmain was destroyed; many strong stone buildings were shaken. From 10 p.m. to 9 a.m. the average velocity of the wind was 57 miles per hour.

Hot Winds.

Of all the features of the climate of Australia the *hot wind* is in many respects one of the most remarkable and interesting, as it is the key which opens the explanation of the whole of our wind system.

These winds are most severe in November, December, and January, but in hot seasons they sometimes come on in October and extend to February, and there are some hot winds recorded as early as September—one even in May, 16th, 1873, when it came on in the evening, and blew for several hours, raising the temperature to 78·3 degrees.

The total number which may occur in one year probably will not exceed seven or eight, and ordinary years pass with only three or four visits from this unpleasant wind. Its heating effects, however, are much more frequent than the wind itself, and it may be safely stated that an extreme rise of temperature seldom takes place at Sydney without unmistakable evidence of a hot wind overhead.

In character this wind is the most disagreeable known in Australia, but I cannot agree with the opinions which have been expressed of its unhealthiness. The heat is no doubt great, but it is *very dry*, and to some constitutions affords positive pleasure. The worst general effect that I have been able to trace is languor, and that would certainly be much worse with a moist wind of the same temperature. Vegetable life, however, does not escape with so little damage, and the commencement of a strong hot wind is a signal for all plants to droop; if the leaves are tender they shrivel up as if frost-bitten, and never recover; in extreme cases stronger plants are injured, and there is one instance on record in December, 1828, where a hot wind destroyed for a space of 30 miles all the wheat on the Hunter River.

The actual temperature of the wind varies from 80° to 110° in Sydney, but it seldom reached 100°, and only once in twenty years has it reached 106·9°, the highest recorded temperature at this Observatory. Inland the heat is much greater, and in Central Australia Capt. Sturt says his thermometer rose to 131° in the shade on the 21st January, 1845.* The heating effects of this wind are well known, and little protection is afforded by doors and windows, for a house rapidly heats, and it is only the greater heat outside that makes it endurable, which is manifest directly the cool "burster" displaces it, for the house then feels like an oven. (See Feby., 1791, for an account of an extreme hot wind.)

Fortunately these winds are rare visitors at Sydney, thanks to the Blue Mountains, which throw them up, and to the n.e. and s. winds, which come in to keep us cool, while the hot wind passes over our heads to lose its heat in colder climates to the s.e. In the great majority of cases all we can see of it is the small cumulus cloud which it forms on the top of the sea breeze, and carries to the s.e., but when the n.e. wind fails to come in with its sheltering coolness the hot wind soon finds the surface, either in a violent gust or as a gradual increase of the light westerly wind.

The hot wind is almost invariably preceded by some days of fine weather, bright and sunny, during which the sea breeze comes in cool and pleasant daily; the barometer falls gradually; the days get hotter, and the sky gets clearer of clouds but full of white haze (due probably to the dust particles brought by the n.w. wind); the sea-breeze gradually fails, and at last, on a bright and sultry morning, the n.w. wind comes down from overhead, where it has been gradually acquiring force, urged on by unusual heat in the

* On this journey, while the party were camped at the one water-hole which saved their lives from January to July, they found the heat very great. The mean shade for December was 101°, January 104°, February 101°. The effects of this heat they afterwards saw in deep cracks, or rather chasms, from 8 to 10 feet deep on the plains.

tropics, which has increased the trades, and the monsoon, by one taking away the force of the north-east wind, and by the other increasing the power of the hot wind. It generally comes on in the forenoon, and may last all day, and be followed by a cool night with light southerly or easterly winds, but if so it will come again next day, and may so return for two days, but in the great majority of cases it is displaced in the afternoon of the first day by the well-known burster; if this is to take place, however, it is indicated in the morning by the rapid fall of the barometer. When it comes it is a welcome change, and I have seen the temperature fall 22° in fifteen minutes—that is, from $106\cdot9$ to $84\cdot9$, and in all cases the temperature falls rapidly.

Sometimes the hot wind comes on suddenly as it were, and displaces the sea-breeze for an hour or two, and then goes again as it came. This may take place at any hour of the day or night, and is evidently only a deflected tongue from the main current overhead.

A few cases, however, will show the uncertain character of the hot wind better than pages of description:—

1862—November 8, 1862. The morning opened with a hot wind, which continued to 2:50 p.m., when the wind went to e., and continued in that quarter to 8:50 p.m., when it changed to s. with thunder, lightning, and rain. The barometer fell from $30\cdot038$ 9 a.m. of 6th to $29\cdot620$ at 3 p.m. on the 8th, and again rose gradually. During the hot wind the thermometer stood at $89\cdot0$ at 9 a.m. rose to a max. of $97\cdot8$, and by 9 p.m. was down to $76\cdot4$.

1862—November 20. The barometer fell gradually from $30\cdot091$ 9 a.m. of 16th to $29\cdot389$, 3 p.m. 20th. All forenoon of 20th there was a fine sea-breeze, and suddenly at 2 p.m. the wind changed to n.w., very hot, until 3 p.m., when it changed again to s.e., and by 9 p.m. came on to blow strong from s.; the temperature, which at 9 a.m. was only $76\cdot3$, ran up to a maximum of $100\cdot0^{\circ}$, and by 9 p.m. was down to $66\cdot0$.

1863—January 5. On the 3rd at 9 a.m. barometer $30\cdot015$, falling gradually to 3 p.m. of 5th $29\cdot485$. On 5th temperature was $86\cdot0$ at 9 a.m.; at 10 a.m. wind went to e., light; soon after changed to n.w.; very hot to 0:45 p.m., when the wind suddenly changed to s., and the temperature fell from $106\cdot9$, 22° in fifteen minutes. Showers of rain followed at night. This was one of the hottest winds I ever experienced, and only lasted about two hours. Barometer here continued to fall for some time after change of wind.

1875—On 24th November, 1875, wind n.e. from noon to 8:30 p.m., then backed to n., and became a hot wind; at 11 p.m. it began to go round towards w., reaching n.w. at 2 a.m.; then suddenly, and with little change of velocity, it veered round by w. to s. by 2:25 a.m.; from 10 p.m. to 1 a.m. the velocity ranged from 12 to 17 miles per hour, and at 4 a.m. was 25 miles. Barometer fell from $29\cdot816$ at 8 a.m. on 22nd to $29\cdot369$ at 2 a.m. of 25th.

The extent of country covered by these hot winds is enormous, and seems at times to include nearly the whole of Australia; they have been traced over good part of Queensland, all New South Wales, and into Victoria and New Zealand, and it is curious to remark, when there is a hot wind generally prevalent its heating effects on the air of places where the wind is not felt may be clearly traced.

As an instance of their extent, the hot wind which blew at Sydney all the forenoon of 17th January, 1872, may be taken; here the temperature rose to $98\cdot3$ degrees, and at 9 a.m. on that day the wind could be traced at Grafton, Bourke, Murrurundi, Muswellbrook, Dubbo, Mudgee, Maitland, Newcastle, Orange, Bathurst, Lambton, Mount Victoria, Moss Vale, Terrara, Wagga Wagga, Cape St. George, Queanbeyan, Urana, Deniliquin, and Melbourne.

In another case a hot wind, early in the season, is reported from Thargomindah on the 18th, 19th, and 20th September, 1873, and may be traced in wind or temperature of almost the whole of the observing stations over the Colony. At Sydney it was not a very marked hot wind, but the temperature ran up rapidly on the 17th and 18th, and there were all the indications of hot wind.

Professor Smith's opening address, Royal Society, 1871, says—"I have felt a hot wind on the Blue Mountains, and down to Penrith (34 miles from Sydney), while the usual sea-breeze was blowing at Sydney. North-west winds occur occasionally at New Zealand, but they are said to be confined to the province of Canterbury, where, at Christchurch, on the 15th January, 1855, I experienced one. To reach that point it had to blow over the neighbouring mountains, and during this wind nearly all the snow in sight of Christchurch disappeared."

The observations at Sydney at this time show strong southerly winds 10th, 11th, and 12th, thunder-storms 15th to 18th, sultry on 18th, southerly 19th and 20th, and on 22nd hot wind.

The presence of the n.w. winds at Sydney is here shown by the heat and thunder-storms, and the s. wind was only the inrushing wind to supply the extra trades, which are manifest in the monsoon stretching right over to New Zealand.

In a pamphlet on the Canterbury settlement in New Zealand it is stated that the n.w. wind possesses there the character of *warmth and dryness*, and melts the snow in such quantities on the snow mountains that floods ensue on the low countries. The same thing takes place on the mountains at the head of the Murrumbidgee in this Colony.

One case is on record in which a hot n.w. wind was felt at sea 60 miles from Sydney.

One, perhaps near Sydney the worst that has ever been felt, has already been referred to. (See February, 1791.) And I will only here add Captain Sturt's account of one he experienced in Central Australia on the 11th November, 1845 (vol. 2, page 90).

"The wind which had been blowing all the morning hot from n.e. increased to a gale, and I shall never forget its withering effects. I sought shelter behind a large gum-tree, but the blasts of heat were so terrific that I wondered the very grass did not take fire; everything both animate and inanimate gave way before it, the horses stood with their backs to the wind and their noses to the ground, the birds were mute, and the leaves of the trees fell like a shower round us. At noon I took out my thermometer graduated to 127° and put it in the fork of a tree, and an hour afterwards when I went to examine it the tube was full of mercury, and the bulb burst; about sunset the wind shifted to w., and a thundercloud passed over us, but only a few drops of rain fell."

SOURCE OF OUR HOT WINDS.

The return trade wind, as we have seen, may be traced month after month at Sydney in its ceaseless flow to s.e. With this current is combined also the n.w. monsoon, and all the heat and heated air which are given off by Central Australia, so that it is, when passing over s.e. Australia, a hot dry wind heated far above ordinary tropical temperature by our burning plains, where the temperature in the shade is known to be at times up to 130°, and when the wind has travelled over the intervening cool earth it is still sometimes 110° when it reaches the coast. Here then is an ample source of hot wind, and a cause for the sunny summer skies of eastern Australia, for

no clouds could long survive such an atmosphere. Fortunately for us the hot wind must rise over the Blue Mountains, and in fine weather the n.e. or s. breezes blowing under it give Sydney a temperate climate. But when the sun is more than usually powerful in the tropics the trade winds are urged with greater force, and to supply the want take away the n.e. winds, leaving a partial vacuum at and about this latitude; at the same time the monsoon urged by the same cause blows with greater force, and gathers power, driving back the southerly winds on the south coast, and supplying here the place of our lost north-easter, and coming down on Sydney from the mountains. Maury records this drawing down of the return trade (page 86, 15th edit.), and there can, I think, be no doubt at all that this is the cause of our hot winds. In Sydney they never last long, because we are as it were on the margin of the regular trade, and if a depression of the barometer does take place and bring down the hot wind, the heavy cool south wind soon finds its way here, for the main range affords additional facility for it to rush in and fill the vacuum. On the south coast, however, the case is different, and hot winds are there more severe and of much longer continuance than they are here.

At Sydney the hot wind seldom blows at night, the demand in the trades is then less, because the sun is away, and the hot wind obeys the law of gravity, and rises, aided also by the inrushing s. wind, which generally takes the evening time to make its way under the opposing wind. In strict accordance with these views is the great prevalence of hot winds in years when the sun is very active to the n.; hence also their great extent, coming over the whole Colony as it were at *one time*, and even reaching right over to New Zealand.

Another very strong argument in favour of this view is to be found in the circumstance, of which many examples might be given, viz., that the hot wind sometimes appears on the s.e. coast, at the same time or even before it does inland, for the ordinary surface speed of these winds does not exceed 20 or 30 miles an hour, and the distance to be passed over from what has been called the cradle of the hot winds is some 1,000 or 1,200 miles distant, or a two days' journey for the wind, even at the greater speed.

Thunder and Hail Storms.

These, as I have already stated, commonly result from an inrush of north-westerly wind, and with scarcely an exception they move from west to east; proof of the predominance of the westerly current. If the storm was caused by the meeting of the n.w. and n.e. currents, it would, as the resultant of these, move to the south, which it does not do, but always moves to the east, except in rare cases, when a great storm of wind and rain comes in from the sea, bringing with it torrents of rain. Such storms occur usually in the autumn when the north-west wind is getting weaker and the polar current is in force. A storm sometimes appears to come from n.e., but in this case it is simply turned back by the superior strength of the sea breeze.

The proof that our thunder-storms do result as I have indicated is found in the following results of an investigation extending over ten years, and including 195 thunder-storms.

The two currents cannot always be traced in the wind records of the storm day, but are to be found within a few hours of it in 178 of the storms; in the other seventeen the two currents cannot be traced.

Taking the period 1871 to 1875, the storms are distributed amongst the months as follows:—

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1871	4	3	1	2	2	1	0	1	1	4	3	4	26
1872	3	3	4	0	1	0	0	4	0	5	8	4	32
1873	1	6	2	1	1	1	1	1	2	3	8	2	29
1874	4	8	2	0	1	1	0	2	1	4	2	2	27
1875	2	0	0	2	2	0	1	0	2	5	4	3	21
Sum ...	14	20	9	5	7	3	2	8	6	21	25	15	135
Mean...	2.4	4.0	1.8	1.0	1.4	0.6	0.4	1.6	1.2	4.2	5.0	3.0	2.7

These results show a marked prevalence of storms in October, November, and December. It appears also from observations made generally over the Colony during the same period, 1871 to 1875, that the number of thunder-storms is in direct proportion to the temperature; this appears also in the foregoing table, which is for Sydney only. We had the greatest number of storms in the very hot summer of 1872. In November of that year only five days passed, viz., 8th, 13th, 14th, 16th, and 17th, without a thunder-storm in some part of the Colony, and on the 27th thunder-storms were reported from sixteen different stations. The sun's heating power was unusually great during this month, and 144 storms were observed. These storms, as I have said, always come from the west, and the signs of one in the morning are not very different from those for a hot wind; they come on a hot morning with a hazy sky and a low barometer, but the thunder-storm may be distinguished by a rapidly falling barometer and a few hazy and cumulus clouds to the west, generally soon after 9 a.m. As the storm gathers force, the clouds turn dark and heavy, the cumulus runs into nimbus, lightnings play about the moving mass, or strike in vertical lines to the earth; at times two or three vertical strokes pass at one spot before equilibrium is there restored; a squall of wind usually precedes the storm. The thunder and lightning are often truly grand in these storms as they pass over-head, and it is a common thing for some down strokes to fall into the city, where probably the prevalence of lightning conductors prevents frequent accidents. The storm may last half-an-hour or several hours, and may generally be seen long after over the sea, where as night comes on the play of lightning in the great masses of cumulus is very fine, in some cases the clouds seem in a blaze of electricity, one or more flashes coming every second. Hail seldom comes in Sydney in any great quantity, but in the country, as may be seen in some of the following accounts, immense damage is done by hail.

There is one apparent and one real exception to the easterly drift of our thunder-storms; the first is when a thunder-storm comes up against a N.E. wind, and after partially spending its force is driven back by the sea breeze for a time, and then passes away to sea again.

The second is the approach of an easterly or S.E. gale, when heavy clouds and abundance of lightning between them, and a little thunder, precede abundance of rain and wind. These storms generally come in the autumn when the polar wind is re-asserting itself, and are evidently caused by an inrushing polar current.

Our thunder-storms seem to take their rise in the mountains 40 to 60 miles west from Sydney, probably about Mount Tomah, and it appears from Mr. Comrie's valuable observations that the majority of the storms there follow the valley of the Grose River, coming out on the plain at about W.N.W. from Sydney, and it is from this point that the majority of our storms appear to come.

In the following list all the thunder-storms are included of which accounts were found in the newspapers, &c., from 1788 to 1840. Some others have been added, but there has not been time to search for accounts of subsequent storms, except the few that are here mentioned :—

DATES OF THUNDER-STORMS.*

- 1788—February, November.
 1789—February.
 1793—October (s), December (s).
 1794—January.
 1795—December (s).
 1796—December.
 1797—January (s), November.
 1798—March, May (s), November.
 1799—November (s).
 1802—December.
 1804—December (s).
 1805—February, April, November, December 8.
 1806—January 19 (s), September 28 (s), November 9 (s), November 23 (s).
 1808—November 6 (s).
 1809—September 17 (s), November 19 (s), November 26 (s).
 1810—January (s), October (s).
 1812—January (s), September (s), November 7 (s), November 21 (s).
 1813—March (s).
 1814—March (s), April 9.
 1815—January (s), October (s), November.
 1817—January, February (s), August (s).
 1818—March (s), November 7.
 1820—November (s), December 11 (s).
 1821—October (s).
 1822—October (s).
 1823—February 6 (s), February 27 (s), October (s), November (s).
 1824—January, May (s), December (s).
 1826—September (s), November (s).
 1827—November.
 1829—January (s), February, August, October 20 and 22, (s), November (s), December.
 1830—February (s), March (s), October 26 (s), and 30 (s), December 23 (s).
 1831—February 24 (s), April (s), December.
 1832—January 12, February 21. See also March 8 and 25 (s), February 28, April 3 (s), November 20.
 1833—February 9, March 16, April 30 (s), November 5, December 14.
 1834—January 11, November 1st (s), November 4 (s), November 20 (s), December 11.
 1835-6—Nothing recorded.
 1837—March 16 (s), October 31 (s).
 1838—January 13 and 15, March 1 (s), March 17 (s), October 22, November 11 (s), December 20.
 1839—January 30 (s), July 31, September 13, November 11, November 18 (s), November 26 (s), December 20.
 1840—March 16, March 25 (s), May 25, November 24, December 22.
 1841—November 21, th. Prospect; December 20, terrible hail-storm, Jerry's Plains.

* Most of the dates here given refer to paragraphs in the history. (s) after the date signifies that the storm was severe.

- 1842—February 11, th. r. A young girl killed by lightning, when standing under a tree at Maitland. September 28, violent hail, rain and thunder; mill in Sussex-street struck. October 27, hail-stone of $2\frac{1}{2}$ inches diameter.
- 1843—December 16, terrific thunder-storm.
- 1844—January 14, storm of lightning, hail, rain, &c., gyrating from n.w. to s.w.; hail-stones of the size of pullet's eggs, and of an angular shape; for one elaborate description of this storm, see Rev. Mr. Clarke's letter in "Australian," January 23, 1844. September 6, th. Singleton.
- 1845—December 9, hl., w., Buree.
- 1846—February 18, th., Sydney.
- 1847—April 13, ketch "Ebenezer" off Whittell's Wharf, was struck by lightning, several persons injured.
- 1850—January 2, th., February 17, th., January 27, hail and thunder-storm, Windsor. October 4, hl., Hunter River. October 13 and 14, th. Moreton Bay, hail-storms with lightning on both days, most heavy on 14th, when pieces of ice fell, some weighing $1\frac{1}{2}$ lb., and many 3 or 4 ozs., several pieces measured 7 inches in circumference. October 15, th. hl., one woman killed in Sydney. November 11, h., Bathurst, hailstones 7 inches in circumference. November 23, (?) Bathurst, thick constant shower of large hail at Bathurst, for half an hour; this storm described a path two miles broad, at least forty miles long. December 16, th. hl., Bathurst. December 21, 22, thunder-storm at Parramatta, Windsor, &c., see a description, with general remarks upon the season, by Rev. W. B. Clarke, in Sydney Herald of December 28th, 1850. It is there stated that 1 inch of rain fell in 21 minutes, or at the rate of 70 inches in the twenty-four hours.
- 1851—January 3, th. Goulburn. January 15, th., Windsor. January 19, th. Bathurst. October 21, th. hl. squall, Windsor. December 18, th., Turon River. December 30, great thunder-storm at Richmond, a young woman killed when standing in the doorway of a room; persons inside were only stunned.
- 1852—April 8, 13, th., Port Macquarie. September 8, th., Turon. September 29, th., Maitland.
- 1853—November 19, th., Bathurst.
- 1856—February 6, th. r., a flock of 200 sheep killed at Yankalilla. September 28, th. r., The Ovens. October 14, th. hl. r. w., Newcastle. November 19. It is a remarkable and interesting fact that on this day hail-storms of extraordinary violence, though of small extent individually, occurred almost simultaneously in parts of N.S.W. as far separated as the following:—
- | | | |
|-------------------|-----------|-----------------------------|
| Yass, at... .. | 9:30 a.m. | Wollongong, at ... |
| Richlands, at ... | 10:0 " | Upper Paterson, at 3:0 p.m. |
| Wheeo, at ... | | Sydney, at... .. |
| Bathurst, at ... | 0:30 p.m. | 11:0 a.m. |
- At Sydney, indeed, there was no hail but only a slight thunder-storm, moving with great rapidity from the west. In other parts of the Colony the accounts of the hail are extraordinary, and very closely coincide. The showers usually lasted twenty minutes, the stones being of the size of pullet's eggs, or sometimes measuring as much as 2 inches in diameter. One stone which fell near Bathurst, weighed 8 ozs. The usual disastrous effects were produced upon all glass windows, all gardens, vineyards, wheat crops, which lay beneath the path of the hail clouds. November 26, th., Sydney, Windsor, Goulburn; two houses struck in Sydney, several accidents

and one child killed at Windsor. November 30, th., Drayton, Brisbane. December 10, Sydney, hailstones of $\frac{1}{4}$ -inch diameter. December 26, th., Sydney, four children struck at Ultimo, one who was elevated on a rock some 8 feet above the others was killed, his felt hat being rent open, and acquiring a smell of brimstone.

1858—March 11, th. h. r., Armidale. On the Bogan a stroke of lightning penetrated the bark roof of a verandah, leaving a small hole, and killed and disfigured a man standing beneath.

The list of storms from 1841 to 1858 I have extracted from Mr. Jevons' list, page 16, vol. 2, Sydney Magazine of Science and Art.

A terrific hail-storm visited Illawarra on the night of the 23rd of October, 1871; never before was such a storm experienced in this district. The sky looked dark in the afternoon, and between 8 and 9 p.m. sheet lightning appeared, and distant thunder was heard in the south and south-west. At 11:30 p.m. rain began near Dapto. Six young bullocks were driven by the hail into a waterhole and there drowned; they were found embedded in hail. Gardens were completely destroyed, and all fowls and pigs not under shelter. The storm seems to have been about a mile wide, and came from Jamberoo towards Albion Park. Two days after the storm there could not have been less than fifty tons of hail in the corners of the creeks on two farms only, and on the morning of the 24th (next day) the depth of hail lying on all the level ground was about 6 inches, and where the streams carried it, it was ten or twelve feet thick.

At Maitland (West) on the 29th December, 1872, during the afternoon, dark heavy clouds seemed to be collecting over the town from all points, and about 4 p.m. the darkness became so great that fowls went to roost. At 4:30 p.m. the storm broke with wind and rain from south-east, followed by terrific hail, which broke nearly all the windows in its way, pierced iron-covered houses, and destroyed crops in some cases totally. After the worst of the storm a piece of ice was picked up which turned the scale easily at three pounds; another piece was seen to fall and break into three pieces, "each as large as the observer's fist." As the storm passed to the east the wind veered round the compass. About Raymond Terrace and the Williams River great damage was done, and one piece of ice was picked up and measured 7 inches long and 2 inches thick. One field of 20 acres of corn was beaten down and not a stalk left.

Snow.

The question has often been asked does snow ever lie upon the ground in New South Wales? so far as Sydney is concerned. The answer must be—only one case on record, which is thus described in the newspapers of the day:—From the *Gazette* of Thursday, June 30, 1836:—"On Tuesday morning, June 28, between the hours of 8 and 9 o'clock, there was a heavy fall of snow in Sydney, which lasted for half an hour, a thing unprecedented in the memory of the 'oldest inhabitants.'" In *The Colonist*, Thursday, June 30, 1836, it was stated:—"Tuesday last, the 28th current, will be memorable in the annals of this good town as the day on which its inhabitants were favoured for the first time with snow. The fall was by no means considerable in Sydney, although we are told it was several inches deep towards Parramatta. It lay for an hour and more on the tops of houses, and in other similar situations, and the Sydney boys were seen for the first time in their lives making snow-balls. The day was very cold throughout. We never felt it so cold before in Sydney." The *Australian* of Tuesday, July 5, 1836, stated:—"Snow.—Sydney was visited by this strange visitant again on Sunday morning, though in less abundance than on the Tuesday previous. There have been very severe frosts in the country, which cut up the grass and vegetables considerably."

In other parts of the Colony, however, the case is different, and in the winter snow may often be seen from Sydney on the western mountains 35 miles distant, by the aid of a telescope, even as late as October in stormy weather, as on October 10, 1876, and on the southern mountains, though far below the altitude at which the snow line may be expected. Snow may always be found in shady places of Mt. Kosciusco, and is sometimes 40 feet thick there.

When the road was cut over the Blue Mountains in 1815 snow fell so heavily that work had to be suspended, and on 20th July, 1872, I saw the railway covered with from 2 to 3 inches of snow from Mount Victoria to Woodford, about 40 miles. In August, 1874, snow fell generally over the Dividing Range (see July 20, 1837).

The following extracts from the Meteorological Registrar at Kiandra will show to what extent snow falls there, and how late in the season it sometimes falls.

Kiandra.

1872. 11·66 inches of snow fell in May; 5 feet 10 inches snow fell in June; snowing all July, and 8 feet 3½ inches fell; 4 feet 2½ inches snow fell in August; 4 inches of snow fell in September; fifteen inches of snow in November.

In 1873. Sleet and snow 24th, 28th, and 29th April. Snowing from 20th to end of June; snowing heavily during the whole of July, and hail on the 5th; snow seven days in August, hail on 17th and 19th; and it was so cold on the 22nd August that the electric battery became frozen. Snowing seven days in September, and two days in October, and four days in November.

From May to October, 1874, the line of the telegraph to Kiandra was so snowed up near that place that it could not be repaired though it was broken.

About 25th July, 1834, a snow-storm began at Maneroo Plains and lasted with little intermission for three weeks. On the mountains called Australian Alps the snow lay from 4 to 15 feet thick, burying the cattle in groups.

July 18th, 1837. Kemp's Creek, Cabramatta, frozen half an inch thick.

In 1876, a man was lost in the snow between Gipps Land (Victoria) and New South Wales, and it is asserted on good authority that amongst the southern mountains and table-lands 3 feet of snow has fallen in one day, and in the early days of settlement there the cattle were sometimes killed by it.

The Rev W. B. Clarke, F.R.S., has kindly given me permission to quote the following valuable notes:—

Copy of Rev. W. B. Clarke's (F.R.S.) letter in re snow in New South Wales.

St. Leonards, May 11, 1870.

There must be dozens of places in New South Wales where snow lies for weeks. In 1851 I saw in October the whole of the ranges from the neighbourhood of the Abercrombie Hills to the head of the Murrumbidgee white as Mont Blanc with heavy snow, and in the neighbourhood of the head of the Shoalhaven I had the pleasure of making a snow-ball from the remains of that snow, and renewing the school-boy use of that article as a missile.

That was on 18th October; and the snow fell heavily on the 10th and 11th, on the Gungahlin Range, and was not melted on the 14th.

Kiandra is not more than 4,600 feet above the sea, and Kosciusco is 7,175 feet.

On the longest day of 1851 (21st to 22nd December), I was in camp just under the summit of Kosciusco, and my blankets lay on full 40 feet of hard dry crystallized snow that had been melted and re-frozen times without number. From November to May I was never out of sight of the snow along the ranges from Kosciusco to the head of the Murrumbidgee. I watched it day by day, and saw it gradually melting away under the summer's sun; but I was driven off the snowy plain afterwards by a fearful snow and wind storm in May, and the day before I had found dry snow in the hollows of the granite rocks on that plain, on the Gungahlin River.

I saw also on the Victorian extension of the Alps, Mount Buller and other hills covered at the end of December; and I believe I am quite correct in saying that very seldom can the Dividing Ridge under the Cobberas be passed without some snow being seen on what is

called the Play-ground (Ingenai). In all the deep places in the Australian Alps snow may be generally found unmelted at the end of the summer; and it is owing to the difference of the day and night melting of the snow that it is high-water in the Snowy River in summer-time in the morning and low water later in the day, when the night's snow-water comes down. I experienced this myself, and had a great risk on horseback whilst the animal was swimming over the river about 9 a.m., coming from Crackeback to Jindebine. (See "Southern Gold Fields," p. 121.)

In New England, even, there are heavy snow-storms in winter, and the snow must, I think, lie for days in the ravines and plains under Mount Ben Lomond, which I made 5,000 feet above the sea. But I was there in summer. I saw snow, however, for more than two days near Dundee and about Ranger's Valley, which is considerably lower, in June.

W. B. OLARKE.

Rev. W. B. Clarke, "Southern Gold Fields," page 224.

I may mention that on the 28th October, 1851, the day I ascended Kugarica or Sugar-loaf Mountain, near Gidleigh, to obtain its altitude and to take angles from its summit, I saw the whole of the mountains and high land along the Murrumbidgee and from Jallula and Marragural, at the head of the Coodradigbee, and all the ranges at the head of the Murrumbidgee, as well as Mount Tennant and the Tynderies, covered with snow. Indeed the whole upper country from south and south-west to west was as white as Mont Blanc itself. Snow fell on the Gourrock Range on 11th October, and on the 13th and 14th I saw masses of it in the rocky hollows west of Jineroo.

I was within sight of snow from October to the middle of May, 1852, whenever I ascended any considerable elevation; and though I noticed its decrease day by day during the warmer months, yet it never entirely disappeared, either along the Muniong Range or at the head of the Murrumbidgee; though on the 8th May I observed that there was but little on Kosciusco, except at the base of it. Tackinal (Table-top) and Jagungal (Big Bogong) and the ridges around Giandarra* were then free from it. The evaporation from the melting snows appeared to be one great source of the frequent thunder-storms and heavy rains that were continually occurring, and the clouds that rose in dense masses from the summits of the Alps always took most wild and singular forms.

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Camp, near Moamba, 16 March, 1846.

I found snow lying on them (the Snowy Mountains) in large patches, very deep in places, on the 10th of February, after the very warm summer that we have had. It was not however, of sufficient importance to deter one from proceeding along the Snowy chain, had not my instructions required me to go in a southerly direction. We had heavy falls of snow during the 11th, 12th, and 13th of February.

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On Mount Kosciusco, says Dr. Müller, the summit of which consists of granite boulders, I found in January, 1855, large glacier masses in the deep ravines towards the top, and downwards about 500 feet. These ice masses, I am convinced, do not melt completely at any time, unless in very dry and hot seasons; for the vaporous depositions during the night restore to a great extent what is wasted of the ice masses during sunny days, whilst, at any time in the summer, snowfalls add to these glaciers when rain takes place in the low lands.

There is, however, neither on the crest of this or of other equally high mountains of the Muniong Range, nor on the tops of Mount Latrobe and Mount Hotham any permanent ice during the midst of summer, since these mountains are not of sufficient elevation to come within the range of a permanent snow-line, which, in these latitudes, taking other physical conditions of the country into consideration, would exist only at a height about 8,000 feet.

Nevertheless I have seen huge masses of snow as low as 5,000 feet, in places where so vast a quantity accumulates in valleys and ravines that the heat during the summer is not of sufficient power and extent to dissolve them. On the summit of Mount Buller, at an elevation of nearly 6,000 feet, I found fresh ice towards the end of March, 1853, not melting under the sunshine of a bright day. Mount Hotham and Mount Latrobe exceed 7,000 feet, and the main system of the central Alps has many heights between five and six thousand feet.

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The effect of snow-storms on these mountains is very evident. The few persons whom I met, as residents on the Upper Indi, told me that the snow falls in paroxysmal storms, and then the gullies are filled from one to three hundred yards deep, so that it must come in drifts with the wind; one told me he had walked over the tops of the trees hidden by snow; and others in the Snowy Plains say, that, in hard winters, straggling cattle have been known to be entangled in the trees and die; certainly bones of cattle may be seen in trees, just as in Gundagai there were recently the head and limbs of a horse high up in the branches of a tree that had been in the midst of the flood of 1852.

* Kiandra.

The effect of a thaw in narrow creeks can be easily understood. The present season, 1860, seems peculiarly mild. In general, however, I believe that from May to October many of the mountains are impassable. In 1851 there was no snow in March, which is the month when the cattle are driven to the low country, but it fell heavily at times from May to October, leaving the summits between the Hume and Maneroo practicable in November. It often snows above when the rain is heavy below, and after this severe frosts set in. The plains in winter are very swampy.

Page 64, 10 November, 1851.

As this storm was of a very unusual character as to its violence, it deserves more especial mention. The day had been very hot, and, as I had been on horseback since 7 a.m. I was anxious to come to an early camp. But as we were approaching the Berudba River, which one of my attendants spoke of as being very difficult to cross in time of flood, and as we saw ahead of us a very threatening sky, as if a furious tempest was brewing to the south-westward, I was induced to go forwards, in the hope of crossing the river before the storm broke. We had, however, scarcely gained the left bank and set foot on the Maneroo territory when we were met by a furious whirlwind of dust, hail, rain, and thunder, accompanied by vivid flashes of lightning dashing along the ground. As I crossed the river I saw for a moment up the valley patches of what appeared to be snow, but these were nothing but vapour suddenly condensed close to the earth by the sudden change of the atmosphere. In an instant all objects were completely obscured except within a yard or two. The horses, two of which were drawing the cart, and the other ridden by myself, immediately turned round to avoid the blinding gusts of dust, rain, and thunder. The dust came on at first exactly like a large wall, and with the hail frightened the horses. In about three minutes we were all drenched to the skin, and there was not time to put on extra covering, though it became very cold. We, therefore, remained as we were during the fall of the aerial torrent, till it grew nearly dark. Soon we heard the roar of waters, and a furious flood came rushing along our track, roaring and hissing, and reminding one of a cascade. The whole country appeared to have been deluged, and I am satisfied, from what I saw next day, that a waterspout had burst over a limited space not far beyond us. The masses of rock and earth that had been washed down to the river, and also a mile or two to the southwards, especially about Cosgrove's, where the torrent had sought a way to the Murrumbidgee, were perfectly astonishing.

Page 66, 10 November, 1851.

As conveniently suiting this reference to the tempest of 7th November, 1851, I may mention that so violent are the floods on that part of the Murrumbidgee, which there makes a sweep through the mountains, that I saw in the sitting-room of Mr. Brodribb's house, which is some feet above the river, a brown mark only a foot or two from the ceiling, and which indicated the height of the last flood! On the 11th November I measured excavations at the stockyard behind the house, which had been formed by the rain that fell from 6 to 8 p.m. on the 2nd January, 1851, and by which blocks of granite and porphyry, some 2 cubic feet in contents, with earth and pebbles, were removed, leaving a hollow in one place 12 feet deep, 8 to 30 feet wide, and 272 feet long; and in another 2 to 3 feet deep, 17 feet wide, and 282 feet long; with minor excavations I calculated that nearly 200,000 cubic feet had been thus removed in the little Stockyard Creek. But this was nothing to the devastation at Bullanamang during the flood that destroyed Gundagai in June, 1851, the atmospheric warnings of which, apparent for three weeks previously, caused me to close my researches in the Snowy Plains beyond the Eucumbene. I have been told that on that occasion Mr. Brodribb's house was under water altogether.

Page 149, 29 January, 1852.

An examination of the meteorological tables which I have kept will show that there is perhaps in all New South Wales no locality subject to such extraordinary variations of atmospheric conditions as the country at the heads of the rivers Umaralla, Kybean, Brogo, Bemboka, M'Laughlan, and of the creeks Cambalong and Brogolong, and from information collected by me from such residents as have lived in it for any considerable period, the deductions from my personal observations have been fully confirmed. Within less than ten minutes of longitude to the south-westward, the climate is varied by paroxysms of extreme dryness and cold, arising from exposure to the w. and n.-w. gales, hot and cold; but here, where also one station (Coowunjewaa) derives its name "Greenland" from the snows of its winter, the summer is distinguished by dense fogs and extreme dampness—the daily product of the sea breeze, which sends clouds of wet mist up the ravines of the Brogo and Bemboko, and other deep indentations of the coast ranges, covering the country with darkness at times that hinders all outdoor occupations, and producing a phenomenon which, if there were an escarpment to the west instead of a dry, lofty region, would no doubt realize the recurrence of a cloudy canopy, such as that which at Cape Town forms the so-called "table-cloth"; for, in both instances, the clouds are formed by a warm, moist sea-wind from the s.e., blowing up a slope towards a loftier level. In the present instance, I have been enabled to discover that though the sea breeze finds its way nearly as far west on some occasions as the snows of the Muniong, it does not generally attain a thickness above the sea of more than 5,000 feet.

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On 28th May, and again on the 31st, I was on Therolonong above Lake George, with the Honorable T. A. Murray, Esq., endeavouring to take angles on the mountains at the head of the Coodradigbee. On the 31st, the whole of the sky in that quarter was of a dense, dark gray colour, and the summits of Mounts Marragural, Jallula, Tidbinbilly, &c., were under the influence of the most extraordinary refraction, perpetually rising, falling, and assuming the most fantastic shapes. The floods that were so soon to follow were occasioned by heavy rains draining into rivers already bank high, and from ground thoroughly saturated.

On the southern end of the Muniang, I found the snow, upon which I lay at night, resting in patches, along the slopes and in the hollows of the mountains. It was dry, hard, and powdery, capable of being blown away from the surface, and the horses that stood on it made no more impression than they would have done on a hard road. It did not melt on the surface, but from below the masses, which were from 16 to 40 feet thick; and where there was contact with the ground it was wet and discharging moisture, which gradually collected into innumerable little channels, forming at last into streams and cata-racts.

I thrust my hand at night under the blanket, into the snowy substratum, and found it dry, but intensely cold, and the n.-w. wind, notwithstanding the recorded height of the thermometer, was equally unpleasant.

The snow itself was not exactly in the condition of that which I saw on the glaciers of Mont Blanc, and which is called *névé*, nor was it strictly *neige*; it partook of the characters of both, and though not lying on ice, but on the rocks, was certainly in a transition state, being partially consolidated. It had been, I doubt not, often partially thawed and re-congealed, the snows of many winters contributing to it. Hence its imperfect crystalline structure. But it had nothing of the character of the *glacier* about it; and I believe the only ice which forms during the present epoch on the Australian Alps, on the pools and swamps, is not thicker than that of a pond in an ordinary English winter. Probably in earlier times glaciers did form, for I saw more than one unmistakeable *bloc perché*, a mass resting on the upturned edges of strata. Everything led me to conclude that the snow falls paroxysmally on the Muniang Range, and lies for years partially unmelted in the hollows and recesses and down the slopes. In some winters, depending on the winds, the season is no doubt mild; it appeared to be extremely so in 1860, till the first snow-fall on the 13th June, and not till the end of July has there been any accumulation of more than ten feet; but in others, judging by the stunted and gnarled branches and stems of trees, which, at an elevation above the sea of about 6,000 feet, form a greyish blue line as far as the eye can see along the mountains; and from the immense quantity of huge trees thrown down, with broken branches, on summits lower than that, I conceive that there are tremendous snow-storms, and that unprotected travellers or sojourners would perish. Nay, Yarrangobilly and other stations have been abandoned on account of the depth of the sudden snow-drifts. With the example of the convent of St. Bernard, on the European Alps, at 9,000 feet above the sea, in a latitude four or five degrees higher than that of Kosciusco, it is certain that there is nothing to prevent any one *properly provided* from wintering on the Muniang; and my only surprise was to see perpetual snow at all, at a level so far below the calculated snow-line. But the accident that befell the blacks (whom I saw afterwards), in the month of March, shows how imprudent it would be for persons unprovided to brave the sudden and violent variations of climate. So sudden indeed, are the changes of weather in the neighbourhood of the Muniang, that snow fell in the night of 8th December, 1851, and whitened the range. It is in this way that the old snow receives accession.

It seems strange to some that perpetual snow of any kind, even in similar proportion to that which is found in the hollows of Ben Nevis in Scotland, should be met with so near the equator as 36°, at an elevation of only 6,000 to 6,500 feet, which is the fact at the south end of the Muniang; whereas on Mont Blanc, in the latitude of 45° n. the snow line is 8,500 feet above the sea. But, it must be borne in mind that the southern hemisphere is peculiar in its relations to temperature; and in fact, there is a case in South America which very much resembles that of the Muniang, viz., that of Antuco, in the southern part of Chili, in latitude 37° 40', on which snow lies at the height of 7,960 feet, yet even this is far higher in proportion than the snow of Kosciusco. In Tasmania I saw the summits of the high ranges about Mount Field, in 42° 45' s. covered by snow on 17th June, 1856, and the ranges between the Mitta Mitta and the Ovens, on which snow rests nearly all the year, quite white, with it so late in the season as 16th December, 1851, a few miles only to the south of Kosciusco, and at the head of Snowy Creek, one of the gold streams running into the Ovens. The Fainting Range, in Gippsland, was seen covered by snow in May, 1842; and snow fell on Mount Alexander on 11th July, 1860.

In January, February, and March, 1857, at an elevation of 3,400 feet above the sea, on Mount Macedon, between the Alps and Mount Alexander, dense fog prevailed for thirty-seven days; fog occurred nine days in April, twenty in May, fifteen in June, fifteen in July, and fourteen days in August. Snow fell occasionally from May until August, and on the 30th June, it fell to the depth of 3 inches.

Tides.

In Sydney harbour there are two tides regularly every day; the extreme range from the extreme highest tide to the extreme lowest is 6 feet 9 inches, and the range of low-water, or difference between lowest spring tide and low-water neap tide is 2 feet 1 inch, while the *average* difference for the year through, between these tides, is only 1 foot, and the average difference between high and low water in Sydney is 3 feet 4 inches.

The establishment of the port is 8 hours 38 minutes.

List of dates of the appearance of Caterpillars, &c., details to be found in historical part.

Caterpillars ... ..	... ..	March and November, 1799.
Grubs and flies ... ..	... ..	October, 1804.
Grass louse (eat outer skin) ... ..	... ..	September, 1806.
Caterpillars (small) ... ..	... ..	September, 1810.
Caterpillars (inch long, black) ... ..	... ..	March, 1812.
Caterpillars ... ..	... ..	April, 1814.
Caterpillars ... ..	... ..	October, 1814.
Naked snails in Sydney ... ..	... ..	1816.
Oat grub (important) ... ..	... ..	January, 1818.
Naked snails near Sydney ... ..	... ..	October, 1818.
Grubs... ..	... ..	April, 1819.
Grubs... ..	... ..	April, 1820.
Caterpillars ... ..	... ..	1821.
Caterpillars ... ..	... ..	October, 1822.
Caterpillars ... ..	... ..	1824.
Caterpillars ... ..	... ..	March, 1825.
Caterpillars ... ..	... ..	October, 1826.
Grubs (black, on tobacco) ... ..	... ..	March, 1834.
Fly ... ..	... ..	5 June, 1834.
Caterpillars ... ..	... ..	January, 1835.
Caterpillars and other insects ... ..	... ..	November, 1838.
Locusts ... ..	... ..	July, 1839.
Caterpillars. (See 8 Nov., 1839.) See also 3 Feb., 1840	... ..	October, 1839.
Caterpillars. (Mr. Bowie Wilson informs me that caterpillars were very bad in Queensland in 1847)	... ..	1847.
Moths. (Rev. W. B. Clarke.) Letter to <i>Herald</i> reprinted with his permission. See p. 28	...	1851. October, 1855. October, 1866.
Moths, great swarms. (Rev. W. B. Clarke)	...	1867.
Moths in Sydney. (Many small moths about lately, about $\frac{1}{2}$ an inch long, with black and yellow wings and bodies, wings spotted, bodies ringed.)	...	February, 1869.
Grasshoppers at Young ... ..	... ..	February, 1872.
Grasshoppers at Deniliquin ... ..	... ..	March, 1872.
Grasshoppers at Narrabri ... ..	... ..	November, 1872.
Grasshoppers, Deniliquin.—On Sunday 9th February, 1873, at 12:30 p.m., an immense flight of grasshoppers passed over Deniliquin; so dense was the cloud they formed that the sky was darkened for two hours, the bottom of the flight was only 3 feet from the ground, and the noise made was like a high wind.	...	February, 1873.
Beetles. Numbers of beetles about at Bourke, small brown, and medium-sized green.	...	February, 1874.

MOTHS.

To the Editor of the *Sydney Morning Herald*.

Sir,

Public attention has been already drawn to the visitation of innumerable moths during the present month.

My object in addressing you is to mention a few facts observed by myself, which may be of some interest to your general readers, and which local circumstances seem to demand of me.

On the 22nd December, 1851, I camped on a thick bed of snow, just under the summit of the Mount Kosciusko range in the Australian Alps, at a height of between six and seven thousand feet. The only fuel was from the belt of old withered draft gum scrub that appears just at the snow line; our fire, therefore, was very small. About sundown an immense flight of moths came down from the granite peaks and nearly extinguished the fire.

On 7th October, 1855, St. Thomas' Church (North Shore) was visited by a great flight, which much disturbed the congregation on that day, and on the following Sunday, 14th October, the invaders were got rid of with great difficulty, and at some cost to the parish, on account of the injury done to the church furniture.

On the 7th and 14th October, 1866 (just eleven years afterwards), a similar visitation took place, attended by similar results; though the moths were not so numerous as in 1855. The moths appeared in church this year (1867) on the 13th September (Saturday), and from that date to this, 10th October, have gone on increasing in numbers, until several bushels have been destroyed, though apparently without diminishing the army. The state of the church was such, on Sunday last (6th October), from the accumulated dust (moth feathers) and the incessant swarms that were continually flying through the building, that Divine service could not be held therein.

This morning I made an attempt to reckon up the numbers grouped together on the windows and I counted more than 80,000. In the tower and below the floor and hidden behind the skirting there are probably many millions.

An opinion has been published that these moths came in from the sea. A flight fully a mile in length, very thick and broad, was certainly seen on the evening of 26th September, travelling from the direction of the heads along the North Shore, and another similar flight was seen at Newcastle, probably both directed by a N.E. wind which would, in the latter case, have perhaps blown them from the projecting land about Port Stephens, and so they might have crossed water. The sands of the sea have been known in former years to be bordered by a thick band of dead moths, doubtless blown in from the land, drowned, and washed ashore. I am told that a vessel, yesterday, twenty miles from land was covered by them. My own observations, especially on the 22nd December, 1851, lead me to believe that if they have immigrated from a distance they have come from the W. and S.W., especially as their appearance this year was with a west wind; and it must be remembered that previous visitations have probably left eggs enough to account for the present multitudes within less distance than that from Sydney to Mount Kosciusko.

The name given to this species is sufficient guarantee for the expectation of the army of caterpillars that will probably follow.

I will, in conclusion, only incidentally remark that all the lower animals increase prodigiously at certain seasons. In America the seventeen-year locust and the pigeons appear in flocks quite as alarming as the locusts of Egypt and Syria; whilst the mice of middle Europe and the lemmings of Northern Europe, the beetles of Hungary, and the canefly of the West Indies increase and multiply in similar proportions.

In the year 1834 I published numerous well-attested examples of the kind in the 7th volume of the "Magazine of Natural History," in a series of essays on a supposed "Connection of Meteoric Phenomena, Vicissitudes of Seasons, Prevalent Disorders, Telluric Disturbances, &c.," to which I may refer such as wish to know more on the subject.

W. B. CLARKE.

St. Leonards, 10 October, 1867.

Lake Cowal.

Mr. M. M. Charter. Lake Cowal was perfectly dry in 1867, but was filled in 1870, and has not been dry since. The lake is about sixteen miles long and ten in width, and is for the most part studded with trees, some green others dead. The lake is filled by the overflow of the Lachlan River, and partly by Bland Creek.

Mr. M. M. Charter. A dam was made on Barmedman Creek in 1874, the creek was fringed with healthy-looking gum trees, but since the water has been over their roots they are all dead.

Lake George.

Lake George is the largest and most important of the fresh-water lakes of New South Wales; it is situated on the table-land west of the main range 25 miles south-west of Goulburn. It is 2,267 feet above the mean sea level.

On the east, and especially on the west side, it is enclosed by towering mountains, for the most part rising in grassy slopes from its margin. From some of these hills magnificent views of the lake can be obtained. North and south the country is lower, but there is no sign of an outlet at either end, unless the water were to rise many feet, probably about 100 above the height the lake has ever been known to rise. A number of creeks from a watershed of about 1,200 square miles discharge into the lake.

The size varies so much that it is difficult to give what may be considered average dimensions; 20 miles long by 7 at the widest place is a fair statement when the lake is moderately full.

The water is brackish but drinkable, except in dry seasons. From this circumstance and the fact that there is no outlet to the water, it seems probable that the formation of the lake is (geologically) recent.

It appears from valuable rain-observations made by Mr. Davis, at Gungahleen, for a number of years, that in 1870 the rainfall near the lake was 50 inches. Comparing these observations with those made at Goulburn in the same years, the rainfall at the two places seems to be almost coincident. We may therefore take 4 feet as the probable rainfall over the watershed of the lake for 1870. As there was at the beginning of 1870 plenty of water in the lake it probably covered 80 square miles, and if the rise in 1870 is taken at 14 feet (see notes Mr. Chisholm), and the loss by evaporation as 2 feet in the wet year (in a dry year it would be 7 or 8), we find the rise in the lake water in 1870 as 16 feet, equal to a rainfall of 13 inches over the catchment, or rather less than one-third of the rainfall.

I have been unable to find in print an account of the discovery of Lake George. Fortunately, Sir William Macarthur remembers and has furnished me with the following facts about its discovery. In the early part of 1820 he formed one of an exploring party, and they visited Lake Bathurst and other places in what was then the "new country," but nothing was then known of the existence of Lake George. It was thought that the great water of which the blacks told them must be Jervis Bay. Towards the end of the year 1820, however, in August or September, it was discovered by a bushman named Joe Wilde.

Dr. Throsby's party, including H. Hume and Surveyor Mehan, who, at the Governor's request, went out exploring in the new country in May 1818, heard from the blacks, when near Lake George, of a great body of water, which they supposed must be Jervis Bay: but it is evident from their position at the time that it was Lake George of which the blacks spoke. The party visited Bungonia, Lake Bathurst, and at last reached Bathurst.

In October, 1820, that is, just after the discovery of Lake George, Governor Macquarie, ever active in furthering the exploration of the country, determined to visit the "new country" himself, and with a party left Liverpool (then the most distant town south) on the 16th of October. "They reached Lake Bathurst on the 23rd October, and it was then a magnificent sheet of water, 20 or more miles in circumference, covered with flocks of wild fowl. The number of wild fowl floating on the smooth bosom of the lake was absolutely incredible." (Bennett, page 467.) On one trip to the south, probably this one, Governor Macquarie went over to a hill called afterwards Governor's Hill, commanding an extensive view of the newly discovered lake, which he then named Lake George.

Bennett, page 467.—"Lakes Bathurst and George were believed, at that period, 1820, to be the sources of some considerable rivers which entered the sea on the *southern* coast."

Several attempts have been made to get from the blacks any information they could give about Lake George, but the accounts do not seem to be of much value. Sir Thomas Mitchell was told by an old black woman that she "had seen it all covered with trees."

Another stated to Mr. J. R. Styles: "Sometimes the water sank down through the bottom and all disappeared."

At another time Mr. H. Hall was told that they (the blacks) remembered having seen the lake dried till it was only a chain of ponds.

The natives appeared to have some dread of the water, for "they would not drink it at all; but it does not prove injurious to white men who drink it" (see Hovell and Hume's overland journey).

1818.—From the account given by the blacks to Dr. Throsby's party, it is evident that in May, 1818, Lake George contained a great deal of water.

1820.—When found it was a splendid sheet of water.

1821.—A station was taken up on its shores this year by Messrs. Broughton and Hume. Mr. J. R. Styles saw the lake from Governor's Hill; it was a magnificent sheet of water, reaching nearly to the town of Collector.

1823.—Mr. H. Hall saw the lake in the end of 1823, and from what he heard from the blacks and others thinks the water of the lake must have been at its highest about June 1823. The first statement of the size of the lake that I can find is the following:—

1824.—"Messrs. Hovell and Hume (overland journey) arrived at Lake George on October 14th, 1824. The lake was then 20 miles long and 8 miles wide, almost entirely enclosed with thickly-wooded, steep hills, and which toward the south are surmounted by lofty mountains. It is said the natives will not taste the water of the lake, yet those travellers who taste it do not perceive anything disagreeable either in taste or otherwise."

Mr. H. Hall "saw the lake this year probably in the early part for the first time, and from this time for five years he was in the habit of visiting it every few weeks. Like Lake Bathurst, it had not increased in size for some time. In it were a number of dead trees; those standing near the margin of the water had not then lost their bark, but those further in the lake looked as if they had been dead for many years. Deep Creek was not fordable for 5 or 6 miles from the lake, and Collector flats were swamps nine or ten miles across.

Lake George did not at first dry up so quickly as Lake Bathurst, and its water was more brackish than that of the smaller lake. I have even known cattle die from drinking it."

1825.—There was no rise this year in Lake Bathurst, therefore probably none in Lake George.

1826-7.—Mr. Kenny says that at this time the lake was nearly as big as it is now (August, 1876), but not so deep by 3 feet. At this time it had receded about 1 foot in depth, and continued to dry up gradually.

1827.—Mr. H. Hall crossed the swamps at the north end of Lake George at least six miles nearer the lake than he could have done in 1824.

1828.—This year Sir T. Mitchell first visited the lake. It was then 17 miles long and 7 wide, and surrounded by dead gum-trees measuring about 2 feet in diameter. These extended into the lake some distance, "until wholly covered by the water." (I am at a loss to explain this, as the lake is in no part deep enough to cover such trees, unless some of them had fallen, and so were partly covered.

It appears also from Sir T. Mitchell's visit in 1836 that it was then a grassy plain.—H.C.R.)

This year Mr. J. R. Styles again saw Lake George, and there was a noticeable decrease in the size of it. In August, 1828, the survey of the lake was completed by Mr. Dixon, Government Surveyor, whose plan is now (1876) in the Survey Office. The lake was found to be 15 miles long, and $6\frac{1}{4}$ miles wide at the widest place. The superficial area was 58 square miles.

1832.—Mr. J. R. Styles "often crossed the lake this year from Kenny's Point to Geary's Gap dry-shod."

1835.—Mr. F. Cooper: "This year the lake-water was nearly up to the standing timber, within say 200 yards." Probably this was in winter, as the next year the lake was dry; but it proves a great loss of water since 1828, when the standing timber extended far into the lake.

1836.—In October this year Sir Thomas Mitchell again visited the lake, and described it as a "grassy meadow, not unlike Breadalbane Plains." It is probable that Sir Thomas Mitchell did not see at this visit the whole of the lake, and the above statement refers to a part of it, and both ends were then, and had been, quite dry for some time.

1837.—Mr. Kenny says: "The lake was almost dry this year, and, with slight fluctuations, continued in this state until 1840-1, when it became wholly dry. In 1837 the water only covered about one-fifth of its present (August, 1876) area." To any one crossing it the long fat-hen and other things growing on it would hide from view the considerable swamps which still existed.

Mr. Powell: "In 1837 the lake was rapidly drying up."

Mr. J. R. Styles: "I crossed the lake this year (1837) from Kenny's Point to Geary's Gap, and could see no sign of water. At the breaking up of the drought (October, 1839) lagoons formed in the lake bed, but they soon dried up again."

1838-9.—Mr. A. Chisholm: "There can be no doubt that in these two years of great drought the lake was dry."

Mr. John Chisholm: "In October, 1839, very heavy rain fell at Lake George and its vicinity. Tarrago and the Wet Lagoons were dry, and the bed of Tarrago was ploughed and sown with wheat, but in October the water rose in Tarrago and destroyed the wheat. A considerable body of water must at the same time have gone into Lake George."

Mr. Powell: "The lake was dry, except a few water-holes, and there was a fine crop of fat-hen on it."—*Goulburn Herald*, October 23, 1875.

The Monitor, newspaper (Sydney), of September, 13th, 1839, says: "The late rains did not extend beyond Goulburn, and the two lakes are dry."

1839.—In this year, Mr. W. Davis, of Gungahleen, says, "The lake was dry enough to drive a team across the middle of it."

1840.—This year, Mr. C. Thomas says (*Goulburn Herald*), "The lake was partly full, the depth not exceeding 3 or 4 feet."

1842.—This year it was dry. Messrs. Cooper, Styles, and Massey had flocks of sheep on it, but even then there were lagoons in it—such as at Grose's Plain, towards Geary's Gap, and at a place called Bungey's Hut or the Muddy Water-hole, where the water was at least 10 feet deep; but heavy-laden wool-drays nevertheless passed over the lake bed (*Goulburn Herald*). Water was at this time carted to huts on the lake bed for the use of the men, as that in the holes of the lake was too salt to use.

- 1842 or 3.—Mr. Kenny says, "In one of these years there was rain enough to make the lake about one-fourth of its present (1876) size, but the depth was in no place more than 3 feet."
- 1843.—Mr. Massey says, "This year the lake was partly dry."
Mr. J. Styles: "I sent wool across the lake this year, from Geary's Gap to Kenny's Point, and the black silt was like sand under the wheels of the dray."
- 1845.—Mr. H. Hall: "This year I drove more than once from Geary's Gap to Kenny's Point, *i.e.*, through the centre of the lake, without going through any water."
- 1846-7.—Mr. Kenny: "It dried up again completely in these years, and remained dry until 1850, when about one-sixth of its present (1876) area was covered with shallow water."
- 1848-49.—Mr. F. Cooper: "Lake George was perfectly dry in 1848 and 1849."
- 1850.—Part of lake covered with shallow water.
- 1852.—Mr. Kenny says, "There was little increase until 1852. During the winter and spring of this year (ever memorable as that in which Gundagai was swept away by a flood) the lake filled up to seven-eighths of its present (1876) size; but the depth did not exceed 9 feet. Since then it has not been dry, though it fluctuates very much, as in 1858-9 and 60."
- 1855 to 1869.—Mr. M. M. Charter says, "During the whole of this time, the northern part of the lake, it was dry, and used as a cattle run by Sir T. A. Murray, and I had then 10 acres of land under wheat cultivation, where now (1876) the water is 10 to 15 feet deep."
- 1858-59-60.—The lake was two-thirds dry.
- 1861 to 66.—The lake slightly increasing until half its present (1876) size.
- 1863.—It was partly dry.
- 1865.—Full, and 17 feet deep in places, after heavy rains of 1864.
- 1866-7-8.—Lake drying until it was not more than 2 feet average depth, and one-third its former area.
Mr. A. Chisholm: "In December, 1868, the lake was at least 10 miles long."
- 1869-70.—Then again increasing slightly until April, 1870, when the average depth was about 5 feet, and the lake 15 miles long and 5 wide.
Mr. A. Chisholm says that in 1869 he sounded the lake and found the depth to be from 12 to 15 feet; next year, 1870, he estimates that the water rose 14 feet.
Writing on 3 July, 1876, he says, "Judging from the experience of the last three or four years, the evaporation has equalled the amount of water carried into the lake. There are large gum-trees, green a few years since, now standing in the water dead, evidently killed by the rise of the water. From this I should infer that the lake is higher now than it has been for at least 100 years, because these large trees must have taken that time to grow."
During 1876 winter the lake has been at a standstill; we have had very moderate rains and nothing approaching a flood.
- 1870.—Mr. Kenny: From April, 1870, it continued to increase rapidly until August, 1874.
- 1870-71.—From the base-line levels it appears the water rose from 8th September, 1870, to 28th August, 1871, 3 feet 6 inches.
- 1874.—Mr. Kenny: August, 1874, when it attained about 6 inches higher than its present (August, 1876) level. It then began to recede, and between that time and April 1875 it had fallen 2 feet 9 inches in depth.

1875—But by October, 1875, the water had increased to a height 2 feet 6 inches above any mark attained since the lake was known to white men.

1876—Mr. Kenny says, "The lake now (August, 1876) is 20 miles long by an average of 7 miles wide, and an average depth of 20 feet; it is now, however, 3 feet below the highest mark."

When I visited Lake George, in February, 1874, I crossed over from near the middle of the base-line to the west side in a boat. As soon as we landed I saw that the water was washing out an old shingle beach, in which were water-worn stones, that had been covered by grass for an unknown period. At the same place, just in the margin of the water, and evidently killed by its rise, were many large gum-trees, from 2 feet to 2 feet 6 inches in diameter. These must have grown since the last time the water was as high as it was then. It was, moreover, evident that the water had at some time been much higher, by the appearance of the shingle, which evidently extended farther back than it had then been washed out. The size of these trees raises the interesting question how long since the water of the lake was as high before? I am unable to answer it satisfactorily, and I cannot get from any one definite answer to the question, how long would such trees take to grow? Two facts, however, may throw some light on it. When Sir Thomas Mitchell was making his survey of the Colony, the top of Mount Victoria, as of many other hills, was cleared except one tree, left as a mark for the purpose of his trigonometrical survey. That was in 1825, fifty years since. Recently I went on to this hill for the purpose of seeking traces of the clearing, and the solitary tree, but I found the hill covered with a forest of trees from 15 to 20 inches in diameter. The top of this hill is poor sandstone country, and the trees would not in all probability grow so fast as they would in the rich soil at the western margin of Lake George. Other hills cleared for Sir Thomas Mitchell's survey are, I am told, now covered with large trees, and the mark-trees left by him cannot be distinguished.

In 1833 a sapling grew near Mr. F. Cooper's house, at Lake George, which he thought of cutting down for the pole of a dray (*i.e.*, it would be about 5 inches through) but did not, and it is now, 1876, a very large tree. I am therefore disposed to think that the trees above mentioned may not be more than fifty to sixty years old.

See also 1802, note of a voyage from Sydney to Melbourne.

Expeditions into the interior of Australia, Mitchell, vol. 2, page 317.

The plains are situated on the high dividing ground or watershed between the streams falling eastward and westward, and had probably once been lagoons of the same character as those which still distinguish other portions of this dividing ground.

The most remarkably of these is Lake George, about fourteen miles further to the south, and which, in 1828, was a sheet of water seventeen miles in length and seven in breadth. There is no outlet for the waters of this lake, although it receives no less than four mountain streams from the hills north of it, *viz.*, Turallo Creek, whose highest source is fourteen miles from the lake; Butmarroo Creek, which arises in a mountain sixteen miles from it; Taylor's Creek, from range on the east, six miles distant; and Kenny's Creek, from hills five miles distant. The southern shore of this lake presents one continuous low ridge, separating its waters from the head of the Yass River, which would otherwise receive them. The water was slightly brackish in 1828, but quite fit for use, and the lake was then surrounded by dead trees of the eucalyptus measuring about two feet in diameter, which also extended into it, until wholly covered by the water. In that wide expanse we could find no fish, and an old native female said she remembered when the whole was a forest, a statement supported "*pro tanto*" by the dead trees in its bed, as well as by the whole of the basin being in October 1836 a grassy meadow, not unlike the plains of Bredalbane.

Mr. Kenny says, "Indisputable evidence exists that Lake George ages ago covered at least twice as much ground as it did in August 1876, without being, perhaps, more than double its present depth."

Lake Bathurst

Is said to have been discovered by H. Hume in 1817, about March, and in the account of his overland journey to Melbourne in 1824, October, he says—"It has evidently much increased in size within the last eight years." The dead trees then in the margin of the lake would doubtless draw Mr. Hume's attention to its increased size.

In March 1818, Governor Macquarie requested Mr. Hume to accompany Mr. Throsby and Mr. Surveyor Mehan on an exploring expedition to the south. Sir William Macarthur informs me that on this trip they discovered Goulburn Plains, Bungonia, visited the lake, and finally reached Bathurst; on the road they heard of Lake George from the blacks, but did not see it, and thought the accounts must refer to Jervis Bay.

Lake Bathurst is a fine sheet of water lying amid the fertile plains of the table-land on the eastern side of the dividing range. It is 20 miles south of Goulburn, and at an elevation of 2,000 feet above the sea. When discovered no streams ran into it, but it is now fed by numerous small streams. Its size of course varies with the season, being much greater in wet years; ordinarily it is about 15 miles in circumference. Near its centre a rocky island stands out of the water, and a sandy one is found near its south-west corner; the water is clear and only slightly brackish.

Over the range at a distance of 10 miles to the west lies Lake George.

In 1817 there were several tremendous floods in the Hawkesbury, the like of which were not seen again until 1867. It seems more than probable that as the upper tributaries of the Hawkesbury rise near the watershed of Lake Bathurst and Lake George, that both the lakes in that year filled up very considerably, as when found they were both fine sheets of water.

Bennett, N.S.W., page 467. Lake Bathurst was in October 1820 a magnificent sheet of water, 20 or more miles in circumference. In 1821 Mr. J. R. Styles visited Lake Bathurst and found it full of water; it then joined the large lagoon on its eastern side.

In the latter end of 1823 Mr. H. Hall saw Lake Bathurst for the first time, and resided there for five years; after the beginning of 1824, he says, "At the time of my first visit to the lake it was at its highest, and a number of dead trees stood in the water, but none with the leaves on; those near the margin of the lake, the bark was falling off. It appeared from what the men said who had been there some months before me, and also from the account given by the blacks, that the lake had been stationary for some time, and reached its highest point about June, 1823. The aborigines also told me that they had seen Lake Bathurst and Lake George a mere chain of ponds. I concluded this must have been some twenty-five years before."

"From the early part of 1824 the waters of the lake gradually receded. When at its highest, Lake Bathurst was 20 miles in circumference, and was connected by a narrow neck of water with a morass about 6 miles in circumference, which lies on the north-east side of it.

"The water of the lake was brackish, and although the cattle liked it we preferred the water of the morass for our own use."

There were no creeks or streams of water at that time running into the lake,—it was supplied by surface drainage only. During the time I resided at the lake, I think it had reduced about one-fourth. In 1825 there were heavy floods in the Wollondilly, but no perceptible rise in the lake.

Messrs. Hovell and Hume, overland journey. "There is a story amongst the natives that Lake Bathurst had been entirely formed within their own and they remember the site of it being all dry land."

17. Mr. H. Hall. Lake Bathurst had in 1827 receded nearly a mile southern end.

Monitor newspaper says, on September 13, 1839,—the late rains did and beyond Goulburn, and the *two lakes are dry*.

Table of Floods and Droughts—1788 to 1875.

(Details will be found in historical pages.)

FLOODS.

DROUGHTS.

Year.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1788
1789
1790
1791
1792
1793
1794
1795	Flood	...	...	...	...	...	...	Flood	...	...	...	...
1796
1797
1798
1799	Flood	...	...	...	...	...	...	...	...	...
1800	Flood	...	...	...	...	...	...	...	...	...
1801	Flood	...	...	...	...	Flood	...	...	...	...

No rain is said to have fallen at Sydney in 1790, from June to November; in October ground parched, grass dried up.

In January and February, 1791, several weeks of excessive heat, hot winds on several occasions. Birds dropped dead from trees and almost everything green burned up. Stream of water which supplied Sydney nearly dried up from drought.

Several settlers in spite of drought had good crops of wheat at Parramatta.

Rain of April came too late to save Indian corn of the season. August wheat looking yellow for want of rain. Much of the wheat blighted. Yield small.

Five feet less water at Windsor wharf in April than in February, owing to dry weather which had prevailed since August last.

Heavy bush fires in January. Flinders & Bass noticed at Bateman's Bay & Western Port unmistakable signs of drought.

September—Pasture and garden ground wanting rain. Bush fires in December. Thermometer 107° in the shade at Windsor.

Continued bush fires. Much continued drought. Pasture burnt up. Cattle in great distress.

DROUGHTS.

	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1803
1803
1804
1805
1806
1807
1808
1810
1811
1812
1813
1814
1815
1816
1817
1818
1819
1820
1821
1822
1823
1824
1825
1826

March.—The late drought has been severely felt in all parts of the Colony. May 29—No rain except passing showers since last July.

February—Long drought.

January—Drought. April—Long dry weather. February 11th—Town gangs cleaning out tanks; drought severely felt. November 24th—New wheat, 34s. bushel. Harvest promises to be abundant. Seven days later, price 18s. bushel.

March 2nd—Drought destroying maize crop. Tanks empty. Water, 6d. per palful. Drought prevalent 1812 and 1813; so severe that Wentworth and party were led to cross the dividing range. Drought.

Drought after September, 1821, to February, 1822.

Turnips failed through extreme drought, 1824.

DROUGHTS.

FLOODS.

Years.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1827	...	...	...	...	...	...	...	...	...	...	...	...
1828	...	...	...	...	...	...	...	...	...	...	...	...
1829	...	...	...	...	...	...	...	...	...	Flood	Flood	...
1830	...	...	...	...	...	...	...	...	Flood	...	Flood	...
1831	...	...	...	...	Flood	...	...	...	...	...	...	...
1832	...	...	...	Flood	...	...	...	...	...	...	...	...
1833	...	...	...	...	Creeks flooded	...	...	...	...	...	...	Flood
1834	...	...	...	Flood	Flood	...	...	...	...	...	...	...
1835	...	...	...	...	...	...	...	...	...	...	...	...
1836	...	...	...	...	Flood	...	Flood	...	...	...	...	...
1837	Fresh	...	...	...	...	...	...	...	...	...	...	...
1838	...	...	...	...	...	...	...	...	...	...	...	...
1839	...	...	...	...	...	...	Fresh	...	Flood	...	...	2 floods
1840	Flood	Flood	...	Fresh	Flood	...	Fresh	...	...	...	...	Fresh
1841	...	Fresh	...	...	Fresh	...	...	...	...	...	...	...
1842	Fresh	Fresh	Fresh	Fresh	Fresh	...	...	...	...	...	...	...
1843	...	...	...	Fresh	...	...	...	Flood	Flood	...	...	...
1844	Flood	Flood	...	...	...	...	Fresh	...	...	...	...	...
1845	...	...	...	...	...	...	...	...	Fresh	...	Fresh	...
1846	...	...	...	...	...	...	...	...	...	...	...	...
1847	Flood	Flood	...	...	...	...	...	...	...	...	...	...
1848	Flood	Flood	Flood	Flood	...	...	...	...	...	...	...	Flood

Drought so bad stock had to be removed from 30,000 acres at Camden for want of water.
 Sturt's Expedition (March, 1829):—"I saw rivers cease to flow and sheets of water disappear."
 August very dry.
 At Illawarra, in January, the Tom Thumb Lagoon dried up (usually 6 miles in circumference).
 January, thermometer 109° in shade; Feby. drought at Illawarra, Argyle, and Maitland.
 G. M. Pitt says wheat sown on the Hunter in May had not germinated in September.
 2nd Novr.—Day of humiliation on account of drought.
 Feby.—Cowpasture River ceased to flow first time since discovery, forty-eight years ago; March, dead cattle along roads; no food for man or beast; Hunter salt at W. Maitland.
 Mudgee district dry, although floods in the north.
 Drought August to February, 1843; Paterson ceased running in November.
 Droughty weather.
 Only chain of ponds in bed of Hunter at Singleton.
 Drought July, 1847, to January, 1848; dreadfully dry December.

DROUGHTS.

FLOODS.

Year.	Jan.	Feb.	Mar.	Aprl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1849
1850
1851	Flood	..	..	..	..	..	..
1852
1853
1854
1855	Flood	..	..	..	..	..	..
1856	Flood	Flood	Flood	..	..	Flood	..
1857	Fresh	..	..
1858
1859	..	Fresh	..	..	..	..	..	..	Fresh	..	..	..
1860	..	Flood	..	Flood	..	..	Flood	..	..	..	Flood	..
1861	2 floods	..	..	Flood	Flood	..	..	..	..
1862
1863	..	Small flood	..	..	..	..	..	..	..	..	..	..
1864	..	Flood	Flood	..	Fresh	2 floods	Flood	..	..	..	..	..
1865	Flood	Flood	..	..	..	..	..
1866
1867	2 floods	Flood	Flood	..	..	Flood	Fresh	..	..
1868	..	Flood	..	..	..	..	..	..	..	..	..	..
1869	Fresh	Flood	Fresh	Fresh	..	..	..	Fresh	..
1870	Floods	Flood	Flood	Flood	Fresh	Fresh	Fresh	Fresh	Flood	Flood
1871	Fresh	Flood	Fresh	Flood	Fresh	..	..	..	Fresh	Fresh	Flood	Flood
1872	Flood	Flood	..	..	..	..	..	..	..	..	..	..
1873	Flood	Flood	Fresh	Fresh	..	Flood	Flood	..	..	..	Flood	..
1874	Flood	Flood	Flood	..	Fresh	Fresh	Flood	Fresh	..	..	..	..
1875	Flood	..	Flood	Flood	..	..	..	..	..	..

Drought August to March.

Drought; August 18, *fast observed*; drought September to January, 1856.

Drought October to February, 1858.
Very serious droughts in Queensland; Lake Grace mere (Rockhampton) dry.

Very dry November to January, 1862.
Fearfully dry; very dry August to January, 1863.
Very dry October to February, 1864.

Drought.
Very dry summer; Jan. 12, day of fast on account of drought.
Very dry September to January, 1868.

Very dry summer.

All floods and freshes, whether in the Hunter or Hawkesbury, are put into this table. Details will be found in the historical papers.

List of Floods in the Hawkesbury.

CATALOGUE of Floods and Freshes in the Hawkesbury River and South Creek, from the middle of June, 1857 to the close of 1875, compiled from his own records, by John Tebbutt, F.R.A.S.

Date of Flood.	Height in feet above mean tidal level of South Creek.	Date of Flood.	Height in feet above mean tidal level of South Creek.
Week ended June 20, 1857	Very small flood.	Beginning of August, 1870	Fresh.
July 29, 1857	32·1	October 9-15, 1870	Fresh.
August 22, 1857	37·1	October 21, 1870	Fresh.
Week ended Oct. 9, 1858...	Fresh.	November 21, 1870	25·8
February, 1859.....	Fresh.	December 26, 1870	{ Not as large as that of Nov. 21 by some feet.
September 4-5, 1859	Fresh.	January 10, 1871.....	Slight fresh.
February 12, 1860	26·9	January 24, 1871.....	Slight fresh.
April 29-30, 1860	36·8	February 5, 1871.....	{ Small flood on creek.
July 26, 1860	34·3	February 23-24, 1871.....	Fresh.
November 19, 1860	35·4	March 19, 1871	Fresh.
April 5, 1861.....	{ Not as high as that of 30th April, 1861.	*April 30, 1871	31·3
April 30, 1861	26·8	*May 2, 1871.....	36·4
August, 1861.....	{ Several small freshes.	May 10, 1871	Slight fresh.
February 17, 1863	Small flood.	May 23, 1871	{ Small flood on South Creek.
March, 1-2, 1864.....	22·4	May 26-27, 1871	{ Small flood on South Creek.
May, 1-2, 1864.....	Fresh.	September 17-18, 1872 ...	Fresh.
June 4, 1864.....	22·1	October 4-8, 1872	Fresh.
June 13, 1864	47·4	November 23, 1872	15·6
July 16, 1864	35·6	November 29, 1872	Fresh.
June 15, 1866	26·0	December 6, 1872.....	13·5
July 12-13, 1866.....	26·9	December 14, 1872	Fresh.
April 11, 1867	{ Fresh during preceding 4 or 5 days.	January 13, 1873	14·0
April 14-15, 1867.....	20·6	February 26-27, 1873.....	41·0
April 30, 1867	25·8	April 8-22, 1873	Two freshes.
June 23, 1867	62·7	June 5, 1873.....	Fresh.
September 9, 1867	15·4	June 17-18, 1873.....	27·4
October 8, 1867	Fresh.	July 26, 1873	15·6
February 18, 1868	29·2	November 17, 1873	Fresh.
July 21-22, 1868.....	Slight fresh.	February 13-14, 1874.....	Fresh.
April 5-8, 1869.....	Fresh.	February 23, 1874	26·7
May 9, 1869	36·3	March 25, 1874	About 10 or 12 ft.
June 19, 1869	Fresh.	May 4, 1874.....	Fresh.
July 19-20, 1869	Freshes.	June 18, 1874	Slight fresh.
March 10-11, 1870	{ Small flood in South Creek.	June 23, 1874	Fresh.
*March 19-20, 1870	21·9	July 6, 1874	{ Small flood on South Creek.
*March 23, 1870	21·7	Beginning of August, 1874	High fresh.
March 31, April 1, 1870 ...	27·6	August 25, 1874	Fresh.
*April 25-26, 1870.....	19·0	Beginning of March, 1875	{ Small fresh on South Creek.
*April 28-1870	44·4	May 4, 1875.....	23·2
May 13-14, 1870	34·9	May 29-31, 1875.....	{ Small flood on South Creek.
May 25, 1870	23·6	June 7, 1875.....	38·2
June 4, 1870	20·0	June 27-30, 1875.....	Fresh.
July 18, 1870	Fresh.		

Windsor, July 17, 1876.

*This flood had two maxima.

(Notes obtained by myself on a visit to the Hawkesbury, August, 1876.)

Mr. Abraham Cornwall, a very old resident, says:—the present Windsor was in the early days called Green Hills. No one ever knew a flood so high as the great one of 1867; it then came 18 inches over the floor of my house, which is in a spot that was never known to be flooded before.

Mr. G. M. Pitt measured the 1867 flood at Richmond; it was 63 feet above the ordinary level, and 5 feet more would have covered the highest spot of ground in the town of Richmond. Boats were brought over the back water on the reserve from Windsor to the door of large hotel (Royal) next the Railway Station.

The change in the banks and great landslips began in 1867, but the great damage was done in 1870, when at Palmer's Farm of 100 acres 50 acres were washed away, and the confluence of the Hawkesbury and Grose have wholly changed since then and lost all the beauty for which it was famed; it is now a quarter of a mile to the eastward of the old junction, all the cutting is in the south side towards the town of Richmond, and three very remarkable landslips took place on that side, one of which he witnessed with his father. They were standing on the south side, and hearing a noise looked towards the river, then in flood, and saw about a quarter of an acre with oak trees upon it sliding rapidly into the stream through an opening in the immediate bank of the river. The opening was much narrower than the moving land, but this seemed to be in a soft and yielding or pasty state, and so found its way through the narrow opening. The trees on the slip did not fall over in the stream, but seemed gradually to sink down into the water. The marks of these slips were visible in August, 1876, and then the opening in the bank of one at least seemed to be less than quarter of the width of the land that had slipped through it. (See March 8, 1817.)

Opposite Mr. Pitt's house in North Richmond the south bank of the river is considerably higher than the flat land behind it known as the Richmond Bottoms, and this bank was never known to be covered until 1867. Since the Richmond Bridge was built, about fourteen years since, the river bed has risen there 6 feet and has become much wider, the encroachment being on the south side, and the bridge has had to be lengthened about 60 feet. On the other or north side and just below the bridge the river has already left a considerable portion of land and changed its course; the land left is much higher than the south side. In this portion is a hollow which seems at no very distant period to have been the river's bed near the hills, but the date of the change is unknown. In years gone by the tide used to flow above the bridge, but this rise in the bed has stopped the tide and it does not rise now very much above Windsor.

Mr. Dight: The flood of 1816 at Richmond was greater than that of 1809.

Mr. R. Ridge: The flood of 1816 was 16 feet below that of 1867, but remembers some great floods about 1816 or 1817. The June flood of 1867 was on the 23rd 18 inches in my house, where no flood had ever been before. All the old residents, including Mr. G. Bowman, said that the 1864 big flood rose to within six inches of the 1809 flood, and Mr. Bowman had both floods marked.

Mr. Tebbutt informs me that his father clearly remembered the great flood of 1809; when the water was at its highest he was crossing in a boat, and when near the Peninsula Hill, where Mr. Tebbutt's house and observatory now stand, he was overtaken by a violent storm, and he, with the aid of his companion, pulled the boat out of the water on to the hill and turned it over as shelter from the storm. He was quite sure the 1809 flood was only equal to the big flood of 1864; moreover, that they never had before in the memory of the white residents a flood at all approaching that of 1867.

In 1809 a boat was taken over the low part of the hill on which Windsor stands, but there was hardly enough water there to float it over, and the 1864 flood was as nearly as possible to the same height there. 1809 flood was known amongst the residents as the big *August* flood, that of 1806 as the big *March* flood.

In proof of the extreme height of 1867 flood, it may be stated that Mr. Tebbutt had to leave his house, and the water rose just to the ceilings of the ground floor. As the house stands on top of the hill that had never been covered before, this is conclusive proof that the flood on June 23rd 1867 was many feet higher than any flood ever before known.

Monday, July 15th, 1867.

(To the Editor of the Herald.)

Sir,

An old and respected resident of Richmond of over sixty years has kindly supplied me with the following particulars (facts) relating to the different flood levels in the river Hawkesbury, which I presume will be perused with interest by some of your readers.

The Hawkesbury, he says, was visited with a heavy flood in the year 1806; and two years after, in 1808,* they had a similar visitation, only a much larger one, and which was (to that date) the highest flood known to Europeans. It attained an elevation of 50 feet 6 inches.

The next highest flood was in June, 1864; it reached 50 feet perpendicular, and was 6 inches below the one in 1808.*

The late flood reached the extraordinary height of 62 feet, being 11 feet 6 inches higher than any known flood.

The statement made in your paper about the floods attaining nearly 100 feet in height (if alluding to the time from when Governor Phillip landed at Botany) must be without foundation.

There are certainly in this district several indications of much higher inundations, but evidently works of very ancient floods, probably centuries ago. Apologising for intruding so much on your valuable space,—

I am, &c.,

GEORGE M. PITT, JUN.

Sunnyside, 10th July, 1867.

Floods on the Hunter River.

Extracts from the Diary of the late E. C. Close, Esq.

1831, May 2, heavy flood; fell in one day 7 feet.

1832, March 20, flood.

1837, January 18, 19, 20, and 21, very determined rain. April 7, rain. May 5, in morning rain. June 30, 4 p.m., commenced raining heavily, and continued on July 1. August 10, delightful rain. September 13, light rain. September 14, showers. September 19, heavy fresh in the river. December 23, heavy rain.

1838, March 25 and 26, rain. October 28, slight rain. November 2, day of humiliation. November 4, night of gentle rain. November 11, thunder-storm. December 1, horses, cattle, and sheep began to suffer from want of fodder; the catarrh prevailed sorely among sheep at Monaro, and at many other places; at Queanbeyan there was scarcely a day's rain in 18 months, wheat crops failed in various places, potatoes remained in the ground without sprouting, and maize without vegetating. all waterholes and swamps nearly dry; large flights of wild geese were seen flying from the east, westerly, and snipe and ibis, and birds not known before were seen in numbers; the upper rivers were nearly dry, and the Hunter salt to near Maitland; lambs were killed to save the ewes, and influenza destructive to inhabitants.

1839, March 21, little rain as yet, many wells dug here and there with success, waterholes nearly dry, grass stamped to powder; the most uniformly dry weather prevailed all March, with strong winds and constant appearance of rain; bowel complaints frequent; water in Maitland failing not only in Wallis's Creek, but also at Molly Morgan's falls; vegetables could not be grown save large bean (now known as snake or Chinaman's bean). March 24, showers, light. March 25, showers in morning. April 3, heavy rain. April 4, rain in morning, light. April 15, thunder-storm, heavy. April 16, showers. April 29, heavy rain in evening. April 30, rain, heavy at intervals. May 1, rain, heavy at intervals—this rain, with that of 29th and 30th ultimo, was of a soaking character. May

* The flood was in 1809.

- 29, heavy showers. June 18, 19, and 20, showery. July 1, heavy rain which filled swamps and waterholes. This ended drought of 1837, 1838, and 1839. July 10, river freshy and muddy several days. September 8, river very high, heavy rain with thunder-storms.
- 1840, January 30, flood commenced. January 31, water rose rapidly. Two men, Hopwood and Cliff, were drowned at Morpeth, and several others in Maitland and its vicinity.
- 1842, April 19, dreadful gale with rain. April 20, rain in torrents. April 21, rain more moderate. April 22, raining.
- 1843, February 18, commenced raining; a great deal fell, doing much damage at Wollombi and coastwise. August 27, raining for four days previously, large bodies of water appeared in various places, passed off without flood. September 25, the weather after a long succession of wet and cold suddenly became warm and rain followed; although more rain had fallen at another time, yet there had not been a season since 1817 or 1818 in which there had been so much rain; country looking beautiful.
- 1844, July 31, a great deal of rain about this time.
- 1845, droughty weather.
- 1846, February 21, drought. December 24, about this time a great fresh in the river.
- 1847, January 14, Very heavy rain from the E. and N.E., and afterwards heavy rain. December 8, weather dreadfully dry; want of water everywhere; all grass burnt up.
- 1848, June 28, for some days past a most offensive smell was constantly pervading the atmosphere, arising from the water brought into the swamps by the late heavy rains; the creek at Maitland black with decomposed vegetable matter.
- 1850, June 6, heavy rain. June 18, rained heavily. June 19, rain continued. June 26, rained heavily. October 22, much rain fell about this time; weather very like that of 1817.
- 1851, drought first part of the year. June 29, commenced raining about 4 p.m., confirmed rain 9 p.m., and began to pour at daybreak on 30th, continued to do so without intermission for forty-three hours. July 2 and 3, continued showery, and on the 2nd heavy fresh commenced. July 8, water at highest at Maitland, 20 feet above high-water-mark. October 30, a great deal of water fell this year from August; a heavy fall on night of 28th with a severe storm. December 28, a change; a good deal of rain fell after a storm from n.w.; heavy rain night of 28th and morning of 29th.
- 1852, May 14, rained, and continued without intermission till 1st June.
- 1853, June 13, heavy rain night of 12th; slight showers day before; 13th, rained heavily; 14th, rained heavily during the night. June 25, much rain about this time, which continued at intervals till the swamps were covered. October 28, it cleared up after four days' steady rain. November 29, severe storm 4 p.m.; rain in some shape almost every day, 29th being an exception. December 13, much rain about this time.
- 1854, June 17, good deal of rain. June 18 and 19, very heavy. Drought; *August 18th, fast observed*; first rain 29th October, 1854; gentle showers 10th and 11th, 1855, January 12, gentle showers; 19th, a most blessed rain began to fall; 20th, rain constant; 29th, thermometer 156° in sun, and 122° in shade; 30th dreadfully hot and close; I was never so regularly done up with heat, could not sleep at night. February 1, commenced raining; 2nd, light rain; 3rd, heavy. February 7, rain commenced steady and continued; February 8, steady rain; February 9, showery during the night. February 14, showery till to-day; weather cleared. March 25, heavy rain till 30th. April 2, afternoon wet, heavy rain incessant all night and the following morning. April 28, unusually wet, rain nearly daily for weeks past, and almost constant. May 4, heaviest rain seen for some time. May 8, flood commenced, did not come in great force or volume. June 18, slight rain, which increased at night with violent gale of wind, and continued 19th and 20th without intermission.
- 1856, March 6, same day heavy rain. March 12, heavy showers. October 30 and 31, rained heavily. November 2, very heavy rain, which lasted four days; 5th and 6th, rained heavily. November 7, partially fine; all the country under water in all directions; ferry at Hinton obstructed. December 28, during morning service a storm came on with heavy rain, this continued for some time, then became a settled rain which lasted without intermission till 31st.
- 1857, between June 16 and 20 a great flood had taken place during my absence. July 30, another flood 6 inches higher than the last. August 22, flood again 2 feet higher than the preceding; water subsided very slowly.
- 1861, July 27, flood at highest. August 7, heavy flood as high as previous one.
- 1864, February 12, a flood, which began to fall on 16th.

[End of Mr. Close's journal.]

E. C. Close, Esq., senior, went to Maitland in 1821, and there were then marks of flood sand debris 7 feet higher than any subsequent flood (to 1876).

MR. E. C. CLOSE ON THE DROUGHT.

(From the *Maitland Mercury*, April 4, 1876.)

It is known to all old colonists that the present very dry season has not yet lasted dry long enough to be ranked among the disastrous droughts of the Colony, and we fervently hope that so sad a distinction is not reserved for the whole year 1876. The present writer's own knowledge of the Colony commenced in the year 1839, a year of drought, of which he only saw the last few months as a Sydney resident. If the tales he then heard from country people were correct, a "great drought" had then prevailed; for two years some persons said; for three years others reported. In January, 1840, came a heavy rain-storm, which produced high floods on the Hunter and elsewhere, and this drought terminated. Further on, the years 1847-8-9 and 50 were a succession of dry years—not actual drought, perhaps; but we remember that in one of these years, Mr. Geddes, then a settler at Ravensfield, near West Maitland, had to take his cattle to water at Innes Falls, three or four miles above West Maitland; and the town water carriers had to fetch water from the river above Bolwarra. All below, the water had become too brackish, so long a time had elapsed since the river Hunter had been scoured out even by a high fresh. At the same time the Hinton people had to go miles away for sweet water, their own lagoons having all become too mineralised. The Morpeth people had still a little drinkable water obtainable from Howe's lagoon; but those who wanted really good water had to go on to "Elwell's Well," close to the Victoria Bridge, Wallis's Creek for it—then said to be the only known sweet well in East Maitland in a season of drought, though since that period other wells have happily struck good and permanent water. In 1851—the year of Hargrave's gold discovery—a good fresh poured down the Hunter, and a succession of little freshes came afterwards from time to time, until the three great floods of 1857 enlightened the great majority of us as to what the Hunter could do in the flood way. And never since has sweet water been so scarce in West Maitland, or we think in either of the other three towns.

About the year 1867-9, we think, disastrous drought prevailed in the interior plains, including both sides of the Darling, and extending up to the table-land; but not we believe raging on the table-land itself, or on the coast as an actual drought. In this frightful drought tens of thousands of cattle perished, and still more of sheep.

We have written the above lines in order to introduce a series of extracts from the diary of the late Mr. E. C. Close. Mr. Close arrived in this district we think in the year 1821, but did not settle here for several years. We heard in 1857 that Mr. Close, then living, had been keeping a diary for many years, in which many notes were made as to floods and droughts, and other matters of public interest. But we understood also that the diary was commenced and continued (as was natural) for private use, and contained many matters of interest appropriate only for his own use and that of his family. Some of the very full-flood notes published in the *Mercury* in 1857, and in reference to previous and also to subsequent floods, were enriched by information given to us as from Mr. Close's diary.

His son, the present Mr. E. C. Close, of Morpeth, and of Berraba, Ellalong, has very kindly made a number of extracts from Mr. Close's diary and handed them to us for public information. [See a more complete extract kindly furnished by Mr. Close for this work.] In 1839 the Maitland people were going to petition Government to put a dam at the Falls for the purpose of keeping out the salt water, for the Hunter was then salt from West Maitland downwards. The extracts refer, as will be seen, to times of dry weather and droughts principally, they being just now of more immediate interest.

The drought ending 1839, according to the diary, commenced in 1837. In January, 1837, on the 18th, 19th, 20th, and 21st, a very determined four days' rain fell; but from that date to the end of the drought the diary shows how little rain came.

Like others, Mr. Close has had part of his land ring-barked, and the trees have died out. In several places, where previously no surface water was noticeable in dry weather, it is to be found now. In more than one place the appearance is as strong as if a spring had there found its way to the surface. In one place (only one) a spring burst forth, and continued running, strong enough to make a small running stream for a considerable distance, when, on nearing the junction of two creeks, the water suddenly disappears. Mr. Close does not assume that the clearing of the trees necessarily caused this greater abundance of water, but thinks it may have had some effect.

Some years since, in a dry season, Mr. Close, finding it troublesome and laborious to take cattle or horses to water a long distance, sought carefully over his ground for a good while, and observing a peculiarly green spot, he dug there, and at three or four feet reached a kind of quicksand, in which water appeared. Digging further, so as to clear out a space, the quicksand fell in with stones and earth; a hollow was left, with standing water, which remained available till a succeeding season proved still more dry. Mr. Close then again set

a man to dig deeper, and using the necessary precaution by stoning the walls of the opening, they got several feet deeper. Then suddenly a spring of water let up upon them from beneath, and in half an hour Mr. Close, who was persisting in stoning up the walls, was up to his middle in water. Having made as sound a job as possible, they left it, and this spring-well has yielded the family the most beautiful water ever since, usually being full up nearly to the brim—higher on a cloudy day, lower on a sunny day. At the present time there are -fill nine feet of splendid water in the spring-well.

At one time no fresh water was to be had at Morpeth, and all the residents had to go to a well in East Maitland for water, and had to take their turn to get it.

Extracts from Report, Hunter River Flood Commission.

HUNTER RIVER FLOODS.		Above high water.	
Year.		ft.	in.
1820	Flood	nearly	37 0
1826	"	less than	29 0
1832	" (Mr. Eckford says within 8 ft. of 1820 flood)	about	29 0
1840	"		26 0
1856	Nov. 1, fresh in river, washing away Lochinvar low level bridge		17 0
1857	Flood of June		26 0
"	" July	26 ft. 8 in. to	27 0
"	" August		29 0
	More water in these floods than in any former within memory of old inhabitants, the clearing on the land allowing the water to get away easier.		
1861	Flood, February		16 0
"	" March		15 6
"	" April		21 0
"	" July		25 4
"	" August		25 6
1864	" February		28 4
"	" March		21 0
"	" June 2nd		24 0
"	" June 11th		26 2
"	" July 15th		25 0
"	" August 9th		24 9
1867	" June		30 0

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Mr. Eckford: Went to Maitland September, 1818; great flood of 1820—that is, 40 feet; 6 feet above highest flood-level, 1870; two floods in 1819—two in 1820.

Mr. John Brown describes flood of 1826 inferior to 1857 and other years; but in 1823 or 1824 he saw flood-drift in the trees 10 or 12 feet above the 1857 flood. Similar traces (4 feet above 1857 flood) were observed about 1830 by Mr. Alexander Macdougall.

Mr. James Glennie says: 1826 flood, 8 miles above Singleton, was higher than any subsequent flood. There were however then remaining traces of still higher floods in 1828; Mr. Wyndham saw flood-drift at Dalwood 7 feet higher than any in 1870—probably from flood of 1826.

Page 10.

1 inch of rain all over the valley of the Hunter when wet would make a greater flood than that of August, 1857. There is satisfactory evidence that the channel of the Hunter at Singleton has much enlarged since 1820.

Page 11.

There were two floods in 1819 and 1820.

Mr. Eckford: In 1820 the second flood was the highest; it came in June or July—first one, I think, in June; they came close together—only five or six weeks apart; heavy rain in middle of June and first week in July. (See history.)

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Mr. A. Macdougall: I think the flood of 1832 rose about the same height as that of 1857 at Maitland. It was after 1832 that the swamp-oaks began to grow in the river channel. When I came here, in about 1830, there were scarcely any oaks in the river; the beach opposite my house was clear when I went there, and shortly afterwards there grew a perfect scrub of oaks.

Mr. Scobie says: Oaks grew up 40 or 50 feet in seven years, and spread nearly 600 yards wide across the bed of the river.

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Mr. J. Mitchell : There was no large flood from 1840 to 1857.

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Mr. J. Shepherd says : Some floods rise at the rate of 16 inches an hour for five or six hours—this is the quickest I have seen ; the river at times runs 5 miles per hour.

Page 57.

Mr. J. Brown : Flood of 1826, at Singleton, not very high.

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Mr. C. E. Jaques : In 1861 there were three floods ; but while each of these floods was not so great as 1857, the last of them was about the height of the June, 1857, flood. In 1864 there was a high flood in February.

List of Floods in the Hunter, by A. Macdougall, Esq.

- 1832.—19 March, high flood.
 1870.—March 12, high fresh ; 20, flood. April 25, high flood. May 14, flood ; 26, high fresh. November 21, high fresh. December 31, high fresh.
 1871.—Nil.
 1872.—Nil.
 1873.—March 1, fresh. May 4 and June 17, high fresh. July 27, flood.
 1874.—January 27, high flood. July 4, fresh.
 1875.—March 1, high flood. June 8, flood.
 1876.—July 19, fresh.

Notes on Floods, 1865 to 1874.

- 1865 and 1866 were years of general drought. In March, 1867 abundant rain fell, and continued nearly all April, May, and June ; in the latter month disastrous floods occurred in the Hunter, Hawkesbury, Murrumbidgee, and other rivers. In the Hunter the water rose as high as the memorable flood of 1857, and on the Hawkesbury it was the highest flood ever recorded. These floods were followed by a drought from beginning of August to end of the year.
- In 1870 floods became general, and the Hunter was flooded seven times. In November floods were very severe in northern rivers, and great damage was done.
- 1871.—Floods occurred in January and April.
- 1872.—Grafton River up 3 feet, 15 January. Bourke, plenty grass and water January, February, March. Narrabri, grasshoppers very destructive in November. No floods recorded by observer at Maitland this year. No floods recorded by Revd. R. L. King, Liverpool. General drought end of 1872.
- 1873.—In June the Darling River was in high flood at Bourke, with the same in July. Slight flood at Murrurundi and Cassilis, July 26. January and February, heavy rain fell generally in the Western Districts. West Maitland, river rose 16 ft., 13 and 14 January ; 8 ft., 27 February ; 14 ft., 1 March ; 20 ft., 13 June ; 21 ft., 16 June ; 27 ft., 27 July to end month ; 15 ft., 9 August. Liverpool, heavy flood 25 February ; 26 July ; 11 November. Cordcaux River, flood, 23 February. Terara, flood, 26 February, only 2 ft. less than flood of 1870. Deniliquin, grasshoppers, immense flight, 9th February. Eden, creeks flooded and coast covered with lost potatoes, corn, &c., 27 and 28 February.
- 1874.—At West Maitland, flood, 25th end of month of January, was 33 ft. 9 in. high on the 27th, covering lower half of town. High flood on January 25, at Muswellbrook. Highest flood known at Scone on 25 and 26 January ; river up again at the end of February. At Goonoo Goonoo this was the highest flood since 1864. George's River, flooded January 22, causing loss of life. Cordcaux River, on February 12 one of the highest floods ever known.
- 1875.—March, very heavy floods early part of this month, ruining many farmers to north of Sydney, especially on the Hunter.

Remarks on the Tables.

TABLE I gives the latitude, height above the sea, distance from the east coast, and longitude of each station from which observations are published. The positions are necessarily approximate.

TABLE II gives the average reading of the barometer at each station at 9 a.m. corrected to 32° Faht. and mean sea level. From the self-registering barograph it is found that the reading taken at 9 a.m. and the mean of the twenty-four hours registered, differ by 0·034, 9 a.m. reading being 0·034 above the true mean for the day. (For further details see description, diagram II.)

The extreme variation of the barometer in eighteen years at Sydney is from 28·901, 13 December, 1863, to 30·678, 11 July, 1875, the average range is between 29·500 and 30·300. The diurnal range is shown in diagram II. The annual curve (diagram I) is not a regular one, but the barometer is usually higher in the winter than in summer.

As an indicator of the weather here, it is very apt to mislead those who have been accustomed to its use in England; one or two considerations however ought not to be lost sight of. In the first place, we are in the Southern Hemisphere, and the rules have to be inverted accordingly; for instance, with a high barometer we expect polar wind, which is south not north; second, we are much nearer the tropics, and the range is of course much less; and, third, we have a large continent, whose interior is often sufficiently heated to divert the winds entirely from their usual course.

Generally, the barometer is low for northerly, high for southerly wind; lowest for N.W., the true tropical; highest with S.E., the true polar wind.

A low barometer is an indication of westerly wind, either in winter or summer.

A sudden fall in summer indicates, as before stated, a burster or a thunder-storm.

Steady, 30 inches, in summer, N.E. winds and fine weather.

High barometer in winter indicates southerly wind.

Great barometric depressions travel from west to east, at the rate of 500 miles and upwards in a day.

TABLE III shows the monthly reading of the barometer at Sydney, corrected to 32° Faht. and mean sea level, from 1858 to 1875 inclusive, with the average reading for each month. There are two maxima, April and July, and two minima, June and December, in the year.

TABLE IV shows the mean temperature for each station for each year it is on record; in several cases one or perhaps two months readings of the maximum or minimum have been made up from other years.

Breaks in the readings often take place, owing to the breakage of instruments and the time lost in getting others in their place.

The range of mean temperature over the Colony is from 45·1 at Kiandra, one of the coldest places on our mountains, to 70·9 at Cowga, in the hottest part of New South Wales; between these limits any required temperature may be found.

Taking the whole series for Sydney and South Head, it will be seen that the range at Sydney is from 59·8 in 1854, to 64·3 in 1867; that, with some slight exceptions, from 1854 to 1867 the temperature gradually rose at the rate of 1° in three years, and that it has since been falling. A reference to diagram No. I shows that the rise of temperature has been principally in the winter months.

The year 1854, that of lowest mean temperature, is also one of those of least rainfall, and 1867, the greatest mean temperature, is one of those of greatest rainfall.

From 1867 to 1871 the temperature at Sydney fell gradually, and since then up to the present time it has been rising.

The mean here given is in all cases the mean of all the maximum and minimum readings.

TABLE V shows the mean temperature in the shade for each month at Sydney, from 1856 to 1875 inclusive. January here appears the hottest, and July the coldest month. If the means are plotted into a curve of temperature it is remarkably regular, July being coldest; June and August, May and September form pairs in which the temperature is almost alike; April is only 1·3 greater than October; March 2·8 greater than November, February 1·1 greater than December.

The mean range of temperature from 51·8 to 71·1 is very small, and the extreme range of the mean temperature from 46·9 to 73·2 is certainly within the most enjoyable limits.

It is noteworthy that the mean temperature of Sydney is 62·6, and not 66·0 as given in some standard works of reference.

The mean of thermometer readings taken at 9 a.m., 3 p.m., and 9 p.m. at Sydney, comes so near to the mean of the maximum and minimum, that I give here the results for six years:—

					Mean of max. and min.	Mean 9, 3, and 9.
1870	...	...	...	...	62·8	63·2
1871	...	...	...	...	62·4	63·1
1872	...	...	...	...	62·6	62·9
1873	...	...	...	...	63·0	63·2
1874	...	...	...	...	63·0	63·1
1875	...	...	...	...	63·3	63·4
					62·9	63·2

TABLE VI shows the monthly average reading of the maximum thermometer from 1859 to 1875 inclusive, at Sydney, and the mean of each month for the period.

TABLE VII shows the monthly average reading of the minimum thermometer at Sydney, 1859 to 1875 inclusive, with the means for each month.

TABLE VIII shows the mean of the readings of the maximum shade thermometer for the hottest month in the year for each station.

TABLE IX shows the mean of all the readings of the minimum thermometer for the coldest month in each year and for each station.

TABLE X shows the mean diurnal range of the temperature at all stations. The great radiation of the inland plains is shown by the difference at Bathurst, 30·3; Albury, 30·1; Deniliquin, 30·6; while the effect of the warm sea-water is shown at the coast stations, Sydney, 14·3; Newcastle, 15·1; Eden, 13·9.

TABLE XI.—The mean humidity of the air, derived from readings of the dry and wet bulbs at 9 a.m. by means of Glaisher's tables.

TABLE XII.—The mean extent of clouds in the sky, assuming that an overcast sky is 10 and a clear one 0. The clear sky of the interior is shown by comparing Sydney, 5·3, with Deniliquin, 3·2.

TABLE XIII.—The average monthly extent of cloud at Sydney, from three observations, at 9 a.m., 3 p.m., and 9 p.m.

February, 6·5, is the most cloudy month, and August, 4·0, the clearest; January, 6·1, and March, 6·2, are next to February; and May, 4·6, though not the clearest month, is still very fine.

The daily distribution of cloud at Sydney shows a slight preponderance at 9 a.m. The averages for a number of years at each hour are 9 a.m., 5.0, 3 p.m., 4.7, and 9 p.m., 4.1; and these proportions are pretty constantly maintained in each month of the year, but occasionally in summer the quantity at 9 p.m. is slightly in excess of 9 a.m.

TABLE XIV.—The prevailing direction of the wind, from observations made at 9 a.m.

TABLE XV shows the amount of rain and number of rainy days for each year at all the stations from which observations could be obtained; also the average for each place.

Taking the results from South Head and Sydney as from one station (they are only 5 miles apart) they extend over a period of thirty-six years, and indicate some interesting features in our climate.

The years 1841, '43, '44, '45, '60, '61, '64, and '67 were years of excessive rainfall at Sydney, and it is remarkable that on each of these years there was a rain-storm which had much to do with bringing up the amount of rain:—

In 1841 it occurred in April; 20 in. fell in one day, the 29th.
1843 " Aug.; 5.5 in. " the 13th.
1844 " Oct.; 20 in. " the 15th.
1845 " April; 9.3 in. in last week.
1860 " April; 12.6 in. on 28th and 29th.
1861 " April; 12.4 in. on 3rd and 4th.
1867 " April; 5.6 in. on 12th.

It will be seen that these storms generally occur in April, and that as much as 20 inches may fall in one day.

Another remarkable fact, which at first it was thought must arise from an accidental misplacement of the results, is exhibited by the table. A careful examination of the records, however, proves the facts to be as stated, viz., that in 1841 the rainfall at Sydney was 76.310 inches; at Port Macquarie, 48.730 inches. In 1842, Sydney, 48.320 inches; Port Macquarie, 72.850 inches.

At several of the stations included in this table returns have been imperfect for one or more years, in most cases owing to the observations being begun after the beginning of the year, and it appears best to keep the amount measured on record, specifying for what part of the year it was recorded.

The stations in this table have been arranged in order of latitude; in Table XX they are arranged in order of distance from the east coast, and the gradual decrease of rain going inland is well seen. It is modified of course by mountains and local features, but nevertheless goes down gradually from about 50 inches on the coast to 16 inches inland on the river Darling, at Wentworth.

TABLE XVI shows the amount of rain and the number of days' rain for each month for thirty-six years at Sydney.

It is remarkable that during that period every month in the calendar, except December, has been the maximum for the year one or more times.

January	2	July	1
February	7	August	1
March	3	September	2
April	7	October	1
May	5	November	2
June	5		

And during the same time there have been twenty-two months in which the rainfall has been less than half an inch, but two such months have never but twice in thirty-six years followed each other, viz., October and November, 1842, and the whole rainfall of the two months only amounted to 0.21 in., July and August, 1871, when 0.77 in. fell in the two months. The smallest monthly fall was 0.060 in. in July, 1858, and the number of days on which rain fell this month was 11; a similar number to that of October, 1842, when the fall was 0.070 in.

The smallest rainfall for a year is 21.490 in. in 1849.

The driest three months, 1867, *October, November, December*, whole rainfall 1.260 in., and 1842, September, October, November, nearly as dry, rain equal 1.310 in.

The driest five months, 1862, July to December inclusive, total rainfall 7.440 in., and similar period July to December, 1875, inclusive, 7.640 in. (*See letter on dry weather.*)

TABLE XVII is convenient for reference for the rainfall of any particular day, and shows that some days are almost always wet, as the 28th March was wet for nine years in succession, 12th August, and others. It is also remarkable that when a rain period extending over a number of days occurs in any year, it is almost certain that a rainy period will occur about the same time next year. Sometimes these periods get gradually earlier in the year, as in August, '63, '64, and '65, sometimes later, as in June, 1863-4-5. This table also indicates the length of the periods which have been quite without rain, the greatest being twenty days in September, 1866.

It should be borne in mind that the rain is measured every morning at 9 a.m.; and the quantity recorded is therefore the rainfall of the twenty-four hours previous to 9 a.m. of the day on which it is entered.

The rain-gauge used in all cases is round, and 8 inches in diameter.

TABLE XVIII.—The amount of evaporation here given is that shown in a glass vessel 8 inches in diameter placed on the ground, with which the measurements were begun in 1859. Since 1870 experiments have been going on with two other forms, one a metal vessel 12 inches deep and 8 inches in diameter, the other 4 feet in diameter and 2 feet 6 inches deep, sunk 2 feet 4 inches in the ground, and therefore as nearly as possible in the condition of a natural reservoir.

The amount of evaporation shown by these evaporators in each year is as follows:—

	Metal 8 in. diameter on ground. Inches.		Glass 8 in. diameter on ground. Inches.		4 ft. diameter in ground.
1871.....	49.887 × .51	=	33.363 × .77	=	25.622
1872.....	66.589 × .45	=	41.588 × .72	=	30.093
1873.....	54.620 × .52	=	47.859 × .61	=	29.432
1874.....	59.622 × .54	=	50.940 × .63	=	32.066
1875.....	59.243 × .61	=	58.636 × .62	=	36.115
Means ...	57.992 × .53	=	46.477 × .66	=	30.666

In the above table, the factor by which it is necessary to multiply the results of the 8-inch diameter gauges to make the results equal that from the 4-foot one is given. The differences in these factors from year to year are remarkable, but not at present open to explanation, as the same instruments under the same conditions as nearly as possible have been used.

The only noteworthy change was made in the beginning of 1875, when a fence and some shrubs that broke the force of the wind were removed, and the evaporators left more exposed.

The amounts for the years here given will be found less than those given in Table XVIII, because in the comparative results of the three gauges, the results for the days on which the water of one or more of the instruments overflowed from rain, or was out of order from any cause, are omitted.

TABLE XIX.—In this table the amount of ozone from 1859 to 1864 was determined by Dr. Moffitt's ozone tests, exposed for twenty-four hours, from 1865 to 1875, by M. Jame's (of Sedan) papers, which were exposed for twelve hours; the numbers, however, given in his scale have been divided by two, to make the results comparable with those by Moffitt's tests; no allowance has been made for the difference in time of exposure. 12·0 Jame's (of Sedan) scale is therefore entered as 6·0. The amount of ozone shown by these tests is greater with easterly and southerly winds, and less with the westerly land winds. The tests, however, are not so uniform as they ought to be.

TABLE XX.—This table shows the gradual decrease of rain, going inland; it is, however, modified by the greater amount at some of the mountain stations, and from local circumstances. The coast rainfall ranges from about 45 in. to 63 in., and on the low lands there is a gradual decrease, going westward; for the majority of western stations the averages given are probably too large to represent the mean for a number of years, as it is well known that the rainfall from 1870 to 1875 was generally in excess of the average. It is stated that at dry seasons rain does not fall in some of the western districts for twelve, eighteen, or even twenty-four months; one case, near Wilcannia, on the Darling, is given, where for thirty months prior to October, 1876, no rain fell, nevertheless, it is probable that over a number of years the average rainfall of the Darling River District would be from 10 to 14 inches, and at Wentworth five years' mean gives 13½ inches.

TABLE XXI.—This table shows better than any description the relative prevalence of each wind in each season; the total number of miles which passed the Observatory in each year; the mean hourly velocity, and the greatest pressure, with direction of wind and date.

The prevalence of wind in one month from one direction is not a good guide to what may be expected in the same month in another year; for instance, the number of hours' N.E. wind in November, 1868, was forty-four, and in November 1871, it was 162 hours; so of other months and other directions.

The great prevalence of southerly and north-easterly weather in summer, and of westerly wind in autumn and winter, is very marked in the mean results, but the mean does not show with any degree of certainty the number of hours wind in that direction which may be expected, but it does show clearly that in summer, when the S. wind is weak, the N.E. is strong, and *vice versa*. The cause of this is, as previously stated, a low or a high barometer, as affected by the trades. Not to take other instances and multiply examples: in February, 1871, barometer for the month considerably below the average, strong and prevalent S. wind, and N.E. very weak; in December, 1871, barometer considerably above the average, S. winds weak, and N.E. very strong.

TABLE XXII shows the number of hours the wind blew from each direction, and the number of miles of wind which passed the Observatory in the time, as well as the average velocity of the wind—the superior strength of the southerly wind averaging 13 miles an hour, when the is only 11 miles, and the great prevalence of westerly winds are remarkable.

TABLE XXIII.—The Earth Temperatures in abstract. At 19 feet the range in temperature from 65·8 to 59·7 is small, but it is remarkable that in six years' results the maximum temperature has been three years reached in February and three times in April; but if the results are plotted into curves, it is found the maximum temperature is reached about the end of March, and the minimum in September and October, which months as a rule have the same temperature—the minimum is therefore about six months after the maximum. The maximum and minimum are both about two months after the same condition in the air temperatures. In the shorter thermometers the conditions gradually approximate to those in air, as they get shorter, both in regard to range and time of maximum and minimum.

TABLE XXIV.—This table shows the total number of hours and amount of rainfall with each wind during the year, at an elevation of 65 feet above the ground, with the averages of three years.

There is added also the percentage which the rainfall collected at this elevation is less than at 15 inches above the ground, which to some extent seems to depend on the amount of rain and force of wind.

In 1873 the rainfall was 52·813, and the velocity of wind 9 miles per hour, with a percentage 28·1 less than at 15 inches.

1874, 42·488 inches rain, 9·8 miles velocity of wind, and 33·2 per cent. less rain than on the ground, while in 1875, with light rain amounting to 22·780, and strong wind 10·5 miles velocity, the percentage less than on the ground rises to 50·8. At the foot of table the average rate of rainfall per hour with each wind is added, showing the maximum at north-east is 0·181 in. per hour, which tells the old story of the extremely heavy rainfalls with easterly winds and the minimum with northerly wind, only 0·031 in. per hour.

TABLE XXV.—Harbour-water Temperatures, which show, as might be expected, a very close accordance with the air temperatures, so far as time of maxima and minima are concerned, but in January the average temperature of the water, 71·1, is the same as the average temperature of the air, while in July the water is 57·7, or 5·9 above the temperature of the air.

It is to be borne in mind that it is the mean temperature of the air, including day and night,—that is, compared with the water temperature during the summer, the water is cooler than the *day* air temperature.

TABLES XXVI, XXVII, & XXVIII contain all the available observations on the temperature of the water along the east coast of Australia. For those taken during the Eclipse Expedition I am personally responsible. Those taken during the laying of the New Zealand Cable were kindly supplied to me by Capt. G. R. Sims, of the Telegraph s. c. s. "Edinburgh." To Capt. Sims also I am indebted for the equally valuable series taken during the passage of the s.c.s. Edinburgh to Port Darwin.

Fortunately one of the series going north was in December and the other in June, so that the conditions in winter and summer are shown. In the summer series a steady increase of temperature is shown from Sydney to Eclipse Island, and in winter a similar increase is shown as far north as Booby Island. It is remarkable in these observations that the temperature of the water seems to be affected by the sun, as it is generally greater between noon and 6 p.m.

In the series between Sydney and New Zealand, there is evidence in the changing temperature that the steamer was passing along the junction of the warm (northerly) and cold (southerly) currents, which is interesting, as the warm current generally goes much further to the south before it turns to the eastward.

TABLE XXIX shows the dates on which auroras have been observed in New South Wales; 1870 to 1875, particulars of these will be found in the annual volumes. The numbers for each year are as follows:— 1870, 27; 1871, 8; 1872, 10; 1873, 3; 1874, 3; 1875, 0.

TABLE XXX is inserted to show the extreme temperature during the summer on the inland plains, and the months have been arranged for that purpose. Deniliquin has been selected as a fairly representative station, and the one at which the longest series of observations have been taken. The results given are, first, the mean of all the readings of the maximum thermometer for the month; second, the highest readings for each month. Taking the four months November, December, January, February, as the hot period, a very great difference in the average max. temperature is found.

In the summer of 1859-60	it was	88·6
”	60-61	” 87·2
”	62-63	” 93·0
”	63-64	” 85·2
”	64-65	” 91·9
”	65-66	” 93·4
”	66-67	” 89·7
”	67-68	” 83·1
”	68-69	” 89·3
”	70-71	” 88·4
”	71-72	” 94·9
”	72-73	” 88·2
”	73-74	” 90·2
”	74-75	” 92·5
”	75-76	” 84·2

One cannot help noticing that the years of the extremes of this temperature agree with the very dry years, markedly 62-63; again, 66-67 and 71-72.

List of private observers to whom I am indebted for valuable observations, results of which are given in the tables in Appendix:—

Thargomindah	...	...	V. S. Dowling, Esq.
Cowga	...	...	L. S. Donaldson, Esq.
Tamworth	...	...	G. F. Finch, Esq.
Goonoo Goonoo	...	...	P. G. King, Esq.
Scone	...	...	J. S. Wilshire, Esq., Rev. John Shaw.
Dalwood	...	...	J. Wyndham, Esq.
Lambton	...	...	Rev. J. Spicer Wood.
Kurrajong	...	...	J. Comrie, Esq.
Woodford	...	...	A. Fairfax, Esq.
Windsor	...	...	J. Tebbutt, Esq., F.R.A.S.
Botany	...	...	F. Bell, Esq., C.E.
Liverpool	...	...	Rev. R. L. King.
Moss Vale	...	...	W. Macdonald, Esq.
Gungahleen...	...	...	W. Davis, Esq.

DESCRIPTION OF DIAGRAMS.

DIAGRAM I.—The mean height of the barometer for each month was marked on the paper, each space being taken as $\frac{1}{16}$ th of an inch; lines were then drawn through the points to form the curve.

The temperature curve was formed in the same way, the *mean shade* temperature of each month being taken, and the spaces are each 1 degree.

The prevailing direction of wind for each month is indicated by a black dot, which is so placed as to indicate the direction of wind, as—June, 1860, w.s.w. From January, 1864, the direction is from the anemometer results; for the same period also, the total number of miles of wind for each month is entered, each space being 1,000 miles; the records for February, May, and July, 1864, are imperfect.

Previous to 1864 the force of wind was estimated three times daily, but the results are not considered comparable with the registered miles.

The amount of rain for each month is indicated by the portion of black line in it, each division being 2 inches. The amount for each month commences at the top of the previous one, and the top in December therefore indicates the amount of rain for the year, and shows how much fell in each month, and the general character of the rainfall throughout the year.

This diagram affords the best general view of the meteorological elements, but it has been found impossible to include more than Sydney.

DIAGRAM II.—This diagram shows the diurnal change of the barometer at Sydney. The spaces between the horizontal lines are here taken as one hundredth of an inch of the barometer, in order to make the curve more conspicuous. It will be observed that about 9 a.m. the barometer is at its daily maximum, and that the following minimum takes place at 4 to 4.15 p.m. in summer, and gets earlier in the winter, being in June about 2.45 p.m. The second daily maximum is usually .010 to .015 below the 9 a.m. maximum, and takes place about 10 p.m. in summer, but is more irregular as to time than the 9 a.m., and the second minimum takes place at 3 a.m. in summer and 4 a.m. in winter. So that in summer the day tide lasts about 13 hours, and the night tide 11 hours; and in winter the length is just reversed, the day tide is 11 hours, and the night tide 13 hours; but even with 13 hours duration the night tide is lower in winter, as compared with the day tide, than it is in summer.

It would appear from these results that the day tide varies with the length of daylight, being longer in summer and shorter in winter, and the night tide gets shorter in short nights, and longer in long nights.

Historical Notes of the Weather in New South Wales, 1787 to 1840.

The following extracts form the meteorological history of the Colony from 1787 to 1840 inclusive. The great bulk of the information has been derived from the newspapers of the day—where the name is not given *Gazette* is to be understood—and Colonel Collins' history. I have, however, here collected all the information I could obtain. Mr. Jevons' history of "Floods and Droughts in Climate of Australia and New Zealand" has been of considerable use to me. Mr. Bennett's "Australian Discovery and Colonization" has also afforded many valuable notes. To Sir William Macarthur I am indebted for most valuable information that he alone could furnish. Information has also been obtained from other sources which are mentioned with the extracts. It has not been thought necessary at present to carry these notes beyond 1840, as in that year meteorological observations were begun. To continue the information from 1840 would have taken so much time that for the present I have been obliged to defer it to a more convenient opportunity.

Lists of dates of *floods*, *thunder-storms*, and *insect plagues* will be found pages 20, 27, and 35 to 39, which facilitate reference to these notes, and in some cases phenomena have been connected by references at the end of the paragraphs.

1787.—Flinders and Bass, when coasting on the south and east side of Australia, observed what they considered unmistakeable signs of drought both at Bateman's Bay and Western Port. The waterholes were dried up, no blacks could be seen, and there were vestiges of extensive bush fires.

1788.—Heavy rains prevented the first settlers from doing much work for the first two or three weeks after they landed, January, 1788. Bennett, page 124.

From Hunter's Historical Journal, page 72.

- 1788.—January. Weather fine and warm, with sea and land breezes.
 February. Sultry, lightning, thunder, and heavy rain for a fortnight.
 March. Weather variable, strong s. and s.e. gales, moist and hazy, heavy sea rolling on to the coast.
 April. Similar to March, few days cloudy with rain.
 May. Beginning much bad weather, strong s. and s.e. gales, and generally rain at night; middle fair; end southerly winds, unsettled, and showers of rain.
 June. Beginning fair pleasant weather; middle and latter end stormy, wind chiefly s.e. On 22nd this month shock of earthquake, at 11 a.m., 1788 (Ford's Almanac).
 July. Early part same as June; middle, blustering rainy weather, frequent showers; end fine with westerly winds.
 August. Beginning cloudy weather with much rain, wind s.e., rest of month fair with variable wind.
 September. Beginning to 20th cloudy, with frequent showers of rain; end strong gales from the s.e.
 October. First half variable wind, cloudy, with frequent thunder, lightning, and showers of rain; latter part fine and clear.
 November. Beginning cloudy, hazy, wind east; middle cloudy, frequent light showers, thunder and lightning; latter part cloudy, hazy, violent thunder, lightning, and rain, wind n.e. to s.e.
 December. First part cloudy with light rain; middle cloudy, frequent light light showers; end good deal of rain, wind n. and e.

Colonel Collins, page 37.

1788.—August. Such heavy rain fell this month that it prevented out-door labour, destroyed a great number of bricks, and the brick-kiln fell in more than once, much damage was done to the settlement, and the roads made impassable; the weather did not clear up till the 14th.

Page 49.

December. The weather, during December, was for the first part hot and close; middle was fine, the end variable. The climate was allowed by every one, medical as well as others, to be fine and salubrious. The rains were heavy, and the thunder and lightning severe, but not attended with any bad effects since February last.

Page 52.

1789.—A day or two after 19 January, 1789, Sydney was agitated by a report that a great gun had been fired at sea, but nothing could be seen that could confirm the report. (See pages 99 and 100, also Sept., 1845.)

Page 18.

Latter end of January and month of February close with rain, at times very heavy, and much thunder and lightning, by which some sheep, lambs, and pigs were killed.

Hunter's Historical Journal.

January. The whole of this month was cloudy and hazy, with light showers of rain and wind N.E. and S.E. and W. at night.

Collins, page 70.

The weather during the latter part of May, 1789, was cold, notwithstanding which a turtle was seen in the harbour. (See 8 Dec., 1805.)

Page 73.

July 14. The Governor and party were deterred from remaining longer on the river, *i.e.*, Hawkesbury, in the narrow part, because they perceived evident traces of floods having risen to the height of from 20 to 40 feet above the level of the water.

Spring: The colonists suffered a parching thirst for several months. The springs from which they had before been supplied either failing entirely, or scarcely yielding sufficient to support nature. (See 11 Oct., 1811.)

Flanagan, vol. 1, page 46.

"Early in the year 1789 it was discovered that the aborigines near Sydney were suffering from small-pox. Dead natives were found in all directions, and many families were swept away by the disease, and others to avoid its evil influence fled into the interior. Whether it had ever appeared before could not be ascertained, but the fact that it had a name, Gal-gal-la, led to the belief that this was not its first visit." (See page 100.) For full account of this see "Wanderings in New South Wales," by George Bennett, F.L.S., page 148, *et seq.*

Collins, page 97.

1790.—February. Heavy rains and gales of wind prevailed during nearly the whole month. The rain came down in torrents, filling brick-yards and every place that had been dug about the settlement, and doing much damage.

Page 102.

1790.—March. The weather had been very wet during this month; torrents of rain again laid every place under water; many little habitations which had withstood the inundations of last month now suffered considerably.

Page 114.

June. Heavy wind and rain on the 1st and 2nd of this month.

Page 132.

August passed without any rain.

Page 137.

September. A very little rain fell at the end of this month, which is the first that has deserved the name of heavy rain since June.

In October the gardens and corn grounds were again parching for want of moisture; the grass was so dried that a spark set it on fire, and very slight hopes were entertained of a wheat crop, for the extreme dry weather was daily burning it up.

Page 141.

October. The weather about this period was evidently becoming warmer every day, and the trees gave signs of the return of spring.

Bennett, page 164.

No rain fell at Sydney in the year 1790 from June to November, and the wheat harvest proved a partial failure.

Page 165.

1791.—In January and February, the colonists experienced several weeks of excessive heat, and the settlement was visited by myriads of flying foxes, which died in such numbers about the fresh water as to render it unfit for use; hot winds also prevailed on several occasions about the beginning of the year, being the first visitation of the kind which they had experienced. Birds dropped dead from the trees, and almost every green thing was burnt up.

Colonel Collins, page 153.

In February the surveyor was employed clearing and deepening the stream of water which supplied Sydney, and which through the long drought was at this time very low. Fresh water was scarce everywhere, and most of the streams about the cove were dry. On the 10th and 11th of February, 1791, on which days the temperature at Sydney stood in the shade at 105°, the heat was so excessive at Parramatta, made worse by the bush fires, that immense numbers of the large fox-bats were seen to drop from the trees into the water, and many dropped dead while on the wing. At Sydney about the harbour in many places the ground was found covered with small birds, some dead, others gasping for water. At Parramatta, an officer of the relief guard left the boat to find a drink of water, and had to walk several miles in a dry watercourse before he found it, and many birds dropped dead at his feet. The wind was north-west, and burned up everything before it. Persons whose business obliged them to go out declared it was impossible to turn the face for five minutes to the wind.

Page 166.

1791.—June. During this month some rain had fallen, which had encouraged the sowing of some wheat on the public ground at Parramatta. Until these rains fell the ground was so dry, hard, and literally burnt up, that it was almost impossible to break it with a hoe, and until this time there had been no hope of the grain vegetating. After this the country about Parramatta wore a promising appearance.

Page 189.

On November 4th, with wind north-west, the thermometer rose to 94.7 in the shade, and one man was killed by sunstroke. At this time the water supply of Sydney was so much reduced by the dry weather which had prevailed that some of the ships were sent to the North Shore to water.

Hunter's Historical Journal, page 203.

Upon my arrival in Sydney on the 27th February, all the streams from which we were formerly supplied, except a small stream at the head of Sydney Cove, were entirely dried up from the very intense heat of the summer.

Collins, page 202.

The crops of 1791 only yielded two to one, while before they had been six or seven to one; this may be accounted for by the scarcity of rain.

Page 206.

1792.—The weather from the 9th to the 13th of April, was extremely bad, heavy storms of wind and rain having generally prevailed until the 13th, much damage was done to houses and land, a large part of the cleared land was under water, and the corn was beaten down.

Page 211.

May. Several settlers at Parramatta had, notwithstanding the extreme drought of the season, (*i.e.* 1791) good crops of wheat.

Page 230.

The month of September was ushered in with rain, storms of wind, thunder and lightning, and much rain fell for several days, and the wheat looked and promised well.

Page 242.

October. The wheat sown in March last looked as promising as could be wished.

Bennett, page 168.

In the month of October it became evident that a very abundant harvest might be expected.

Collins, page 247.

November. The wheat harvest was got in, and had every appearance of turning out well.

Page 257.

December. The weather this month was very hot. The 5th was an excessively hot day, the wind blew strong from the northward, and the bush was all on fire; on going out of the house it was scarcely possible to breathe or endure the heat; thunder was heard at intervals during the day, and at night a little rain fell.

Colonel Collins, vol. i, page 262.

1793.—January. Icebergs seen by ships coming out in latitude 51° 30' south.

Page 284.

The rain of April, 1793, came too late to save the Indian corn of the season, which now wore a most unpromising appearance. On the 12th of this month an extraordinary appearance in the sky was observed by several people between 5 and 6 o'clock in the evening; it was seen to north-west, and appeared as if a ray of forked lightning had been stationary in that quarter of the heavens for fifteen minutes. It was not visible after sunset. (See Sydney Observations: on the 4th October, 1874, a zig-zag streak of lightning was observed hanging in the sky for twenty minutes.)

Page 286.

The weather about the middle of May, 1793, was extremely bad, a very heavy storm of wind and rain passed over on the 15th.

Page 300.

July. Last summer's wheat crop was now thrashed out, and found to average between 17 and 18 bushels to the acre.

Page 301.

The winter of 1798 was colder than any which the colonists had yet experienced.

Page 308.

In August, 1793, much apprehension was entertained for the wheat, which began to look yellow for want of rain. Towards the latter end of the month, however, rain fell on three days and nights, which considerably refreshed it.

Page 309.

Unproductive as the Indian corn sown last year (1792), on the public ground had been, the farmers had a good crop.

Page 317.

October. The weather throughout this month continued extremely favourable for wheat.

Page 319.

October 26, noon.—Two men and a dog were killed under a tree where they stood for shelter during a thunder-storm. This was the first accident of the kind that had happened in the Colony.

Page 324.

In the middle of December, 1793, the wheat sown in April, being perfectly ripe, was reaped, and yielded about 22 bushels to the acre.

Page 326.

December. During a violent storm of rain and thunder on December 6th, a boat loaded with corn was filled by the water, which ran over the wharf.

Page 338.

1794.—January. About the end of the month a most violent storm of wind and rain at Parramatta; it travelled in a direction from east to west (probably west to east—H.C.E.). The west end of Government House, Parramatta, was injured, paling fences were levelled, and a great deal of corn was damaged. The rain was represented as having been very heavy. This storm was not felt at Sydney. The climate was known to be subject to sudden storms, but nothing like this in violence had been before experienced.

Page 352.

March. A very violent storm of wind and rain, on the 8th and 9th of this month.

Page 365.

April. The Indian corn, in general, turned out very productive. The weather was variable and unsettled during this month. (See May, 1796.)

Page 386.

August. The weather throughout the whole of this month has been very unpleasant and turbulent. Much rain had fallen, and the wind blew strong at south. On the 25th a hot wind was felt for the first time this season, blowing until the evening with much violence; a south wind came up at night.

Page 390.

September, 17. A violent gale from south-west.

Page 402.

December. Much of the wheat this harvest was found to be blighted. At Toogabbe, the crop growing was estimated at seventeen bushels per acre, but did not yield more than six or seven.

Page 405.

1795.—January, day not given. The Indian corn looked very well, and the settlers on the Hawkesbury expected a good crop. In consequence of heavy rain this month, the Hawkesbury rose many feet higher than it had ever been known to do; by this flood several settlers suffered much. The Government wheat at Toongabbe was injured; and at Parramatta, a new and well made bridge over the creek was swept away.

Page 413.

March. The weather during the former and latter parts of this month was wet. About the time of the equinox the tides in the cove were observed to be very high.

Page 415.

April. The Hawkesbury is spoken of as "a river, which from the fertility of its banks and the effect of its inundations, might not improperly be termed the *Nile* of New South Wales." Five feet less water was found at the stone wharf at Windsor, on the 21st April, than there was there in February, the same year (1795), owing to the dry weather which had for some time past prevailed.

Page 427.

1795.—August. Public labour was scarcely anywhere performed during this month, owing to the extreme badness of the weather which prevailed. On the 26th August, and for some days afterwards, the weather was very bad. Accounts were received from the Hawkesbury that several farms on the creek were under water; very much damage was done by these rains to paling fences, which could nowhere stand the force of the storm.

Page 450.

September. The weather throughout this month has been very variable.

Pages 442–446.

The wheat harvest seems to have been good, but all the Cape wheat which had been sown to try it was blighted.

Page 445.

December. In the beginning of this month four farms at the Hawkesbury were totally cut up by a fall of large flakes of ice. The storm passed in a north-west direction (? south-east). The bark of trees was cut as if shot had been discharged against them, and some flakes of ice were brought to the officer the second day after it fell, measuring from 6 to 8 inches long, and at least 2 fingers in thickness. It was not felt at Parramatta or Sydney.

Page 466.

1796.—March. It was seen with concern that the crops of this season proved in general bad, the wheat being almost everywhere mixed with a weed named *drake*. Every care was taken to prevent this happening in the ensuing season.

Page 474.

May. In this and the preceding month many people were again afflicted with inflammation in the eyes, having been visited by this disorder in the month of April, 1794, about which time we had the same variable weather as now experiencing. A very excellent barrack was erecting on a spot which had been selected, sufficiently high to preclude any danger of the building being affected by a flood.

Page 481.

May. The weather was very variable this month.

Page 493.

August. The first and middle parts of this month were wet. The branch of the harbour named Duck River was so swollen as to overflow its banks, which were very steep.

Vol. 2, page 7.

October. In the first part of the month the weather was not very good; about the middle some showers fell very seasonably for the harvest, and towards the latter part the regular sea and land breezes had set in.

Page 14.

December. The weather in the first and middle parts of this month had been very bad, heavy rains (which much retarded the getting in of the harvest) prevailing, with thunder and lightning, and winds strong at east. Latter part moderate.

Page 16.

1797.—January. The present harvest is said to be abundant. Near Toon-gabbe was in flames this month, and a stack containing 800 bushels of wheat was burned.

Page 20.

January. The weather during this month had been most uncomfortably hot, accompanied by some severe thunder-storms, in one of which the flagstaff at South Head, and that at the entrance to the cove, on Point Maskelyne, were shivered to pieces by the lightning. The vast blazes of fire which were seen in every direction, and which freshened with every blast of wind, added much to the suffocating heat that prevailed.

Page 23.

February. Some heavy rains fell during the first and latter parts of this month, which it was hoped would extinguish the vast fires which had surrounded the place.

Page 28.

March. The weather during the greater part of this month had been very wet.

Page 31.

April 21st. On the 21st as much wheat as the public granaries at Sydney, Parramatta, and the Hawkesbury could contain having been received, they were closed until the month of August next.

Page 33.

April. Much rain fell this month, and a heavy squall of wind came on the 27th.

Page 38.

May. Very little rain fell this month.

Page 42.

June. The weather was remarkably dry.

Page 44.

July. The dry weather had been followed by several days' rain, by which the appearance of the wheat grounds was very much improved.

Page 51.

September. Towards the middle of this month strong south winds with rainy and unsettled weather prevailed, particularly at the change of the moon.

Page 52.

October. Weather 2nd to 3rd of month weather unusually bad; wind blowing a gale from southward, with much rain.

Page 57.

A bridge put over Duck River, between Sydney and Parramatta.

October. The wheat everywhere wears the most promising appearance, and the weather had been very favourable for bringing it to maturity.

Page 59.

November. The wheat had ripened suddenly, owing to some heavy rains having been followed by hot weather. [*This was written after the 24th November.*]

Page 64.

1797.—November. The weather was in the first and middle parts of this month very unsettled, blowing hard at times with much rain. On one day there fell a shower of hail, the stones of which were each as big as a lark's egg. The latter part of the month was fair, and favourable for reaping grain.

Page 72.

December. The weather was now becoming exceedingly hot, and as at this season of the year the heat of the weather was so intense that every substance became a combustible.

Bennett, page 215.

The harvest of 1797 was a very abundant one.

Colonel Collins, vol. ii, page 84.

1798.—January. Some heavy rain fell this month, which for a time retarded all outdoor work, but it came opportunely for the maize, the growth of which had been rather obstructed by the dry weather which preceded.

Page 95.

February. Toward the latter end of this month there was an unusually heavy fall of rain about 10 o'clock at night.

Page 202.

March. There was very little intermission of rain, thunder, and lightning, during the whole month.

Page 115.

May. On the 14th of this month there was a squall of wind from southward, attended with a shower of hail-stones of an uncommon size, many of them measuring 6 inches in circumference, and appearing to be the accumulation of smaller hail-stones which had adhered together by the intensity of the cold of the higher regions of the air, until they became of the above size. This was the most dreadful hailstorm ever remembered (*Ford's Almanac*). Much rain fell this month.

Page 118.

June. Maize harvest all got in this month, but some of the new buildings were rather retarded by the rain which fell toward the latter end of it.

Page 121.

July. The heavy rain which had fallen in part of this and the preceding month much damaged the public road from Sydney to Parramatta.

Page 125.

August. The weather of last month was remarked to be uncommonly cold; in the latter part of this it was excessively sultry and the wind high, with many bush fires.

Page 128.

September. The weather during this month had been so very sultry and dry, there was every appearance of being completely disappointed in the sanguine expectations which had been entertained of a most abundant harvest, pasture and garden grounds were suffering exceedingly through want of rain.

Page 134.

1798.—October. The weather proved much too dry and sultry for the harvest ; some rain fell toward the end of the month, but it was greatly feared it came too late to be of much benefit to the wheat or maize.

Page 136.

November. There was but little variation in the weather, except that on the 25th there was a violent burst of thunder attended with partial whirlwinds.

Page 139.

December. The wheat harvest being over, the country, as happened generally at this season of the year, was everywhere on fire. In the early part of this month the thermometer stood at 107° in the shade at the Hawkesbury.

Page 142.

1799.—January. Agricultural concerns at this time wore a most unpromising appearance ; the wheat proved little better than straw or chaff, and the maize was burnt up in the ground for want of rain. From the establishment of the settlement, so much continued drought and suffocating heat had not been experienced. The country was now in flames, the wind northerly and parching ; and some showers of rain which fell on the 7th were of no advantage, being immediately taken up again by the excessive heat of the sun.

Page 195.

January. The Governor in a visit to Parramatta, found that the pasture over the whole of the country had been entirely burnt up ; the cattle were in great distress, and from the lamentable continuance of the drought, the maize crop was everywhere likely to fail.

Page 199.

February. The great drought and excessive heat had affected the water ; such ponds as still retained any were reduced so very low that most of them became brackish and scarcely drinkable ; and the bush from Sydney to Parramatta was completely on fire, the trees being burnt to their tops.

Page 199.

March. The dry weather which had so long prevailed, to the great detriment of the cultivated and pasture lands, was succeeded by rain for two or three days, which greatly refreshed the gardens, that were nearly wholly burnt up, and everywhere revived the perishing vegetation.

At the Hawkesbury, however, an accident occurred which, although not so ruinous to the Colony at large as the drought, proved most destructive to the settlers in that district. This river suddenly and in the course of very few hours swelled to the height of 50 feet above its common level, and with such rapidity and power as to carry everything before it. The Government storehouse which had been erected at the first settlement of this part of the country was not out of the reach of this inundation, and was swept away with all the provisions it contained. Many of the inhabitants were taken from the ridges of their houses by a few boats which they fortunately had among them, just in time to save their lives ; for most of the dwellings were inundated, and the whole country appeared like an extensive lake ; only one life was lost, but many pigs, poultry, and other live stock, with much of the produce of the late unfortunate harvest, and the domestic effects of the people were

hurried away by the torrent. This was a most serious calamity, and no cause having appeared to indicate an approaching overflow of the river, the settlers were not prepared for such a disaster. It was said that the natives warned the settlers, but this wanted confirmation. There could, however, be no doubt that unperceived by our people, a heavy fall of rain had taken place in the interior of the country among the mountains, and which from the parched state of the land for such a length of time, had in no part been absorbed, but ran down the sides of the hills, as from mountains of solid rock. This flood began on the 3rd March, and did not abate until the 19th. (See June 1st, 1809, and November 10th, 1805.)

Page 203.

1799.—March. A new enemy of agriculture made its appearance, this month destructive grub-worm was discovered in several parts of the cultivated lands; and at the Hawkesbury a caterpillar had commenced its ravages wherever it found any young grain just shooting out of the earth.

Page 203.

April. The maize harvest had entirely failed in Norfolk Island, owing to the long drought which had prevailed there.

Page 207.

April. The weather was in general moderate and seasonable this month.

Page 213.

In the evening of the 4th of June, 1799, the weather became very tempestuous, and continued for three days, blowing a heavy gale from the southward, attended with a deluge of rain, and many buildings were injured. This gale having subsided, it returned again about the middle of the month, blowing again from the southward with increased violence, and another deluge of rain which did much damage to public and private buildings. The south side of the church-tower (brick?) was entirely destroyed. New and unfinished Government House at Parramatta, built of brick, was materially injured, but not wholly destroyed. A man in crossing a gully between Sydney and Parramatta was washed away and drowned. The ravages of this storm were so great that the settlement was thrown back nearly twelve months. The weather from the beginning of this month had never since the establishment of the Colony been observed to be so severe.

Page 246.

August. The weather had for some time past been moderate and temperate.

Page 268.

October. The crops wore this month a most promising aspect, and it was hoped that the various and unforeseen misfortunes which had from time to time affected agriculture were now at an end.

Page 272.

November. The wheat crop at this time nearly ready for the reaper, wore the most promising appearance; the stalks everywhere, particularly at the Hawkesbury, bending beneath the weight of the richest ears ever beheld in this, or indeed in any country; but a crop is never safe till it is in the barn. About the middle of the month there fell a heavy storm of thunder, lightning, and rain, and hail, from s.e. that beat all the fruit off the trees, and destroyed the gardens in and within 2 miles of Sydney.

A heavy gale of wind and rain took place at the Hawkesbury on the day preceding the storm at Sydney; this laid much of the wheat, and beat down one end of the public store. This destructive weather having subsided for a day, recommenced on the 20th and continued without intermission to the 25th, when it cleared up, and then myriads of caterpillars were found destroying the young maize.

Page 288.

1800.—March. Accounts of a most alarming nature were received towards the latter end of the month, from George's River and the Hawkesbury. The weather had, unfortunately for the maize now ripe, been uncommonly bad for three weeks, the wind blowing a heavy gale, accompanied with torrents of rain that very soon swelled the river Hawkesbury and the creeks in George's River beyond their banks, laying all the adjacent flat country, with the corn on it, under water. Much damage of course followed the desolation which this ill-timed flood spread over the cultivated grounds, and some lives were lost, but fewer than could have been expected.

Page 289.

March. Referring to the flood just described, he says—"It is much to be lamented that in establishing themselves on the banks of the Hawkesbury, the settlers had not with more attention considered the manifest signs of the floods to which the river appeared to the first discoverers to be liable, and erected their dwellings upon the higher grounds; or that the inundations which had lately happened had not occurred at an earlier period, when there were but few settlers. These, indeed, had been such as formerly no one had any conception of, and exceeded in horror and destruction anything that could have been imagined.

June 17th. Shock of earthquake (Ford's Almanac).
Latter end of the year heavy rain, see March 3rd, 1805.

Page 334.

1801.—August. The Hawkesbury had again flooded the adjacent country, and many settlers who had farms on its banks had in despair totally abandoned them.

March 2. A very high flood in the Hawkesbury; one man drowned. (See March 23, 1806.)

It was probably very wet in January this year. (See January 19th, 1826.)
Wet at end of year. (See March 3, 1805.)

Flanagan, vol. i, page 127.

A flood in the Hawkesbury, which continuing through the first three months of 1801, destroyed grain and other property to the value of nearly £23,000, having deprived the colonists of one of their chief sources of supply, the Governor despatched a vessel to Otaheite, in May, for provisions, &c.

Flinders, vol. i, page 233.

1802.—July. The Colony was on short allowance, prices of food very high, sheep, pigs, wheat, &c.

Flinders says (after mentioning that he paid 60 shillings each for sheep weighing from 30 to 40 lbs., and for other things equally high prices):—"The biscuit cost 33 shillings per hundred pounds. Considering that the Colony was at short allowance it was a favourable price."

1802.—July, page 237. “During our stay of twelve weeks at Port Jackson, there were not many days favourable to our pursuits at the observatory, the weather being dull and rainy for the greater part of the time; by watching opportunities a sufficient number of observations were obtained to show the rate of the time-keepers.”
(They arrived in Sydney May 9th, 1802.)

From a Journal of a Voyage from Sydney to Port Phillip in 1802, directed by Capt. P. G. King.

December 17. At Elephant Island, a wet morning; started about 12, travelled along a rocky shore, the rain and hail annoyed us much, there being no shelter, walked till about 6 p.m.; made a hut for shelter, rain and hail all night. On the 21st the writer mentions, “Saw some fine trees by the river-side, but in every place I have seen, the large trees are decaying and fresh ones springing up.” Rain seems to have continued to the 24th December. On 14th also he mentions the “remains of some very large gum-trees, but they are all rotting.”

1803.—January 10. He measured a tree that “appeared to have fallen lately, 100 yards clear stem, and between 5 and 6 feet diameter; he estimated there were twenty such trees on every acre, the rest being small and straight, and only 2 or 3 feet apart and from 6 to 18 inches diameter; they grew on a fine, deep, black soil.”

January 20th. “Arrived at Port Phillip, hot winds most of the day; found the country all newly burnt.”

January 28th. Excessively hot for two days past; they saw fine grass fit to mow; but there seems to have been little water in the creeks.

February 26th. He says, when about to leave Port Phillip, “I have every reason to think that there is not often so great a scarcity of water as at present, from the appearance of the herbage.”

The name of the writer of this journal is not given, but Captain King vouches for his intelligence. (The journal is in the Colonial Secretary's Office.)

Sydney Gazette.

March 5th. The granaries at Parramatta and Hawkesbury being filled with wheat, no more can be taken in.

Same date. The late drought has been severely felt in all parts of the Colony, and has been attended with much loss to the gardener. Vegetation was almost at a stand, and for want of rain great part of the seed perished in the ground. The maize, but for the late seasonable rain, would have been equally unpromising. We are, however, happy to state it is now looking well in all parts of the Colony, and we have assurance of an abundant (maize) crop.

March 19th. Granaries at Sydney being full of wheat, no more can be received until further notice.

April. No rain recorded.

May 29th. No rain except a few passing showers has fallen since last

July. This long drought has deprived many of the settlers of their late crop of maize, but in nowise injured the wheat reaped in November last, or the first crop of maize, owing to the heavy and fertilizing dews that had generally fallen at night.

June 25th. From the general abundant crop of maize, and the present thriving state of the swine, and the other stock, &c. This paragraph goes on to speak of matters not connected with the weather.

- 1803.—October 9th. "Nature seems intent on rendering the approaching season the season of abundance. She deals her favours with unsparing and impartial hand, and promises throughout the Colony to rear the Cornucopia," &c.
- October 16th. "We are sorry to state that the hot winds prevalent on Sunday last were productive of very disagreeable consequences to the crops and fruit trees."
- October 30th. "The growing crops and gardens will, we trust, be much benefited by the seasonable rains during the past week."
- November 13th. "We are concerned to state that the late blights have almost destroyed the crops of wheat which a short time since were so luxuriant in appearance."
- December 11th. Thermometer up to 93° in the shade.

Bennett, page 350.

"On the 21st October, a more beautiful appearance of a successful harvest never flattered the expectations of a farmer. It was within three weeks of being ripe, and the ears were full and plump, and in every respect it was gratifying to look at. In three days it was completely destroyed by rust."

Flinders, vol. ii, page 273.

June. Such was the favourable change in the state of the Colony in one year (see July, 1802,) that the meat and pork one day, and mutton another, was obtained at the average price of tenpence a pound, which before, if it could have been obtained, would have cost nearly double that sum.

Sydney Gazette.

- 1804.—April 8th. The heavy rains during the past week have again furnished a testimony of the inadequacy of the slight mode of building, &c.
- May 7th. Earthquake at Parramatta and the Hawkesbury.
- July 15th. The mildness of the present season excites the surprise of the oldest colonist. The grain was scarcely ever known to be so forward at this time of year.
- September 9th. The drought at Norfolk Island continued without intermission for eight months; seasonable rains had fallen previous to sowing the last crop of maize.
- October 21st, Sunday. We are sorry to state that the late rains and heat have produced a number of grubs and flies which have greatly damaged the grain crops—all the maize had to be re-planted—same date, we learn that the Hawkesbury almost wholly escaped the violent storm of Tuesday last; several gardens near Sydney were totally washed away by the influx of water.
- December 9th. Some of the late crops have suffered from the blight, but in general there exists no great cause of complaint.
- December 16th, Sunday. The rain, hail, and thunder-storm from the north-west, on the 10th, was remarkable for the rapid succession of the peals, &c.; lightning very severe—two men hurt.

Wentworth's New South Wales, page 177.

The harvest of the year 1804 was so abundant, and the surplus grain so extensive, that no sale could be had for more than half the crop. During the greater part of the following year wheat sold at prices scarcely sufficient to cover the expenses of reaping, thrashing, and carrying it to market; and these two years of such extraordinary abundance involved the whole

agricultural body in the greatest distress; for grain their only property, was of little value. The consequence was that it was wasted in the most shocking manner, and had the harvest of the following year proved equally abundant, the majority of the settlers would have abandoned their farms.

Fortunately, however, for the agricultural interests, *the great flood of 1803* intervened to prevent the intended desertion.

The old and new stocks on the banks of the Hawkesbury and Nepean were all swept away.

Page 24.

These inundations often rise to 70 or 80 feet above low-water-mark, and in the instance of what is emphatically termed *the great flood*, attained an elevation of 93 feet.*

Page 25.

Within the last two years there have been no fewer than four floods, one of which was nearly as high as the *great flood*. In the six years preceding, there had not been one. (Published in London in 1819.)

Sydney Gazette.

1805.—January 20th, Sunday. The rains were very heavy on Tuesday last, and general over all the settlements; on Wednesday, some heavy showers fell at Parramatta, but did not reach Sydney; at Parramatta the low grounds were deluged in a short space of time, and part of the mill-dam carried away.

February 3rd, Sunday. The last rains will be found serviceable to the gardens and maize in Sydney and neighbourhood; the shower on Friday night and yesterday morning was heavy and incessant.

February 10th, Sunday. The effects of the late very heavy and incessant rains have left their usual traces among the cottages, few of which have escaped injury, but no damage was done by the lightning; the unabating shower that fell on Wednesday night from dark to several hours after daylight few dwellings could resist; had it continued, many slight buildings must have been washed away. The Hawkesbury, from the rains of the 1st and 2nd February, which continued without intermission until Sunday night, was in flood up to the height of the banks; by Wednesday it had very much subsided; on that night the very heavy rainfall gave indications of a general flood, but happily with the rain these apprehensions also disappeared. Some of the low grounds were flooded on Sunday, February 3rd, and some growing corn destroyed.

March 3rd, Sunday. During the present month some very heavy rains have fallen, which, although not of that consequence to produce a flood at the Hawkesbury, yet have exceeded any weather of the kind since the latter end of the years 1800 and 1801, when the floods were so destructive in that quarter. The intermediate periods have been remarkable for continued dry weather, and sometimes drought.

March 17th. For several days during last week the rains at the Hawkesbury were incessant, insomuch that the last two days the river rose to a considerable height and flooded many of the low lands on the banks of South Creek; a great deal of maize was destroyed.

March 24th. During the late flood (probably on 16th of this month) the water rose to so great a height as totally to obscure the South Creek Bridge.

* This statement is incorrect. See note to August 6th, 1809.

- 1805.—April 21st, Sunday. Late on Wednesday night, a dreadful thunder-storm set in from the westward, which lasted about two hours; very heavy rain fell with vivid lightning, succeeded by deluges of rain ever since (*i.e.* three days).
- April 28th, Sunday. The heavy rains of last week did not produce a flood in the Hawkesbury. In the late flood (16th March), all the low-lying farms were inundated, and the toll-house was submerged.
- September 1st, Sunday. Heavy rain has fallen this morning (probably Saturday), and still continues.
- October 20th, Sunday. The heavy rains that set in early on the morning of 18th October, and continued with intervals of violent gusts of wind from s.e., may, it is feared be injurious to the growing wheat. (Same date.) The long scarcity of vegetables was caused by the little rain for the last three months.
- November 10th, Sunday. The late inundations at the Hawkesbury have not been productive of any serious effects, being chiefly confined to low situations about South Creek, and it is expected that the increase in the crops will make up for the losses by flood.
- November 3rd, Sunday. The lightning on Thursday was extremely vivid and the thunder awful; no damage was done, but several cavities were formed by the lightning in a garden at Farm Cove.
- November 10th. A prodigious rise took place on the 6th November, in the Hawkesbury, without any evident cause, and can only be attributed to heavy rains in the distant mountains. Such was the rapidity of the rise that the river rose 3 feet in one hour; it continued rising for eight consecutive hours, but not so rapidly; by this time it had nearly overflowed the banks. On the morning of the 8th it began to abate, and fell 3 feet in an hour; South Creek farms and other low situations were a second time laid under water. (See June, 1799, and June 1st, 1809.)
- November 17th. In many parts of the Colony the crops have materially suffered from smut and rust.
- November 24th, Sunday. The very violent and terrific thunder-storm of the 18th (Monday night) was preceded by a slight shower of hail, which lasted only a few minutes; the creek bridge was seriously damaged. The very tempestuous weather that set in on Friday evening, (22nd) and lasted till late yesterday (23rd) morning did much damage, several poor families were obliged to forsake their dwellings; immense trees were stripped of their largest boughs, and the head of the old windmill was displaced; the damage done to the gardens in Sydney is almost incredible.
- December 1st. In consequence of the great loss sustained in the wheat crops by the smut, as well as the damage done by the late floods to that growing at South Creek, the Government paid for wheat the same price as last year.
- December 8th. On the 4th instant a tremendous thunder-storm visited Parramatta; it set in about 4 p.m. from eastward (? westward); there was a similar storm at Sydney, at midnight. The late showers have not impeded the gathering of the harvest. On the 1st December, 1805, a turtle, weighing upwards of 600 lbs., was taken by some fishermen at Broken Bay; It was brought to Sydney, and sold for 6d. per lb.* An extraordinary influx of the sea occurred at Norfolk Island on May 8th, 1805. Ford's Almanac says there were floods in South Creek, October 25th and November 6th, 1805.

* See May, 1789.

1806—The crops have not so generally failed as was previously apprehended.

January 19th, Sunday. The thunder-storm of Saturday last was severely felt at and around Parramatta. Several cows and oxen were severely injured, and three calves struck dead by the same flash of lightning. The seasonable rains of the latter end of the week have cooled the atmosphere.

February 22nd, Sunday. The rains on Friday were much wanted to recover maize crop, which began to wear a parched appearance. This is the first rain since 19th of last month.

March 2nd, Sunday. During the last three days there has been a very violent gale from s.e., e., and n.e., accompanied with deluges of rain.

March 9th, Sunday. Although the late rains have been very desirable to revive the languishing crops of maize, yet it is to be regretted that they have fallen in such continued torrents as to have occasioned a considerable rise in the river Hawkesbury, and still greater one in South Creek, which has unfortunately inundated the lower lands and destroyed a great quantity of maize. The rains somewhat abated on Monday 3rd, and Tuesday 4th, and the river and creek gradually fell. We are, however, sorry to add that from the continual rains of the latter part of the week the Hawkesbury River and South Creek about the 7th were again rising fast.

March 16th. The rains of the latter end of last week, violent as they were, had not that evil tendency at the Hawkesbury which we suspected. The rise on Saturday, the 1st instant, was very alarming, and the more so from the deluges of rain that fell the whole day and part of the night. The loss of maize (600 bushels) can be ill spared, owing to the bad wheat harvest and other casualties the grain met with last year from the uncommon weather, floods and vermin.

March 23rd. The rains at the Hawkesbury have had little intermission during the whole of the week.

March 30th. The *great flood* in the Hawkesbury began on Thursday, March 20th, 1806. On the next day it fell a little. On that day, the 21st, and 22nd it rained incessantly, and by daylight on the morning of the 22nd the water was nearly as high as in the flood of March 2nd, 1801, and a scene of horror presented itself in every quarter. Many farms were then under water, and all day, owing to the incessant rain, the water rose rapidly, and was at its maximum on Sunday morning, being 8 or 10 feet higher than any previous flood known to the settlers. On Sunday morning, the 23rd, the rain abated and the water began to fall. The lives of 300 people were saved by great exertions, many of them being taken from the tops of houses, stacks, and rafts of straw floating on the deluge, by means of a few boats that were found in the district. 200 wheat stacks were swept away, and an immense quantity of stock of all descriptions. On Saturday not a house could be seen except those at the Green Hills, Windsor, and one or two of the highest on the other side of the river. Five persons are known to have perished in this flood. The scene of horror which presented itself baffles description. On the morning of the 23rd the weather abated, and the flood waters began to fall, and by the 26th, at noon, the water had fallen 12 feet.

Bennett, page 360.

The month of March, 1806, was remarkable for the occurrence of the heaviest flood that up to that time had visited the Hawkesbury. The rains commenced the last week of February, and continued, with trifling intermissions, for nearly a month. The waters reached their highest point on the 22nd March, and on the 26th had fallen 12 feet. The precise height of this flood cannot now be ascertained owing to the

want of any reliable data, but that it was higher by 8 or 10 feet than the highest that had previously occurred is generally acknowledged. Several lives were lost, and an immense amount of property swept away. One settler, with all his family and servants, was carried down the river for seven miles on the top of a barley mow. They were afterwards rescued.

"The total loss of property was estimated at £35,000. The Government took very prompt and energetic steps to save the unfortunate settlers from starvation. The making, baking, consumption, and price of bread were regulated by the Bench of Magistrates weekly. No flour was allowed to be used in biscuits, cakes, or any pastry whatever, and those who had saved their grain were compelled to part with a portion of it to those who had not been so fortunate."

The consequences of this flood were most serious; the Colony, in fact, was reduced to a state little short of starvation. Bread was scarcely procurable at 4s. 6d. and 5s. the 2 lb. loaf. Wheat rose to 70s. and 80s. a bushel; in one case £7 was paid for a bushel of seed wheat, November 22. *Ford's Almanac.*

"The flood of March, 1806, carried away grain and live stock to the value of £35,000. The waters on the Nepean rose 92 feet above the common level of the river."—*Atkinson's New South Wales, page 10.*

(At Hawkesbury same flood is said to have been 86 feet—was in reality under 50 feet. See notes, August, 1809.)

Gazette.

1806.—April 6th, Sunday. The rains at the beginning of the week were productive of a slight fresh in the river Hawkesbury, which was observable on April 1st.

April 20th. The rains of the 12th and 13th April occasioned a prodigious rise in the river running through Parramatta, and on the afternoon of the 14th it rose above the bridge.

April 27th. "The latest accounts from the Hawkesbury speak most unfavourably of the weather on 21st, 22nd, and 23rd. The banks of South Creek were overflowed, and the Hawkesbury rose rapidly from the continued heavy rain. On the 23rd the rain ceased, and on the 24th the flood considerably decreased."

July 13th. The business of sowing wheat was now completed at the Hawkesbury, and the settlers had leisure to restore their habitations.

August 31st. Although there is a scarcity of provisions, and the effects of the March calamity are most generally and acutely felt, some settlers being on the point of starvation, yet the crops are in an advanced state, and promise to be very luxuriant.

September 14th. The grain fields had a very promising appearance, but some damage was done by the "grass louse," which ate off the outer skin of wheat stalks and killed them.

Same date the rains were beneficial, and would doubtless partially cleanse the wheat.

September 28th. On the 24th of this month the crops on several farms at the Hawkesbury sustained considerable injury from a heavy fall of hail at night. The fall lasted almost an hour—some of the stones 3 inches in circumference. In May, 1798, a similar storm occurred, but the hailstones were twice as large. On the 24th September, in the morning, a shock of earthquake was felt at Richmond Hill; it lasted 28 to 30 seconds; direction from N.E. to S.W.

October 26th. In consequence of the late rains a flood took place at South Creek on the 19th October, 300 acres of wheat and barley under water. A rise of 30 feet took place in the Hawkesbury at the same time.

1806.—November 9th. On the evening of the 7th November a hail-storm came on at Richmond Hill—lasted a few seconds. The day following another hail-storm lasted 20 minutes, and did much damage to fields and garden.

November 16th. No former harvest wore a more promising appearance than this one.

November 23rd. The thunder-storm that came on on the evening of the 22nd November was remarkably violent; three men were knocked down, but not injured (one account says two men were killed in Sydney Cove).

December 30th. Hot n.w. wind on 27th and 28th of this month; thermometer 91° .

("The great flood" of March 20, 1806, is that which Mr. Jevons thinks Wentworth refers to when he says it "attained an elevation of 93 feet, and which Martin, "British Colonies," vol. 4, page 257, says that "in this flood the water rose 97 feet above the ordinary level.")

It is a pity these statements have been published, as they evidently rested upon the mere assertion of settlers in the flooded districts, and not upon measures. (See note to 1809.)

1807.—January 11th. The rains on the 5th and 6th of this month have greatly improved the maize crops. These heavy rains produced a rise in the water in the Hawkesbury on the evening of the 7th, but no damage seems to have been done.

February 1st. The appearance of the maize gives room to hope that we shall have sufficient grain.

February 15th. Vegetables were rather scarce owing to the long drought.

March 8th. There is an abundant maize crop, to which the last seasonable rains have much contributed.

June 7th. The long continuance of the rainy weather at the present season is almost unprecedented, and it is feared will injure the wheat.

(From August, 1807, to May, 1808, the Gazette was not published.)

1808.—July 3rd. A settler at the Field of Mars informs us that on the 1st July, 1808, between 7 and 8 in the morning, a fall of snow took place at the Brush Farm, but that it dissolved as soon as it reached the ground. (That is about 9 miles w.n.w. of Sydney—See June, 1836.)

July 10th. The wheat sowing is in many places finished, and in some places rather too forward.

(The accounts in Ford's Almanac and Jevons' "Climate of Australia" of floods this month on 29th, and also a flood in May, I have after much care found to be mistakes, caused by inserting in Ford's Almanac 1808 for 1809. The weather during the winter of 1808 was so moderate as to call for no remark in the Gazette; indeed it was evidently a dry winter and spring. (See next paragraph.)

September 11th. The growing wheat looks everywhere healthy, and is in some places far advanced. Pasturage on the contrary has been remarkably poor for the last month or six weeks. The late rains, however, will no doubt assist the growth of the spring grass.

October 16th. Fears have been entertained of a flood in the Hawkesbury owing to the late frequent falls of rain, but there has been no rise in the main river. South Creek rose about 10 feet on the 9th; there has been nothing to fear from the showers that have fallen since.

November 6th. On the evening of November 4th, 1808, a dreadful hurricane set in at the Hawkesbury; it lasted twenty minutes, laid the wheat all flat, and did much damage. Some damage was done to houses. The storm was preceded by a violent rumbling in the air like thunder, too distant for the separate peals to be at first distinctly heard. The lightning was very vivid for ten minutes. There was some hail and a deluge of rain for several hours. The storm did not extend many miles. The harvest is expected to yield abundantly.

1808.—November 13th. The heavy rains which set in on the 6th continued almost incessantly till Friday. There was not much rain at the Hawkesbury.

November 20th. The long, and at this season of the year unusual, continuance of the rain, has created great fears for the wheat on the Hawkesbury. On the 13th November, 1808, the river could be seen rising, and during the day rose 20 feet above its usual level; on the 14th, however, it began to fall.

1809.—January 15th. The hop vines looked well until several hot days, in the beginning of December, 1808, altered their appearance, and the continued drought since has still more injured them. Owing to the continued drought the whole of the maize about Kissing Point is totally lost.

January 22nd, Sunday. The rainy weather in the early part of the week was very acceptable, and may save the maize.

February 26th, Sunday. The rains throughout the week have much refreshed the gardens, which had a very languishing appearance.

March 12th. For some years we have not witnessed so heavy a fall of rain as last night and this morning, 11th and 12th March, 1809. It came on about 6 p.m., wind s.e., rained the night and morning with little intermission; wind variable, and almost a hurricane.

April 9th. Notwithstanding the long succession of dry weather, from which little short of a total failure of the maize crop was to be expected, the stubble corn looks well, the early corn was too far gone to be saved.

May 7th, Sunday. Heavy rains last week about Sydney, but little fell at the Hawkesbury.

May 21st. The rains have at last broken up after a duration of many weeks; on the 14th and 15th the Hawkesbury rose 12 feet above ordinary level, but the South Creek overflowed its banks and much maize was flooded.

In Cackle Bay several cottages have been washed down, and the roads have been rendered almost impassable.

May 28th. On the 23rd May, 1809, the Hawkesbury began to rise rapidly and continued to do so till the 25th, when the greatest part of the settlement was inundated, and the water is said to have been as high as in the flood of 1801; began to fall on the 26th or 27th.

June, 1st. Recent accounts say that the flood in the Hawkesbury began to rise on the 25th May, at the rate of 4 feet per hour. About 4 a.m. 27th May, the water was at its highest, and remained so for about three hours, when it began to fall. From Green Hills over the South Creek, as far as Puckwell's Lagoon, near the Red House, was one sheet of water, and all the lower situations down the river were laid entirely under water. At Cornwallis the water rose within a rod of the Ridge's House, and if it had continued to rise an hour longer it would have been equal to the last dreadful inundation, which was the highest ever experienced.

It was remarkable that very little rain had fallen at the Hawkesbury for several weeks previous, so that this calamity may rather be considered a phenomenon than as proceeding from any evident cause. (See March, 1799; also November 10th, 1805.)

The Lieutenant-Governor ordered every assistance to be given by the other settlements so that those who had sown their wheat might be able to re-sow the land, and it was hoped that the consequences would not be serious to the Colony. (At this time they could not of course foresee the fearful flood that destroyed all their labour in August, 1809.)

At the same time as the Hawkesbury flood, May 26th, 1809, the water in George's River was 12 feet higher than in the memorable flood of 1806; at half-past 6 a.m. on the 26th it was at its highest, 34 feet above the usual level.

1809.—August 6th. "The dreadful flood." Little or no rain fell on the Hawkesbury until Saturday evening, 29th July (rain appears to have fallen in Sydney some days before) when a heavy rain set in which continued without intermission till 31st. The river began to rise between 10 and 11 p.m. on the 30th, and continued for some hours to rise gradually, but afterwards with an astonishing rapidity; about noon on August 1st it was at its highest, and in the course of that day abated 5 or 6 feet, but in consequence of the deluge of rain which fell on the evening and night of the 1st August the water again rose several feet; on the 2nd it began again to fall, and by noon of the 3rd August was down 10 feet.

The whole of the Green Hills settlement is (July 31st) one uninterrupted sheet of water, the lower range of houses on the hills is immersed, and the river has formed a junction with South Creek across the hills, through Rickerby's ground on the river side and those of the Rev. Mr. Marsden on the creek. The day and night of the 31st July was a most dreadful season. The danger encroached with a rapidity never before witnessed, and the cries of numerous families in danger were rendered still more agonizing by the impossibility of affording any relief. In one instance eight persons perished.

It is considered that the perpendicular rise of the river could not be much less than 86 feet from the general level, and to have exceeded the March flood of 1806 by 6 or 8 feet perpendicular.

As soon as the melancholy news reached Sydney the Lieutenant-Governor left town for the scene of the calamity, but had to return owing to the impassable state of the roads.

"A flood like this at such a time of year of course totally destroyed all the wheat crops."

George's River again overflowed its banks, and 790 sheep and several houses were washed away.*

* By some mistake the winter floods of 1809 were in Ford's almanac given to 1808, but I find by the newspaper paragraphs above given that they really took place in 1809. The extraordinary height attributed to this flood has often been doubted, as also have the statements of Wentworth and others that floods on the Hawkesbury have been known to rise 80 to 90, and in one case 97 feet above the ordinary river level.

The foregoing extracts fortunately contain a statement which does not seem to have been noticed before, and which affords the means of testing the flood measures in the early days. The writer says the waters of the river formed a junction with those of South Creek across the Green Hills (Windsor), through Rickerby's ground on the one side and Rev. Mr. Marsden's land on the other. Again, "the perpendicular rise of the river could not be much less than 86 feet from the general level."

On a visit to the Hawkesbury district I obtained proof that this flood was at Windsor less than 47½ feet, and at Richmond less than 50½ feet above the ordinary summer level. At Richmond, Mr. Bowman had marked the flood of 1809, and also that of 1864, which was 6 inches below it, and Mr. G. M. Pitt, junr., by levelling, ascertained that the 1864 flood rose 50 feet above ordinary river level.

At Windsor, Mr. Tebbutt measured the 1864 flood 47¼ feet above mean tidal level. In this flood the river and South Creek waters joined over the low part of Windsor at the same place as they did in 1809. Mr. Tebbutt, senior, remembered that in the great flood of 1809 a boat was taken over the street of Windsor at the low place, but there was not water enough to float it and it was dragged over. In 1864, at this spot the water was nearly the same, if anything rather deeper. Mr. Tebbutt further informed me that his father had landed on the Peninsular Hill from a boat in 1809, and that from the position of this landing place he knew the 1864 flood was at least as high as that of 1809.

The paper of the day also states that the 1809 flood exceeded the "great" flood of up to that time was the greatest known, and said to be "from 8 to 10 feet above flood known to the settlers." It is evident, therefore, that the book statements of the Hawkesbury floods must refer to this of 1809, when they give the extraordinary rise of 86 feet. The incorrectness of these statements is therefore manifest, and the error which they have been received is more than justified.—H.C.R., November, 1876.

1809.—August 13th, Sunday. Accounts received officially by the Governor from A. Bell, Esq., Commandant at the Hawkesbury, contain a less disagreeable statement of the consequences of the late flood.

“The Lieutenant-Governor is paying for provisions for distressed families.”

It is stated on good authority that the height of the water at Richmond during the late flood was about 4 feet above that of March, 1806. In the vicinity of the Green Hills (Windsor) and above, it rose 6 feet above the former flood, and down the river from 8 to 10 feet. The differences in height at the various places are accounted for by the different points or headlands which retard the passage of the water.

September 17th, Sunday. The rains of the 11th, 12th, and night of 13th were excessively heavy. On the latter day a shower of hail fell of about ten minutes duration; the stones fell perpendicularly. The racecourse was flooded on Tuesday morning to such a height as to prevent direct passage across, and on Wednesday the water was considerably higher. At Toongabbee the water was 8 feet above the bridge. A man named Grainer nearly lost his life in attempting to go from Parramatta to Sydney; he was obliged to turn back, and had to swim some distance.

September 24th. The heavy rains of the 11th, 12th, and 13th did considerable injury to the settlers on South Creek, all the lower grounds on the banks of which were once more flooded, as was also the whole of Mr. Thompson's wheat plantation, extending from the creek bridge to the red house.

Between 5 and 6 p.m. of the 23rd a heavy squall which lasted 20 minutes set in from the northward.

November 5th, Sunday. Samples of new wheat may be expected in about three weeks, and the crops are far superior to any expectations that could have been formed after the repeated inundations which at an advanced season menaced the Hawkesbury.

November 19th, Sunday. During the thunder-storm which took place in the forenoon of the 13th a very large mulberry tree in the garden of Thomas Alford, at Farm Cove, was struck by lightning and rent from top to bottom.

November 26th, Sunday. The thunder-storm which visited us on Monday evening last was very severe. The lightning was excessively vivid, and from 7 to 8 p.m. may justly be said to have kept the atmosphere in one continued blaze, while scarcely a moment's interval could be heard between the heavy peals of thunder. At one instant the new military barrack was struck in many places; in the east front two fissures were made in the roof; and on the west side, extending nearly from the saddle-board to the eaves, a number of muskets were scattered from the gun rack, and one soldier was for some minutes deprived of recollection, sight, and hearing.

1810.—January 7th, Sunday. A very heavy thunder-storm set in yesterday between 4 and 5 p.m.; the effects of the lightning were sensibly felt by many. The Gazette office was struck in several different places, and those who saw the lightning said it was like a ball bounding to and fro with great velocity.

February 11th. The town gangs are engaged cleaning out the tanks. The long-prevailing drought has been severely felt.

May 26th, Sunday. The heavy rains that have taken place during the week have excited fears of floods in the Hawkesbury, but there have been no dangerous signs.

Bennett, page 489.

There were very heavy rains in July, 1810.

Gazette.

1810.—July 14th, Saturday. At South Creek there was a flood. The water rose 12 feet over the bridge on the 6th instant, previous to which it had rained several days without intermission. The water in the Hawkesbury rose very rapidly, but fortunately the rain ceased and it only overflowed the first bank of South Creek.

September 5th, Saturday. The rains that have fallen during the week were much wanted, and will be equally beneficial to field and garden; the former, on account of the growing wheat, must have suffered severely if the drought had been much longer, and the latter from the spur vegetation will receive, the long want of which had made every vegetable scarce.

September 29th, Saturday. Much damage has been done within the last few days to fields and gardens at Hawkesbury by a small caterpillar which made its appearance ten or twelve days since. Whole acres of wheat and barley have been devoured. It is thought the late heavy rains have caused them.

October 6th, Saturday. A hail-storm took place on 28th September, in which the gardens suffered severely.

November 24th. New wheat in the market, sold at 34s. a bushel; but this price cannot continue, as the harvest will soon be general and promises to be the most abundant of any for several years past. (Seven days later wheat had fallen to 18s. a bushel.)

1811.—March 2nd. The long prevailing drought has destroyed every hope of a maize crop. In Sydney the tanks have been for several weeks empty, and water is sold at from 4d. to 6d. the pailful.

March 30th, Saturday. The rains at the latter end of last month had nearly been attended with most distressing consequences to the Colony.

On Saturday, 23rd ultimo, the water was much discoloured at the Hawkesbury, and began to rise, which it continued to do the whole of the following day, when it was supposed to have attained the height of the flood at the beginning of 1801. At noon on 25th it was at its height. The low grounds have been laid waste, and as the long preceding drought had left no prospect for the high lands all hopes of a maize crop are gone. Much damage was done to wheat stacks and other property.

(The extracts, March 2nd and 30th, 1811, are very contradictory, and as Saturday fell on 23rd Feb., and 23rd March, the day (Saturday) will not decide the question. I think it is probable the rain fell on the 23 March.)

August 2nd, Friday. A whale came into Sydney Harbour, and was killed at Rose Bay.

October 11th. The long succession of dry weather at the present season has heretofore been unexampled, and the field and garden languish for want of rain. The last refreshing shower was upon 27th August; it was very general throughout the various settlements, and lasted twenty-four hours, since which period we have scarcely had one passing shower. From the best information we can get, so intense a drought at this time of year has not been witnessed since the year 1789, when the new colonists suffered a parching thirst for several months, the springs from which they had before been supplied either failing entirely, or yielding scarcely sufficient to support nature. Numbers of flying-foxes, squirrels, and birds of various kinds, flocked from the interior to the coast, and perished as they flew. A visitation of such a calamity now that stock is so numerous would be dreadful.

November 23rd. The seasonable rains during the last week have been and acceptable.

14th. The harvest is now being gathered, the weather has been very favourable, and the harvest promises to turn out one of the best had for several years. The growing maize crop looks well.

Flanagan, Hist. N.S.W., vol. i, page 198.

1811.—There was a flood in the Hawkesbury in the month of March, 1811, which destroyed the maize crops. The middle of the year 1811 was marked by a drought longer and more general than any which had occurred at the same season since 1789.

Gazette.

- 1812.—January 25th, Saturday. On the 17th January, during the violence of the weather experienced at and about Sydney, a hail-storm set in at Mr. Morris's farm, about 10 miles distant, which lasted twenty minutes, and it is positively affirmed that the hail-stones were mostly of unaccountable size, and that one, which did not appear to be the largest that fell, measured 8 inches in circumference, after being handled five or six minutes.
- February 22nd, Saturday. The frequent showers of the last few days apprise us of the approach of March, and it may not therefore be unreasonable to hope that the produce of the late wheat harvest is for the most part, if not entirely beyond the probable reach of flood; against the ravages of which we ought, at least to the best of our ability to guard.
- March 14th, Saturday. The almost incessant rains lately experienced have been productive of much less injury to the crops than general expectation might have calculated on. On Monday, a rise in the Hawkesbury River was evident, but by no means rapid. In the course of Tuesday it attained its greatest height, which laid many low grounds and cultivated hollows under water. The banks of the South Creek were considerably overflowed.
- March 28th, Saturday. With the late rains which set in about the 22nd of last month innumerable swarms of caterpillars have made their appearance, the roads in many places have been nearly covered with them; their depredations have been confined to grasses; they are generally about an inch long, colour black or dark brown, and yellow streaks on the belly.
- August 8th, Saturday. The continuing rains are very uncommon at this season of the year, which has generally been remarkable for the few showers that have visited us. This ought to be a busy season in the field and gardens, as it is the fit season for sowing potatoes, clover, and maize, &c., &c., &c.
- September 12th, Saturday. On Monday last a severe hailstorm was experienced in the vicinity of George's River, which lasted twenty minutes. Some of the hail-stones were of prodigious size, and killed a number of fowls and damaged gardens.
- October 20th, Saturday. The crops throughout the country have a healthy and promising appearance, and much of the early sown wheat is now in ear; that later sown would be considerably benefited by a few refreshing showers, which would be no less serviceable to the ground under preparation for maize planting, and as acceptable to the garden.
- November 7th, Saturday. At 2 o'clock this day (probably 6th) a violent storm of hail and rain set in from the eastward, and lasted more than half an hour. Some of the stones were as large as musket-balls. No great damage was done, but ice lay 6 inches thick on the ground after it. One person had 110 fowls killed, and in another place 90 acres of wheat were destroyed.
- November 21st, Saturday. The effects of the hail-storm last Saturday night (14th) were severely felt at George's River; 100 acres of wheat which looked very promising were totally destroyed, and a quantity of small stock killed. The stones were very large, and an immense quantity fell; in some places it was 6 inches thick on the ground, and did not melt for several days.

1812.—November 28th, Saturday. At Sydney the heavy rains set in on Wednesday night, and continued with little intermission till Friday morning. At Windsor the lower banks of South Creek were flooded, the water being several feet above the creek bridge. At Parramatta the river had a considerable rise, and the same at Toongabbee, but no serious damage was done. At George's River, serious losses have been sustained: the water is stated to have risen 10 feet perpendicularly, and much land was flooded. At Duck River the water was several feet above the bridge on Thursday.

Flanagan, page 199.

Towards the close of 1812 heavy rains counterbalanced the drought of the previous year.

Gazette.

1813.—March 20th, Saturday. A hail-storm set in at the Hawkesbury on Wednesday, 10th instant, between 3 and 4 in the afternoon, which in extent and damage has never been equalled in this Colony. Many crops of stubble corn, from Richmond down to Bardo-Narrang, have been injured, and in some cases the strongest stalks have been cut through.

May. Wentworth and party thought the drought had affected the western sides of the mountains, "from the dead and brown appearance of the grass on the western plains."

July 31st, Saturday. The weather has been much colder during the last week than at any other period of the present winter. Ice nearly half an inch thick has been seen nearly every morning in open situations, and hoar frosts have been discernible for some hours after sunrise.

August 21st, Saturday. The want of rain has been long felt throughout the Colony, as particularly hurtful to the pasture land, notwithstanding which the wheat fields derive from the heavy dews a lively verdure, which may be the omen of a luxuriant harvest.

October 23rd, Saturday. The heavy rains at the beginning of the week have revived the hopes of the settlers, and the expectation of a fair harvest happily supersedes the dread of an almost total disappointment in the crops.

Bennett, page 393.

The prevalence of a drought during the years 1812 and 1813 compelled the settlers to seek new pastures for their flocks and herds, and in May, 1813 Messrs. Wentworth, Blaxland, and Lawson, made a successful attempt to cross the Dividing Range.

(See *Osley*, extract given in 1817.)

From Martin's "British Colonies," vol. iv, p. 255, Cunningham's "Hints to Australian Emigrants," p. 70, and other works, it is evident a rather severe drought affected the Colony in 1812 and 1813, but the *Gazette* has little to say about it; and I find generally, that when the weather is moderate the *Gazette* has no notices of it.

Gazette.

1814. March 12th, Saturday. The hail-storm which visited the town of Sydney on Thursday last was one of the severest ever felt in the Colony, though of shorter duration than many former. It set in from the southward about 2 o'clock, and in less than five minutes shifted to nearly south-west, completely covering all Sydney. Some of the hailstones, which fell with incredible velocity, measured nearly 3 inches in length, and as must be expected did considerable damage to the gardens besides destroying almost every window that faced the south. It succeeded by a light rain, which lasted about an hour, with of distant thunder.

1814.—April 2nd, Saturday. Several settlers on the banks of the Hawkesbury complain of considerable damage to the growing maize crop from the grub-caterpillars, which have appeared in considerable numbers. They attack the stem that unites the young cob with the stalk, and by weakening it occasion the cob to fall off before the grain is completely formed. This insect, which seems to visit us more or less every year, is generally first discovered after rainy weather. The damage they occasion is generally perfected in a few weeks, for as soon as the weather undergoes a change to fair again they disappear.

April 9th, Saturday. On Monday morning last a heavy thunder-storm was experienced at Hawkesbury, which lasted several hours, without any disagreeable effects from the lightning, which was excessively vivid.

April 16th, Saturday. Since the first setting in of the late rains, the face of the country has undergone a change of appearance the most captivating, from one peculiarly contrasted. The fields, like a bird new moulted, attract the eye with their ornamental beauties, giving the herdsman, the shepherd, and the farmer, the sublimer task of appreciating blessings which Providence alone can bestow. We have heard of late very few complaints of the visitation of the grub-caterpillar, and hence conceive its visit for this season terminated.

October 1st, Saturday. The long subsisting droughts of the present season are very severely felt throughout the country. The wheat fields are in a universal state of languor, while the grazing stock are hourly falling off from the poverty of the pastures. The grub-caterpillar is very much complained of; in many fields of wheat it appears in prodigious numbers, but we trust it will vanish with the first heavy showers.

October 15th, Saturday. During the week we have been favoured by Providence with showers of rain in various parts of the country, which, though mostly light and of short duration, were nevertheless gratefully acceptable; and it may yet be hoped that the late sown wheat will yet be rescued from the poverty of appearance which the long succession of dry weather has occasioned.

November 5th, Saturday. The rains, which have had a continuance with little intermission for the last fortnight, have been very general throughout the settlements, and already produce a pleasing change in the appearance of fields and meadows.

1815.—January 14th, Saturday. Much damage was sustained by the settlers of Bunbury Curran from a heavy hail-storm which visited them on Christmas eve. Most of the ripe standing wheat was beaten out of ear, and much poultry killed.

August 5th, Saturday. The late rains, which have extended throughout the various settlements, have already changed the appearance of the fields, and revived the hopes of a good harvest.

September 9th, Saturday. A fall of snow, unknown in this part of the island in which we are settled, was experienced nearly a month back at the newly employed passes of the mountains, which was so very deep as to prevent persons stationed there from travelling.

October 1st, Saturday. Yesterday night a heavy storm set in at dusk, at and about Appin, and continued with unexampled violence about half an hour, when it abated and turned to a settled rain. This tempest is described as the most tremendous ever witnessed; it blew a complete hurricane, accompanied with vivid lightning, which darted across the sky in a succession almost void of interval, while the thunder, in swift succeeding peals, came with a tremendous crash. Some hail fell with the heaviest rain.

1815.—November 25th, Saturday. The rains during the week have, we are happy to learn, extended to the banks of the Hawkesbury, as well as to other settlements of the Colony; which may yet be hoped to give a spur to the backward wheat, and considerably alter the production of the crops. The thunder-storm that terminated the rain yesterday was attended with several very heavy peals. A tremulous motion was communicated to the largest buildings, and the lightning that preceded each concussion was piercingly vivid.

December 23rd, Saturday. The late rains have been very acceptable to the backward wheat, the growing maize crop, and in preparing the garden for a fit state of tillage.

Oxley's "Journal of two Expeditions," page 366.

The Campbell River, judging from the height of its banks and general width, must be at times of considerable magnitude, but the extraordinary drought which has apparently prevailed on the western mountains equally as throughout the Colony for the last three years, has reduced this river to a chain of ponds. (Written in Sydney, 10th June, 1815, in an account of the Governor's visit to Bathurst. He was at Campbell's River on the 6th or 7th of May, 1815.)

Gazette.

1816.—February 24th, Saturday. The heavy rains we have lately experienced are by no means unusual to the season, though they have set in some weeks earlier than usual. The Hawkesbury River has several times shown a fresh during their continuance, but has never risen to any alarming height. Their much further duration would be alarming, as most of the hollow grounds are filled, and all excess must naturally tend to inundate the country. The growing maize is for the most part strong enough to bear the wet without being much injured, and will, therefore, prove a happy relief to the scarcity of wheat, which is more than probable we should otherwise have felt.

June 8th, Saturday. On Thursday, the 30th of May a violent rain set in at the Hawkesbury, and continued without intermission the whole of that and the following day and night. On Saturday the rise in the river became everywhere alarming; the lower banks were inundated on Saturday morning, and at noon the water in the river appeared for some time very nearly stagnant, owing to the branching out of the efflux into innumerable channels contiguous to its sources. On Sunday morning the scene was extremely dreary; the settlers, with their families, had from necessity abandoned such of their houses and farms as were likely to be inundated, and a watery waste presented itself on every side. On Sunday night the water was at its greatest height, which, being only 2 feet less than the August flood of 1809 (which was 86 feet beyond the level of the river). About 6 on Sunday evening the ebb became evident at Richmond, and by 10 the water had declined several inches. Of all the floods that ever happened in the Colony less damage on the present occasion was experienced. (See August 6th, 1809.)

June 29th, Saturday. A second flood was occasioned in the Hawkesbury by the succession of rains during the last fortnight. On Thursday night the rise in the main river became rapidly perceptible, and in the course of the day all land travelling was put a stop to, the water having attained a height nearly equal to that of the recent previous occasion.

October 19th, Saturday. Last night's rain if general will much benefit the fields and gardens, and considerably restore the verdure of the pasture lands, which are in a languishing state, owing to the late succession of dry weather.

1816.—November 9th, Saturday. The late heavy rains are not likely to be attended with any bad effects, unless the possible inundation of the banks of South Creek, but at the same time it is a gratifying reflection that these casualties are not likely to affect the general prospects of a fair harvest.

1817.—January 18th, Saturday. The heavy thunder-storm experienced on the evening and night of the 7th instant very fortunately passed over this part of the country without doing injury, but at Windsor and the Nepean considerable damage was done.

January 25th, Saturday. The late incessant rains that have fallen have done considerable injury to such of the wheat as has not yet been brought in and stacked, and the roads and bridges have also suffered severely. The bridge at Long Cove was carried away by the force of an irresistible torrent, and it is apprehended that similar disasters have occurred in other parts of the country, for certain it is that the rains of the last two days have been as heavy and unremitting as any that have been experienced for many years.

February 15th, Saturday. The thunder-storm that was experienced in Sydney and its vicinity on Sunday last did no other damage than that of striking Ultimo House (the seat of John Harris, Esq.), the lightning, which was particularly vivid, severing the wall from top to bottom, and forced its way through a parlour window; no other damage or accident being done from the violent duration of either of the storms.

March 8th, Saturday. The inundation of the Hawkesbury, which attained its greatest height on Wednesday the 26th ultimo, is to be accounted one of the most serious disasters (the flood of March, 1806, excepted) that has ever befallen the Colony. On Tuesday about 9 the rise in the river became generally observable; it rose several feet in the space of an hour, and on Wednesday the inundation was at its extreme height at Windsor (within 10 or 12 inches of the August flood of 1809), and in some places higher than on any former occasion, but in some places lower. The quantity of cattle and stock lost is prodigious, whole acres of land entirely annihilated, and one or two men's lives lost.

May 3rd, Saturday. We are happy to learn from a person who came in from Bathurst about three weeks since that the wheat grown there, and at present contained in several stacks, is of excellent quality. There had been but little rain, and the mornings were in general cold, attended with light frosts and thin ice, which remained till dissipated by the sun.

August 9th, Saturday. The brig "Jupiter" left the Heads on Thursday morning last for Hobart Town, but returned to port last evening, owing to damage by lightning during the heavy thunder-storm on Thursday evening, by which a man named Mullins was killed, and several others much scorched. The lightning struck the vessel twice within ten minutes. It was about half-past 5, the evening was dark, the thunder awful, the lightning excessively vivid and accompanied with torrents of rain. When the first stroke was received, by which her top-gallant mast was shivered and set on fire, nothing was visible but the sparks it threw out, and had it not been for the heavy rain it is impossible to calculate on the extent of the danger.

December 13th, Saturday. With infinite satisfaction we congratulate the public on the abundant and luxuriant harvest with which, under Providence, we are likely to be favoured. Reaping has become general, and so vast will be the redundancy that we feel pleasure in stating that it will be some time, should it ever occur again, before we shall be under the necessity of resorting to distant markets for supplies.

1817.—(In Oxley's expedition down the Lachlan he came, on the 12th May, 1817, to a place where the river seemed to lose itself in apparently endless marshes, and the party could not go further in that direction. They then took another direction, and found the prospect very disheartening, and recent flood marks in all directions.)

Bennett, pages 458 and 461.

In every attempt to follow the river westward they were met by swamps caused by the overflow of the river, and were at last stopped near the junction of the Lachlan and Murrumbidgee, in about lat. 34° S. long. 146° E. (near Booligal). Oxley says, "The flood was like an inland sea, and they could only see the tops of the river timbers. In every direction they found swamps and marshes, formed by the overflow of the river during recent and very heavy floods."

Page 642.

There had been very heavy rains in Sydney just before Oxley started. (Started in April.)

Hume's "Overland Journey," page 36.

The Bong Bong River was flooded in the year 1817. Month not given, probably in February.

1817-18.—Oxley's journal of two expeditions.

Page 7, Introduction.

The year 1818 proving extremely dry the grass was very nearly all destroyed, the water failed, and cattle died in great numbers.

Page 148.

It may be remembered that for nearly two years, viz., 1814-15, scarcely a drop of rain fell on the east coast of New South Wales, and when the country of Bathurst was first visited it bore marks of being similarly affected by drought.

The last summer was a very wet one on the east coast, and at the depot on the Lachlan during that period when the rains were heaviest (in February, 1817) the people enjoyed the finest weather; at the same time the river was constantly flooded, often rising to a great height in the most sudden manner. Since the present expedition set out on the 6th April, 1817, it has generally enjoyed clear weather. (When starting they were delayed at Bathurst from 14th to 19th April by rainy, unfavourable weather.)

Sir W. Macarthur.

There were floods in the Nepean in 1817, but they were not so high as those of 1860-61.

Gazette.

1818.—January 10th. Oats are most materially injured by a kind of grub which peculiarly attacks them, called the oat grub. This pernicious insect comes into existence, if the autumn has been warm, towards the end of October, and progressively increases in size till the beginning of winter, without being injured by the most intense cold. Towards the end of February the grub recommences its devastations, and gradually becomes larger till early in May, when it is more than an inch long and one-third of an inch in circumference. In the summer the oat grub undergoes similar transformation with the caterpillar. These destructive insects appear every year, but chiefly in wet seasons. They are more or less numerous according to the heat or cold of the former season. Were it not, indeed, for the vernal showers which fall at the period of May or early June such devastations would be irreparable.

Rain began at Camden on the last day of February, 1818, and rained for several days.—*Sir William Macarthur.*

1818.—March 7th, Saturday. The rains, we are sorry to say, have had their usual operation on the banks of the South Creek, some of which are so very low as to render their cultivation a matter of surprise. It is the maize that this particular line of ground mostly suffers in; and as the rains at the end of February and during March may be calculated on with almost equal precision to the hurricane or monsoon months, a day or so of hard rain is almost certain of destroying the farmer's land and hopes.

March 28th, Saturday. Last Wednesday night a hail-storm set in at the Hawkesbury, which did some damage to several corn fields and broke many windows. Last Monday night there was another hail-storm at Hawkesbury, which also did a great deal of injury to the corn fields. Some of the hail-stones measured 7 inches in length, their thickness being irregular, and in the largest part about an inch and a quarter round.

In May, the *Gazette* speaks of a long succession of dry weather in Van Diemen's Land, Port Dalrymple, and Cunningham calls it the lesser drought of 1818. (Jevons, p. 64.)

July 18th. Oxley says there was a flood in the Castlereagh River at this time, the water rose 8 feet.

August 29th, Saturday. The gale of wind which set in from the east and north-east on Wednesday night last was certainly one of the most violent etchings of a hurricane that this Colony ever experienced, and yet no harm was done that we have as yet heard of.

September 5th, Saturday. The heavy rains of the week have been very general, and the roads have been greatly impaired, but we have not heard of any of the bridges which cross the chasms on the turnpike roads being carried away or any other serious injury.

October 24th, Saturday. About fifteen or twenty gardens towards the south end of Castlereagh-street, Sydney, exhibit at the present time an extraordinary instance of the ravage by the naked snail. These gardens were attacked some two years ago and soon laid waste, and they have at last been given up after many fruitless efforts to destroy the snails.

November 7th, Saturday. A very severe tempest visited Portland Head (River Hawkesbury) on the night of the 5th instant; it set in about 3 in the afternoon and laid down a great deal of the wheat, much of which was lost. The squall which visited Sydney on the same evening was not of great extent, but at Botany it is said to have raged frightfully; the thunder was awful, but we do not hear of any accident from the lightning.

In May, 1818, in tracing the Macquarie River, "No traces of floods could be discovered by Mr. Oxley and party (Bennett, page 461), but following down the river to about lat. 31° and longitude 148° the river lost itself in apparently interminable marshes and swamps so extensive that Mr. Oxley thought he was on the margin of an inland sea."

Turning to the eastward they came, on the "27th July, to a considerable stream, the Castlereagh, more than 500 feet wide, and apparently in flood from the heavy rains now falling."

1819.—January 16th, Saturday. It must have been remarked by persons inhabiting situations that are washed by the tides, that the spring tides, which were highest last Wednesday night and the two succeeding days, rose higher by 4 or 5 inches than had been experienced for seven or eight years previous. It must be at the same time remarked, as a speculative method of accounting for this phenomenon, that the

height of the barometer exceeded, during the fortnight of which the days mentioned form a part, the average for the same period in any of the years above mentioned, and consequently that the melting of the ices at the South Pole was much greater than in any of those years. It is curiously coincident to add that, upon naming the foregoing observation to a nautical gentleman, he assured us that during the last summer much greater bodies of ice had been floated from the northern regions than ever before remembered.

1819.—February 20th, Saturday. The late incessant rains have been productive of considerable loss at the Hawkesbury. On the 8th February a rise of the river began, and during the four following days buried a considerable tract of the low ground in its inundation; a good deal of the growing maize crop has been spoiled from the long continuance of the inundation which was experienced on the lower grounds, more particularly up the river. At Freemason's reach and at Wilberforce a great deal of maize and a quantity of stock was lost, as well as two human lives.

February. (There appears to have been two floods this month) for the *Gazette*, of 20th mentions "Again on the 18th the waters at the Hawkesbury are nearly up to the level of the dismal flood of 1806." Saturday, February 27th. The rise of water during the course of the weather was as high on Thursday the 18th as to compel travellers on horseback to swim their horses across the hollow betwixt Howe's Bridge at Windsor and the Red House; the water was then still rising, and came in some places nearly as high as the dismal flood of March, 1806, when the Colony was in a very unprepared state for the disaster, but plans, from experience of the past, have been judiciously devised for the protection of the present time, or, with an increase of population, the flood of 1806 must have been little short of an almost universal famine.

In the *Herald* of June, 1864, it is reported that an old resident of Windsor (Mr. Dorset) said of the flood of June 13, 1864, "There has not been so high a flood since 1819."

March 13th, Saturday.—We have authority to publish the following extract of a letter from Mr. Rowland Hassell, addressed to His Excellency the Governor, under date 9th instant, on the subject of the late calamitous flooding of the country near the Cowpasture, by the overflowing of the Nepean:—"On Friday, the 5th instant, the flood was considerably higher than it has been through the last month (evident there had been several floods, but the heights are not given). The rain had, for the previous fortnight, from February 26th to March 19th, been incessant; the earth was saturated to its lowest imbibing depth, and rejecting the superabundancy of waters those fluviated, and went into a variety of currents and streams until they perhaps reunited with the very basins from which they had been exhaled. The thermometer was on Tuesday (8th) and Wednesday up to 80 degrees, and some time before noon the heat experienced in walking was greater than is usually felt when the thermometer is up to that height. The sun was scarcely, if at all resplendent throughout either of those days, and yet the heat was as intense as if its luminous orb had not been at all obscured by luminous vapours. These floods are said to have been more destructive than any since 1812.

April 3rd, Saturday. From the letter of Dr. Throsby, an extensive farmer, we take the following interesting information on the subject of the grub which now desolates the fields:—"We have been attacked by the caterpillar, which I fear will cause more real and general injury to the Colony than the most severe flood it has ever been visited with;

every inch between this and the Cowpasture River is covered with them, and they are devouring every blade of grass, and the young wheat, wherever it has made its appearance above ground; I have some acres that had been up about a week, every inch of which is destroyed. I find they have left the clover field untouched, but pick out of it every blade of native grass. They will most likely perish under the warmth of the present month, but our pasture is to a vast extent destroyed." I recollect a much more partial attack by the same pest about five years since, the season immediately preceding the fatal dry year by which the stock suffered so much.

1819.—April 17th. The floods, the rains occasioning which together with the intervals of heat necessary to the hatching of the beetles' eggs, have been more generally destructive to our field and forest grasses than they were in 1812, which was also a direful season. "As February finished with rains so March began, and during these rains the caterpillars were first seen in great numbers, and what was no less unaccountable they appeared to have attained their full growth at once. (See Sir W. Macarthur's note this year.) Of their origin no conjecture could be formed. The writer says, the grazing ground was entirely covered all about me, and in the space of a yard square of grass, four or five inches high, as many insects were collected as filled a three-pint measure; all the vegetables except the asparagus escaped. Horses and cattle grazed in the fields that were swarmed, and they must have devoured prodigious numbers with the grass. The caterpillars appeared to shun the wild fern.

On the 5th April I went out for a walk, and as I entered the beaten track the ground appeared to be in motion—the caterpillars were all moving in one direction; they were in single file, joined head and tail together in one connected line, composed of many hundreds; they were travelling directly east, and pursued their course surmounting every impediment, and if the line was broken they immediately joined again, taking care to join each their own line. Put into fresh water they died in half a minute. These pests seldom remain more than a month, and in that time they do more damage than the highest flood.

June 12th, Saturday. From the late heavy rains an extensive flood has taken place at the Hawkesbury, and while the loss is much to be regretted, yet in this climate it is not too late to sow again.

Mr. Eckford says, between 1818 and the great flood of 1820 there were two floods on the Hunter (probably one was at the same time as the Hawkesbury floods.)

Mr. G. M. Pitt remembers three floods in the Hawkesbury this year, the last in August.

Sir W. Macarthur says, "that in the early part of 1819 there had been extensive bush fires, and when the rain fell a splendid crop of grass came, especially where it had been well burnt. In April, about the second week, the blacks pointed out small specks in the grass, which on examination proved to be countless numbers of minute caterpillars. In fourteen days they were fully developed, and destroyed all the native grasses except rib-grass. The destruction of grasses was complete, especially where the fire had preceded them, and the pastures did not recover for years their former luxuriance, if indeed they ever did, as many new and less valuable grasses made their appearance instead of the oat grass. These caterpillars were of the ribbon species, and appear more or less every year, but seemed to be at a sort of maximum state every seven years, at least such was the general opinion.

February and March were both wet. The rain began with a southerly wind. There were three floods in the Cowpastures during the two months, and a great fresh in June, but no rain of any consequence fell after that to the end of the year, the drought however was not severe. Sir John Jamieson says, in *Sydney Magazine*, January, 1834, page 59:— On 19th November, 1818, it began to rain fast when we were going up the river Warragamba, and at night all were thoroughly wet from the determined rainy state of the weather.

Gazette.

1820.—February 5th, Saturday. The long succession of dry weather, with scarcely a salutary shower, may prove as unfriendly to the maize as to the vegetables. The tanks are for the most part dry, and but for the wells by which Sydney is supplied the scarcity of water would be much felt. Intense heat on February 12th and 15th.

May 6th, Saturday. The rains of the week will, it is to be hoped, be found beneficial to the farmer in slackening the ground for the reception either of the culter or the hoe; and as the weather is more than usually cold for the time of the year, the grubs that remain may perhaps be destroyed by the joint causes of wet and cold.

June 24th, Saturday. The rains of the week have been heavy, and for several days and nights incessant; we do not however hear of any damage to the banks of the South Creek, which would have been severely felt had the maize been still upon the ground. We understand that the Hawkesbury has risen above its banks in low parts, and much of the late sown wheat will undoubtedly be lost; but if seed can be procured it will not now be too late to sow afresh. We have before experienced a heavy June flood, and a great portion of the inundated grain was not resown until an advanced period in July, and wonderful to remember we had a fine crop.

July 8th, Saturday. The rains and tempestuous storms of the week, which, during Wednesday and Thursday, raged day and night with unabating fury, could only be compared with a hurricane accompanied with a deluge, and has done fresh injury to the crops, either by inundating such parts as were accessible to the rise of water up the banks of the Hawkesbury, and by beating a quantity of newly-sown seed out of the ground, and thereby depriving it of its covering.

August 19th. Scarcely a family in Sydney has escaped the very severe coughs and colds which have been so violent during the past fortnight; they have attacked old and young, going right through households. During the prevalence of this influenza we have observed that westerly winds, inclining to southerly, have been prevalent. The disease has all the appearance of a specific contagion.

October 28th. The present dry season of the year seems indicative of an approaching drought.

November 11th, Saturday. We learn with great gratitude to Divine Providence, that the late refreshing rains have been experienced generally throughout the Colony. It is extremely gratifying to declare that the harvest, which was exhibiting a most dreary and forbidding aspect from the drought, promises now to be both luxuriant and abundant; the parched and burnt up fields are clothed with beautiful verdure, and the garden and orchard contribute to bear convincing marks of the beneficence and mercy of our Heavenly Parent.

1820.—December, 9th, Saturday. The heaviest rains that we have experienced for a length of time set in at 6 o'clock on the morning of the 4th, and continued without intermission for many hours; the strength of the wind varied between the south and south-east, after driving the shower in a horizontal direction. The streets were in some parts rendered almost impassable, immense quantities of stone were washed down the rocks, the river at Parramatta overflowed its banks at an early part of the rains, and travelling on the roads was during the whole of the 5th put a stop to; it continued with less violence on the 6th and 7th, with now and then an occasional interval. The most of the low lands in the country have been inundated, and in some parts, particularly at South Creek, the water has been reported higher than before known for many years past, whereby considerable damage has been done.

December 11th. Thunder-storm. Mr. Oxley's house at Kirkham, the lightning is described as like a pillar of fire, one man killed.

Rain began at the Cowpastures in the end of March, 1820, and poured for several days, making the country very wet.

There were two floods, one in June the other in July, there were two floods also in the end of November at the Cowpastures (Sir William Macarthur).

Ford's Almanac. "In November, 1820, there was a tremendous thunder-storm at Parramatta. The lightning struck Government House, and made it almost a wreck, passing from top to bottom. The Governor was fortunately absent, as the walls of his office were perforated, and his chair struck. Mrs. Macquarie escaped injury, though in the house. Almost every pane of glass in the house was broken."

Mr. Eckford states that the flood which happened in 1820 (month unknown) was the highest he had ever known in the Hunter district. He estimates the rise of the water at Maitland at 37 feet; with the exception of two small patches, all the level parts of the present town of East Maitland were flooded, and the present site of West Maitland, then densely wooded bush, with only two or three huts, was chiefly under water.

1821.—July 21st, Saturday. The rains that have fallen within this day or two prove highly acceptable to the garden and field. The change of weather has also been productive of infinite benefit in the health of the citizens, great numbers of whom have lately been afflicted with severe colds, but which with the chilling blasts lately experienced from the west and south-west appear to abate.

September 22nd, Saturday. To calculate with unerring precision on the seasons of this country appears next to impossibility—the changes are truly astonishing. The month of September, to our knowledge, has for the last eighteen or twenty years been regarded as salubrious and temperate, and considered charming in the extreme, but there is now existing proof that abundantly demonstrates its fallibility. We have lately experienced but transient intervals of fine weather, the whole month having been showery, and altogether unpleasant, occasionally the rain has descended in torrents. The South Creek has been flooded, and no inconsiderable loss is expected in consequence. The river Hawkesbury rose, we are informed, to within 8 or 10 feet of its banks, and reached the greatest heights on Monday last, when happily it began to fall.

October 13th, Saturday. In the heavy thunder-storm which visited Sydney on the 11th instant four cows were struck dead by one flash of lightning.

Sir William Macarthur says that there was not much rain this year, but what there was was so well distributed that the year was a very good one. In June there was a slight flood at the Cowpastures, and after some hot weather there were frosts on the 1st and 2nd of November. This year with rain at moderate intervals did much to restore the pastures which had been so seriously injured by caterpillars in 1819. The end of the year was rather dry.

1822.—January 4th, Friday. On the 2nd instant a severe southerly squall with thunder and awfully vivid lightning broke over Sydney. In same paper is notice of the discovery of a new road to Lake Bathurst, along the side of the Wollondilly River, by Mr. Hall.

February 8th. The other day a professional gentleman was induced to dig for some moist soil to preserve a few choice plants, and he found the ground at 20 feet down as much heated as it was within a few inches of the surface. (Same date.) The present month of February makes the fourth of continued drought this season. The maize is in a terrible condition, only plenty of rain can save it. But we must not too readily give way to despondency after having been blessed with such a luxuriant harvest.

February 15th. Rain has come at last.

February 22nd. The long looked for and much desired weather, which is showery, still continues.

March 1st. The Governor issued an order that the Hunter or Coal River was to be surveyed.

May 3rd. The maize crop is superior in quality to what three months since it was thought it could possibly be.

October 4th, Friday. The caterpillar has been threatening destruction to the wheat crop; about three weeks since, the lands in the interior, particularly cultivated parts, became suddenly invaded by hosts of this destroying insect. A farmer in Castlereagh has given an account of the way in which they take possession of a field. They extend to a great length in equal line, and thus in myriads regularly march forward, carrying all before them, first the leaf and then the stem is devoured. Sir John Jamieson informs us that he has had seventy acres of promising wheat so far destroyed that he does not expect to save more than twenty bushels. These pests disappear as suddenly as they come; they become buried in the earth and are no more seen. In about April, 1819, the fields were ruined for some months by a similar visitation.

October 11th. There is not the smallest apprehension to be entertained for the coming harvest, present appearances are most favourable. On the 8th instant a heavy thunder-storm visited Evan, near Richmond, and vicinity, the hail was very heavy and rain fell during the night. The storm extended as far as Prospect, this has nearly destroyed the caterpillars. (Rainfall this month 3.413 in.)

October 25th, Friday. In a heavy gale of wind accompanied with deluges of rain, on the night of 20th instant, the schooner "Sinbad" was blown on shore at Port Stephens reach, and became a total wreck, no lives lost.

November 1st. On the 20th October, at Bathurst, a man was drowned, while attempting to swim the river on horseback. The current became so impetuous that it swept the horse before it.

November 22nd. On the 17th instant there was a very hot wind from w.n.w.; it was a steady wind, and so hot that it seemed like a fire surrounding those who were in it. Rain this month 0.516.

December 6th, Friday. The steady showery weather we have enjoyed in Sydney and vicinity since the thunder-storm on Thursday last has done great good to garden and fields. Water was becoming very scarce before the rain came. Rain in December, 5.235 in.

Sir W. Macarthur.

At Cowpastures, rain came on suddenly at 7 a.m., with very dark clouds, and for three hours the downfall was heavier than I ever saw it, the water accumulated to a considerable depth on a flat field; this shower was very partial. The latter part of this year was moderate, with some beneficial rains.

Atkinson, page 53.

The harvest of 1822 was a full average crop. The harvest of 1823 was abundant.

Gazette.

1823.—February 6th, Thursday. On Friday, the 18th ultimo, there was a heavy thunder-storm at Liverpool, which travelled in a line across the country from s.e., extending over a breadth of about 3 miles, and at last burst with tremendous fury; the rain came down in torrents, and the lightning and thunder were fierce beyond description. A gang of eight Government men, with irons on, went into the church for shelter, when, awful to relate, the electric fluid burst upon their asylum and, attracted doubtless by the chains, knocked the whole of them down and killed three of them instantaneously.

February 13th, Thursday. About a quarter past 5 on Monday last a white squall came on; previously it had been stiffly blowing from the s.e. corner, but quickly was it subdued by the hurricane that in a few moments spread round the town of Sydney. The gale, as usual set in from the southward, and the thick clouds of dust that enveloped the metropolis was truly astonishing. We have seen as violent, but none to exceed, this squall. About 7, vivid lightning, attended with thunder, visited Sydney, and gentle and genial showers followed, the wind continuing its violence during the whole of the night.

February 27th, Thursday. During the thunder-storm that visited Sydney on Monday night last, the ship "Brixton" had her mainmast smashed to pieces; the whole mast from the top-gallantmast several feet below the deck being struck by lightning. The lightning struck the ground in at least four or five places, killing one man and doing much damage. It is curious that the ship "Brixton" was lying in the very spot where two other vessels had been struck by lightning previously.

February 27th, Thursday. The rains with which we have been visited during the past week have been extremely beneficial to the gardens and the fields. The face of nature speedily assumed a grateful appearance, and the poor beasts even have had occasion to rejoice. From experience, however, we think it a duty to put the settler in mind of next month, for the "Ides of March" approach. Rain, January, 1.092. Rain, February, 5.261.

March 6th, Thursday. The late rains have done incalculable good, the water went to a depth of $5\frac{1}{2}$ inches. We are informed from high authority that the tobacco plant will certainly flourish in this country equal to any other part of the world, and superior to many countries. Some seeds were sown the other day and in thirty-six hours after they actually sprung up, and are now in a flourishing state. Rain, March, 6.660; April, 7.215; May, 0.556; June, 2.590; July, 5.618; August, 0.752; September, 0.576. Measured at Parramatta.

October 16th, Thursday. During the storm that visited Sydney on Sunday night and Monday morning the thunder and lightning was very extensive in its influence over the whole of the country on this side of the mountains. There were no accidents except the loss of a number of sheep by lightning. Rain, October, 2.812.

1823.—November 13th, Thursday. Last Tuesday night there was such a hail-storm in the vicinity of Wilberforce as was never before witnessed in the Colony. The hail-stones were from 4 to 6 inches in circumference, but some much larger. Ten rods of a 5-railed fence upon the farm of Mr. Garrick were completely washed away. Considerable injury was sustained in different parts, but happily no lives have been lost. The thunder and lightning were awful. Rain, November, 1.688. Rain, December, 0.493. Total rain this year, 35.313 in.

Sir W. Macarthur.

The summer of 1823 was very hot. Fine rain fell in March of this year and during the winter; the end of the year was moderate.

Gazette.

1824.—January 1st, Thursday. On Saturday and Sunday last the town of Sydney was visited by loud thunder and vivid lightning. On Saturday we had a hail-storm, which continued from eight to ten minutes without intermission; at the commencement the stones were as small as they well could be to form hail, but for the last three minutes they increased to a tolerable size, being about the circumference of a pigeon's egg, and came down with much velocity. Fortunately there was little or no wind, and the stones fell almost perpendicularly. Rain, January, 1.576.

February 26th, Thursday. The late rains which were so acceptable have only penetrated to the depth of a quarter of an inch, and what is more surprising, all the rains we have been favoured with sunk no lower than two inches. As the rainy season is now expected, it is hoped that those settlers in reach of inundation will be prepared. We have had a long drought, and abundant rain may be calculated on. Rain, February, 1.125. March, rain, 1.988.

May 6th, Thursday. On the evening of Monday, 26th ultimo, a hail-storm visited Prospect and its immediate vicinity, and was nearly of an hour's continuance. Some of the old settlers in that neighbourhood say they never beheld such a storm, either as to the loudness of the thunder, the vividness of the lightning, or the size of the hail-stones, which measured generally from three to four inches in circumference and numbers larger. Great quantities of wheat as well as maize were destroyed. For the greater part of the night the rain fell in torrents, and many of the tops of the hills were carried into the valley. The violence of the storm was confined to Prospect and its vicinity. In this storm ice collected in the lower parts at Prospect to the depth of 10 feet. Many pigs and poultry were killed, and corn, potato, and tobacco crops destroyed, shingles on the roofs of houses were split, and the hail-stones cutting through the bark of trees sometimes grazed the wood beneath. In some places overshadowed by trees the road was strewn with broken branches. The falling of the largest flakes was partial and singular; they fell in a kind of narrow stream; sometimes it went forward in a direct line and occasionally curved like a half-moon so that some farms appeared to escape miraculously, while others alongside in the same direction were greatly damaged. The hail assumed various shapes, some being oblong, others globular, others semi-globular, while great quantities were triangular. A man at Pennant Hills measured a hail-stone 12 inches in circumference; often they were six times as large as the hail-stones which fell eighteen years back (1806), and which were described as the size of an egg.

July 15th, Thursday. Much rain has fallen this week, to the joy of our husbandmen and graziers, whose faces are in consequence all sun-browned by whom we trust the opportunity it affords will, with their valuable industry, be embraced.

1824.—September 9th, Thursday. The rain that had come on gradually on the afternoon of the 5th instant set in vehemently during the night, and continued till the forenoon of the 6th, was one of the most acceptable visitations that could possibly have reached us after so long a drought as that which we have experienced. It was by no means partial, its vivifying effects have been diffused far and wide.

Hume's "Overland Journey," page 35.

On the 19th October, 1824, we found the Murrumbidgee in high flood, and there was no abatement on the 20th, 21st, or 22nd, when we crossed it.

Gazette.

December 16th, Thursday. On the 13th ultimo a thunder-storm was experienced at the Hawkesbury, from Portland Head down to the upper branch. It came on between 2 and 3 in the afternoon. The lightning was severe, and the thunder awful. A shower of hail lasted for the space of half an hour, committing great destruction in the maize-fields and fruit gardens, and killing many poultry. The stones were of enormous size, generally from the size of a hen's egg. One of the largest weighed $7\frac{1}{2}$ ounces, and measured $12\frac{1}{2}$ inches in circumference. The country for miles round suffered from the devastating effects of this storm.

On the 10th December, 1824, about 2 in the afternoon, a thunder-storm, with vivid lightning and heavy hail, visited Parramatta. Before the storm the heat was excessive, and the temperature rose to 103 degrees. Total rainfall this year, 19 inches.

Sir W. Macarthur.

"The summer of 1824 was very hot, and the winter remarkably dry. Fine rains fell in October, and the weather again became dry. About July, 1824, the longest westerly gale of wind that I remember took place, and westerly winds were very prevalent. No rain at the Cowpastures in July."

Atkinson, page 27.

Mosquitoes, except in low situations near water, and where there are thick woods in the neighbourhood, are not very numerous and seldom of any serious inconvenience.

The town of Sydney, however, in the summer of 1824 was visited by immense swarms of mosquitoes, a circumstance never experienced there before; and what was more remarkable, the large blow-flies that had formerly been very troublesome disappeared immediately the mosquitoes made their appearance.

Page 40.

"In the dry season of 1824 I ploughed the wheat in with advantage" (to give it deeper roots).

Page 46.

In 1824 the turnips failed through the extreme drought of the season.

Gazette.

1825.—March 3rd, Thursday. The late rains with which the country has been favoured call for a proportioned gratitude towards a gracious and considerate Providence. The maize crops, however, those of the earlier kind, were blasted with the long succession of drought—not one cob out of fifteen being saved upon an average. Of the later crop there may be some hope, but then it will entirely depend on the weather. In a few months maize will, no doubt, be as high as ever it was in the Colony, with the exception of the memorable year of 1806; but as the rainy season may be daily expected to set in, the fields will not fail to yield abundance of herbage, so that we shall obtain plentiful supplies of beef, of which article the Colony has been rather destitute lately—another consequence of the long drought. It has been remarked by some of the oldest inhabitants that a warmer summer has seldom been experienced, which may justly be attributed to the unfrequency of thunder and lightning. The storms have been few in comparison with other years, and when such is the case the heat of the atmosphere becomes intense. The failure of the maize crop leads us to contemplate the consequences that may arise in the course of the year.

March 10th, Thursday. The seasons of this Colony seem to differ from one another more than in most other countries, and the temperature is much more elevated in summer than the mere local position as to latitude would justify. This cause must therefore be sought for from the peculiar formation of the interior, either being composed of loadstone or extensive deserts of sand. In support of this, the n.w. wind invariably produces in summer that singular oppressive heat from the interior when it blows from that quarter, and, what appears almost paradoxical, the wind in winter from the same quarter should be the cold one, which, however, is easily accounted for, as the mountains in that direction are sufficiently elevated to be covered with sleet or snow.

The quantity of rain that falls is by no means equal to the powerful evaporation of the solar rays, independent of the quantity required for the soil, which is also of that consistency as to require almost constant moisture. In the year 1823 fell 35 inches of rain, and last year only about 19 inches, which is said to be about the average quantity which falls in Paris, and the former about the medium of the west coast of Scotland and Ireland. Every one acquainted with the nature of this country and its pastoral properties must be sensible how inadequate this quantity of moisture is for the useful wants of Nature, as, were it not for the excessive dews, the country must be totally burnt up.

March 31st, Thursday. The caterpillar is spreading destruction throughout the whole of the country; not a part on this side of the mountains that is not infested by them. As far as the Five Islands their ravages are experienced. They do not leave so much as a solitary blade of grass standing.

Howe's Express.

July 18th, Monday. In the alleged scarcity of wheat it is very gratifying to observe that our crop of potatoes, which is now being gathered in, far excels, both in quantity and quality, what we usually witness in this Colony. We suppose their excellence is owing to the moist and temperate weather, and to the unusual lateness for which the autumn has been remarkable. Be this, however, as it may, the existing abundance of this valuable vegetable is a circumstance of great importance, particularly at this juncture, as it forms a very grateful and nutritious substitute for bread.

From the Benevolent Society of Port Macquarie we derive the pleasing intelligence that the fields of wheat present a most fascinating scene of luxuriance; and that some part of the crop had aspired so rapidly to full growth before the proper season that the scythe had necessarily been resorted to. A most abundant and forward crop is anticipated.

1825.—November 7th, Monday. The hot wind on Tuesday last was one of the most unendurable we ever experienced. Until about noon the wind was from the N.E., from which quarter our summer breezes invariably emanate; but about that hour the wind instantaneously shifted to the S.W., and continued to blow strongly the rest of the day, and could only be assimilated to that of one ceaseless flame. What renders it surprising is that the hot winds have hitherto come from the N.W., and scarcely ever known to proceed from the S.W. In August, 1825, the weather was very cold with rain and sleet at Lake George, and all the creeks were flooded. (Mr. F. R. Hume, senior.)

Sir W. Macarthur.

Fine rain began on 25th of February this year, but the end of the year was very dry until the end of December, and the rain came on, on Sunday, 25th.

Mr. H. Halls speaks this year of heavy floods in the Wollondilly (date not given).

Gazette.

1826.—January 19th, Thursday. The late rains have been incessant and particularly heavy; had they continued much longer the low lands on the banks of the Hawkesbury must have suffered greatly.

The maize crops in consequence of these rains will turn out the most abundant and luxuriant that we have ever witnessed. Such weather at this season of the year has not been experienced for the last twenty-five years. South Creek and other minor watercourses were heavily flooded, and many bridges near Parramatta swept away.

February 1st. The late flood has considerably damaged the fences of many farmers, and some have suffered more or less in their maize crops, particularly on the southern and eastern creeks; still the crops will be unusually abundant.

February 4th, Saturday. Accounts have been received from Hunter River, Newcastle, that from the heavy rains the river overflowed its banks and totally destroyed 100 acres of fine maize. It is very much feared that more extensive damage will yet be done in that neighbourhood if the rains continue. Mr. Eckford estimates the height of this flood as rather less than that of 1832, which was 29 feet. (See Mr. G. B. White's letter, page 165.)

The late rains are altogether astonishing at this season of the year; though our climate is one of the most salubrious under Heaven, yet the various seasons of the year are always uncertain. Some of our farmers have suffered considerably from the circumstance of their wheat not being stacked and thatched in time.

About March 4th, after heavy rains, the rivers in the neighbourhood of Bathurst were at flood height. (Jevons, page 66.)

April 26th, Wednesday. The rains which have been excessively experienced in Sydney and Parramatta and their vicinity for the last three weeks have not extended to any distance in the interior, otherwise the low lands, and especially the Hawkesbury banks, must have long since been flooded. We do not remember so much rain to have fallen in Sydney since the ever-memorable 1806.

- 1826.—May 17th, Wednesday. The Bathurst country is represented to us as one of the most salubrious and otherwise delightful in the world. There has scarcely been any rain experienced lately in that part of the country, indeed for the space of upwards of a month there has been only one day's rain. The thermometer varied in the course of last month from 48 degrees to 61 degrees. With this month the *frost* commenced, and was most bitterly felt by those unaccustomed to such regions.
- June 28th, Wednesday. The winds from the w. and s.w., of late, have not only been strong, but also particularly chilly, and the mornings and evenings are severely cold. In the country thin ice is observable some hours after sunrise, and in Bathurst and New Country the cold is nearly as intense as in Old England.
- September 6th, Wednesday. The late rains nearly caused what is termed a creek flood. The waters rose on the South Creek nearly on a level with the temporary bridge at Windsor, and a general inundation was expected. The weather, however, is now remarkably fine.
- September 20th, Wednesday. Monday night and yesterday morning exceeded everything in the tempestuous way that we have ever witnessed in this part of the world. The incessant rains and the ceaseless gales were terrific. Hitherto we have looked on our September as one of the most salubrious seasons under the heavens in any part of the globe, but now it seems to be as little depended on as any other.
- September 23rd, Saturday. On Sunday and Monday nights last a great fall of rain took place in the districts of the Hawkesbury, and the banks of the South Creek were inundated. Several farmers along the creek will suffer the total loss of their growing crops of wheat. The railing of the temporary new bridge at Windsor was carried away, but no other damage was done. The water is now abating. It was nearly over the banks of the Hawkesbury.
- September 27th, Wednesday. Last week, during the storm, a horse and cart containing five servants belonging to Mr. Wilde were swept away by the current, crossing Cabramatta Creek. Two women were fortunately saved by the opportune assistance of some persons who were at hand. The others, together with the horse and cart, were lost. The violence of the storm in that neighbourhood was such that trees of considerable magnitude were torn up by the roots.
- October 21st, Saturday. The caterpillar has scarcely committed any injury in the interior this season. The harvest is in a most promising way, and where there were a hundred bushels of wheat grown last year there are two hundred bushels this year.
- Yesterday (Friday, October 20th, 1826), between 3 and 4 o'clock, the town of Windsor was visited by one of the heaviest squalls of wind that has been remembered for some years. It proceeded from the north-west, and its course left nothing movable remaining. Trees were torn up by the roots, and of many the heavy limbs were broken off. Two sheets of lead of considerable weight were blown from the tower of the Windsor church. The saddle-boards were blown off the roof to a great distance.
- November 4th, Jevons, page 66. On November 4th a great and sudden fall in the temperature, the cold being severely felt after the hot weather in October.
- November 18th, Saturday. About a fortnight ago a tremendous hail-storm was experienced in the vicinity of Penrith, which destroyed some fields of wheat, and committed terrible devastations among the poultry. Though the lightning was vivid and the thunder truly awful, we have not heard of any accident.

1826.—November 29th, Wednesday. The heat and hot wind of Saturday last excelled all that we ever experienced in the Colony. On board the "Volage," man-of-war, in the shade, the thermometer was 106°, and on the shore it was, in some parts of the town, 100°, and in others 104°. To traverse the streets was truly dreadful, the dust rose in thick columns, and the n.w. wind, from which quarter our hot winds invariably proceed, was assisted in its heat by the surrounding country being all on fire, so that those who were compelled to travel felt themselves encircled with lambent flames. Sydney was more like the mouth of Vesuvius than anything else. Sunday, however, brought a change of wind, since when the weather has been somewhat more endurable.

December 13th, Saturday. The late rains have been exceedingly beneficial to the land. Cattle were so reduced for the want of herbage that when they got into a waterhole it was with difficulty they were got out. Even in so few days everything begins to wear a much better appearance.

Sir W. Macarthur.

The winter of 1826 was very dry. Rain began in the end of July, and tremendous rain fell about the equinox in September, after which the weather again became dry and excessively hot.

Gazette.

December 20th, 1826. "The late dry season in Russia is expected to raise the price of flax."

Jevons, page 66, says :

"It is noted on December 20, 1826, that no rain of any consequence had fallen for three months previous." [I am unable to find this notice in the newspapers, and Mr. Jevons does not give his authority.]

Bennett, page 597.

Season 1826 proved to be the last of a favourable series.

Sturt, "Central Australia," vol. ii, page 1.

The year 1826 was remarkable for the commencement of one of those fearful droughts to which we have reason to believe the climate of New South Wales is periodically subject. It continued during the two following years with unabated severity; the surface of the earth became so parched up that minor vegetation ceased upon it.

Gazette.

1827.—January 6th, Saturday. The market on Thursday was rather more thickly attended by the settlers than was the case a week or two ago. There were 728 bushels of wheat, which brought from 5s. to 5s. 6d. per bushel, maize from 3s. 6d. to 3s. 9d., and other articles went off proportionately reasonable. The fruit is beginning to show itself, though the long drought has been a great drawback on the orchard; but the late occasional showers have revived our hopes in this respect.

July 4th, Wednesday. The season of late has been very favourable to stock, and the town was never supplied with better meat. The pork is also very excellent, and is sold at 9d. per lb., eggs 3s. dozen, fresh butter 4s. per lb. Wheat continues at about 5s. per bushel.

1827.—November 7th, Wednesday. We have received very unfavourable accounts of the state of the harvest generally speaking, in the neighbourhood of Hunter River, though some of the settlers in that quarter have been signally favoured by Providence. A Mr. Mudie has 250 acres ripe for the sickle, and we have a few ears of the grain before us, which is large, weighty, particularly white, and entirely exempt from smut.

November 21st, Wednesday. Very flattering accounts have been received respecting the beauty and fertility of the soil on the banks of the river M^r Leay.

December 9th, Friday. The little craft "Charlotte," which arrived in the harbour on the 3rd instant, has encountered dreadful weather during her passage from the Five Islands. On the 20th of November, the wind being from the s.w., she was blown off from the heads a considerable way to the northward, in which condition she was for several days. One man died from excessive fatigue, and another was unfortunately washed overboard.

Sir W. Macarthur.

The year 1827 was bad all through, and the autumn was especially dry. Some rain fell in the spring, but it afforded no relief from the drought. November 19th. A heavy thunder-storm and squall at midnight.

[I find a report of a flood in the Hunter this year, but am unable to find the date.]

Bennett, page 623.

"During the years 1827, 28, and 29 occurred one of the severest droughts that has ever visited the Colony. Many of the lagoons and waterholes believed to be permanent dried up. This was particularly the case with Lake George, which in 1827 presented the appearance of an inland sea, seventeen miles long and from five to seven miles wide. In 1828 its waters began to dry up and continued to evaporate steadily for several years, until they entirely disappeared. This drought was followed in April, 1830, by heavy floods, in which several lives were lost and a large amount of property destroyed at the Hawkesbury and Hunter Rivers.

G. B. White received his appointment as Surveyor, 4 April, 1827.

Extracts from journal kept on the Hawkesbury River and about, in 1827.

April 9th, boisterous weather, wind s.w., heavy rain at times; 20th, pleasant weather; 21st, fine; 23rd, rain the whole of this day; 24th, threatening rain; 25th, very heavy rain during this day; 26th, showery; 27th, showery; 30th, sultry.

May 1st, fine; 3rd, fine; 4th, fine; 5th, sultry; 6th, sultry; 8th, sultry; 9th, sultry; 10th, fine; 11th, fine; 12th, fine; 13th, showery; 14th, showery; 16th, fine; 20th, fine; 26th, fine; 27th, fine; 29th, fine; 30th, cloudy; 31st, cloudy.

June 1st, fine; 2nd, fine; 5th, fine; 6th, threatening rain; 7th, cloudy; 8th, cloudy; 9th, very heavy rain; 10th, continued rain; 11th, showery; 12th, heavy rain; 13th, heavy shower of rain; 14th, fine, employed tracing a creek (but he says nothing of a flood); 15th, fine; 16th, fine; 17th, fine; 19th, fine; 20th, heavy rain at intervals; 21st, raining; 22nd, heavy showers, too heavy to work; 23rd, heavy rain; 24th, fine; 25th, fine; 26th, fine; 27th, fine.

July 1st, gloomy weather; 2nd, boisterous, gloomy; 3rd, fine; 5th, fine; 6th, fine; 7th, light rain; 8th, showers at times; 9th, showery during the day; 11th, fine; 12th, threatening rain; 14th, fine; 15th, fine; 16th, fine; 17th, fine; 19th, fine; 20th, fine; 21st, fine; 22nd, fine; 23rd, fine; 24th, cloudy, with rain at times; 25th, fine; 26th, fine; 27th, fine; 28th, fine; 29th, fine; 30th, very fine; 31st, fine.

1827.—August 2nd, fine ; 3rd, fine ; 4th, fine ; 8th, sultry ; 9th, sultry ; 10th, sultry ; 11th, sultry ; 12th, sultry ; 13th, sultry ; 14th, sultry ; 15th, the weather continuing tremendous sultry about noon. Vegetation is completely retarded, and the early sown wheat on the high land looks like dried grass, and rain will be now too late to save it ; many of the settlers are cutting it to feed their stock. 16th, weather sultry ; 17th, still on the Hawkesbury, very sultry ; 18th, sultry ; 19th, close weather ; 20th, sultry ; 21st sultry ; 22nd, not so sultry ; 23rd, threatening rain ; 24th, heavy showers at times ; 25th, rain during the day.

At Sydney.

26th, heavy showers at times ; 27th, fine ; 29th, fine ; 30th, passing thunder-storms, otherwise fine ; 31st fine.

September 1st, fine ; 2nd, fine ; 4th, fine ; 5th, fine ; 6th, from 12 p.m. tremendously heavy rain with thunder and lightning ; 7th, heavy rain during the day ; 8th, heavy rain during the day, prevented work (so that it was unusually heavy) ; 9th, 10th, and 11th, fine, but sultry.

At Hawkesbury River.

12th, sultry ; 13th, removed my tents to Windsor, blustering weather ; 14th, blustering weather ; 15th, same as yesterday ; 16th, warm during the day ; 17th, gloomy ; 18th, Windsor laid out, weather cloudy, looking for rain, which the country is much in want of, the cattle being nearly starved for want of food ; 19th, cloudy ; 20th, cloudy ; 21st, heavy rain during the day prevented work ; 22nd, fine after the rain, which has been scarcely sufficient to soften the earth. It has not penetrated more than an inch into the ground ; 23rd and 24th, fine ; 25th, 26th, 27th, and 28th, sultry ; 29th and 30th, blustering, sultry weather.

October 1st, fine ; 2nd, sultry ; 3rd, fine ; 4th, sultry ; 5th sultry, hot wind during the day ; 6th, blustering weather. Found by a series of observations the variation at Parramatta to be $10^{\circ} 49'$ easterly.

Left Sydney on 14th March, 1828, to be stationed at Hunter's River.

Jevons, page 66.

1828.—A little rain had fallen, January 8th, but drought had put a stop to many operations in town and country in January, 1828. The Brisbane Distillery had ceased working (January 9th), owing to the supply of water at the Blackwattle Swamp being dried up.

The aspect of the weather was ominous of rain from time to time, but none fell until February 8th, about which time there were a few days' rain.

In March, 150 men were employed in laying some sort of piping along the South Head Road, to supply Sydney with water. Pumps were also placed in several public wells that yet contained water.

Gazette.

March 26th, Wednesday. In a late *Australian* it was remarked that the *Colonial Almanac* mentioned that there would be torrents of rain fall in the month of March, whereas none has yet fallen.

April 7th, Monday. The scanty and unnutritive state of the pasturage and the want of water have materially diminished the quantity and quality of our dairy produce during the past season, and the last two months have proved fatal to cattle kept on inferior, overstocked, and badly-watered estates in this country. But notwithstanding the suffering of our cattle here, most of the herds of the interior, where they have extensive runs in the native wilds, and a sufficiency of water, preserve a storable condition, equal to all the supply of animal food required for consumption in the Colony.

1828.--April 24th, Monday. The late rains have been very general throughout the Colony. The face of the interior wears a different aspect, one that calls for gratitude from the most indifferent minds.

A good deal of rain in Argyle about May 2nd.

Rain in Sydney, May 7th.

June 18th, Wednesday. Rain has visited many parts of the agricultural districts within the last fortnight, as well in the southern as in the northern direction. We may soon calculate on some heavy and seasonable showers, though the *Australian Almanac* inclines to the contrary opinion.

June 27th, Friday. The late rains set in at Windsor and the surrounding neighbourhood, early on the morning of Tuesday last, and the aspect of nature soon became gratifyingly changed. Further, we have to inform our readers, from a source on which we can depend, that there is not that scarcity of wheat in the interior as has been reported, and, of course, contemplated. An individual, just from the country, who has no sinister object in view, positively assures us that there is grain enough in the country, with what Van Diemen's Land can produce, to supply the country until harvest.

July 4th, Friday. In the Sydney Market yesterday wheat brought on an average 13s. currency a bushel. Potatoes have fallen 3s. in the cwt. Vegetables very cheap. Hay also has fallen in consequence of the late rains, which were pretty general in the interior. Maize alone has kept its price; but this, as well as every other species of grain, must fall in proportion to the influx of wheat which is hourly expected.

July 21st, Monday. From all parts of the country complaints are reaching us as to the conflicting accounts which the journals give of the state of the market. Of this fact we have long been aware, without being able to devise any remedy whereby so great an inconvenience might be obviated.

August 4th, Monday. The young wheat on the banks of the Hawkesbury looks remarkably healthy and promising, the yellow tinge which the long drought had spread over it has almost entirely disappeared, and fresh and delightful verdure is fully restored. The late-sown wheat too, which, for want of moisture, lay dormant several weeks in the ground, is now coming up finely. The recent rains have had a most reviving effect, and have completely rescued us from the fear of a total failure of the crops. The sharp nocturnal frosts, however, continue to nip the young grass as soon as it springs, so that there is little or no pasturage, and the swamps being all dried up, even the pigs are suffering with every other kind of stock, and many, even on the flats of the Hawkesbury, have been starved to death.

August 27th, Wednesday. Drought still maintains its sway over the once smiling district of the Hawkesbury. The wheat begins to droop in every quarter, and some of the settlers have so far abandoned all hope of a crop this season as to turn their horses and oxen into the wheat fields. It is the opinion of the most rational and experienced of our neighbours, that if we have not rain before the expiration of the present month the harvest will be ruined. It would grieve your heart to behold the grass, and you would wonder how the cattle subsist. A blade of grass is scarcely to be found, either on hill or in the dale, or even by the watercourses; sterility and desolation everywhere meet the eye.

September 3rd, Wednesday. The Bathurst crops of wheat, we are told, promise to be most abundant, and it is doubtful whether the luxuriant harvest in that part of the country, as well as in the picturesque neighbourhood of the whole of the Hunter's River, will most amply compensate for the effects that will be felt from the severe droughts in other parts of the Colony, especially in the neighbourhood of the Hawkesbury, which for years supplied the country with nearly all the grain that was required for home consumption.

Bennett, page 642.

Sturt's expedition left Sydney on the 10th September, 1828, when the face of the earth had become so parched by drought that all minor vegetation had ceased, and the settlers had begun to drive their stock in search of pasture and water. "Capt. Sturt attempted to navigate what seemed the main stream of the Macquarie, but it was soon lost in innumerable smaller channels, which at length disappeared amongst reeds, and no sign of a lake or any considerable body of water could be discovered." (See 1817.)

(Sturt, in 1828, when going over Oxley's tracks, made in 1818, found the footprints almost as fresh as if made the year before, clear proof that there had been no similar rain in the interval.)

Gazette.

1828.—September 26th, Friday. We are happy to be enabled to state, on unquestionable authority, that, owing to the late refreshing rains, there is every prospect of an average crop of wheat at the ensuing harvest. The monopolisers of grain, who have caused so exorbitant a rise in the price of bread as from 8d. to 2s. 1d. in the double loaf, will feel it necessary to get rid of their stores at a reasonable price, before the harvest is reaped, which will be in eight weeks at the farthest.

October 17th, Friday. The rains of Sunday were very extensive and copious in the country districts, especially at the Hawkesbury and Nepean. The crops are delightfully refreshed; the wheat swells out most promisingly, and the young maize shoots upward luxuriantly. All vegetation, in fact, is in its richest state, and both man and beast will soon have enough and to spare.

November 12th, Wednesday. One of those sudden squalls which are of such frequent occurrence in this part of the world visited Sydney on Saturday last. The forenoon of the day was peculiarly sultry with a dense atmosphere, the heaviness of which was only disturbed by an equally disagreeable hot wind, which cast a glare on the face of Nature not very dissimilar to that which proceeds from the mouth of a furnace. About 4 o'clock in the afternoon, the heat being then not at all diminished, the sun became obscured, and in an instant a storm, fierce as a tornado, drifted an almost overwhelming body of sand and earth into the air, caused several of the ships in the harbour to drag their anchors for a considerable distance, and all to swing round as if it were "the crack of doom, or chaos were come again." Several boats were upset in the harbour.

December 5th, Friday. We have been informed that the crops on the lower part of the Hunter River have been got in well, being an abundant harvest; not so with the upper districts, where a blighting wind, similar in its effects to a sirocco, destroyed for a space of thirty miles nearly all the wheat.

December 17th, Wednesday. Yesterday was the hottest day we have ever experienced in Sydney. The thermometer in the shade, at 11 o'clock in the morning was 102°.

December 30th, Tuesday. The rains in the past week extended from one end of the banks of the Hawkesbury to the other. The rain that fell on Sunday night and yesterday must have been appreciated more than it is possible for language to describe.

Mr. G. M. Pitt, senr., says, 1828, he heard on the Hawkesbury a single explosion, like the noise of a great gun, but could not see any clouds or other cause for it. (See 1789, 1829, pages 55 and 100, and September, 1845.)

Sir W. Macarthur.

1823.—The drought was so bad in 1828 that the whole of the stock had to be removed from 30,000 acres at Camden for want of water.

Still in September, 1828, there was heavy rain, and the Cowpasture rose 28 feet.

From 1821 to 1830 there was nothing at Camden worth calling a flood; there was, however, one in 1831, and again we were free to 1841.

Mr. Ranken (near Goulburn) informs me that in 1828 or 29 small-pox existed amongst the blacks in the western districts to such an extent that one-third of them died, but it did not spread to the whites, who in many cases went amongst the diseased blacks. (See 1789, page 55.)

Gazette.

1829.—January 13th, Tuesday. The most violent hurricane (accompanied by a hail-storm) which has occurred in the remembrance of the oldest inhabitant of the Colony, visited Sydney on Saturday last. Shortly after 12 o'clock at noon the sky became partially obscured, and a shower of hail (some of the stones measuring an inch round) accompanied by frightful gusts of wind from the north-west, carried devastation before it to every object exposed to its fury. The destruction of glass in the windows throughout the town is almost incalculable in its extent, and the injury to buildings considerable—several roofs of houses were blown off, and also chimneys blown down. In Darling Harbour a little vessel named the "Frying-pan" was capsized and sunk, but the four men on board were rescued. These form only a portion of the damages done; but there is scarcely a house in Sydney that has not more or less suffered from the fury of the pitiless stones. We have much pleasure in hearing that the storm did not extend to Parramatta, and we hope that the districts of the Hawkesbury have equally escaped, and that the crops of wheat and corn which were in so flourishing a state have not experienced that inevitable destruction which a visitation like the one that occurred in Sydney would have subjected them to.

January 22nd, Thursday. It is not a little singular that the finest wheat at Bathurst is that which has been self-sown; it excels both in productiveness and in quality that which has been regularly sown, even on the finest and best-tilled land, and has sustained incomparably less injury from the heat and drought.

February 7th. Sturt mentions that at 3 p.m. he heard, when out on the Darling, a sound in every way like the discharge of a heavy piece of ordnance at the distance of five or six miles. (See Sept. 1845, also end 1828, also January 1789.)

February 12th, Saturday. We have at length been favoured with some refreshing showers. In the nights of Monday and Tuesday the rain descended in torrents, and has for the present completely saturated the earth and delightfully cooled the air. On Monday night there was considerable thunder and lightning, accompanied by a violent hurricane from the s.w. We sincerely hope it has extended to the agricultural districts, where it would be exceedingly beneficial to the stubble maize.

February 26th, Thursday. There appears to be a pretty general opinion throughout the Colony that, notwithstanding the long-continued drought, the average quantity and quality of the maize crop are such as will prove satisfactory to the growers, if the elements should happily admit of good harvesting.

March. We are all burnt up; it is frightful to go into the garden. Not a drop of water but what we send for from the Botany Swamps. (*Asiatic Journal*, page 363, 1829.) Four-pence per gallon was paid for water in Sydney during 1829.

- 1829.—March 3rd, Tuesday. We have received the gratifying intelligence that there has been a good supply of rain at Hunter's River, Five Islands, and at Argyle. At the latter place the grass has shot up with amazing rapidity, and looks delightfully green and fresh.
- March 12th, Thursday. The weather has undergone a most exhilarating change—the late rains and the steady north-easter having refreshed both earth and air; and we are happy to hear that the heavy showers with which the metropolis has been favoured have extended with equal bounty to many parts of the interior.
- March 21st, Saturday. Rain has at length come in abundance. During the nights of Wednesday and Thursday it fell in torrents, accompanied by a stiff southerly breeze, and on the former night by rather a heavy thunder-storm, and now the sky bears every appearance of continued wet.
- May 21st, Thursday. We are sorry to learn that the grub has again made its appearance in the fields and gardens; in the district of Prospect it threatens to be mischievous to a great extent. If the calamity of drought be aggravated by this Egyptian plague, our agriculture will indeed be reduced to a deplorable state. The face of the country in the Hunter River districts assumes an increasingly forlorn complexion—the occasional showers with which we have been favoured in Sydney having been scarcely felt there. The young wheat however begins here and there to show its green blade, which is more healthy than could have been expected.
- May 23rd, Saturday. On Thursday night we were cheered by the commencement of heavy rain, which continued the whole of the night and the greater part of yesterday and last night. Should we be blessed by its continuance for a few days, the country will be saved from an awful calamity generally deemed inevitable.
- May 26th, Tuesday. We are sorry to find that the late rains did not extend to the Cowpastures, no more than ten miles inland from Newcastle; at the Hawkesbury, however, we understand they had a good share. The Sydney gardens have been greatly refreshed, and are now looking beautifully luxuriant.
- June 6th, Saturday. Intelligence from all parts of the country, we are happy to state, confirms our hopes that the late rain would prove a most providential interposition on behalf of the agricultural interest. The hopes of the farmer have again revived, as the heavy showers that have fallen throughout the country have already caused the crops to put on an appearance which gives ample promise of an abundant harvest. We have every reason to believe the rain has been general; but we can speak positively as to the districts of Campbelltown, Richmond, Prospect, Windsor, Parramatta, and Liverpool, from which the accounts we have received are particularly cheering.
- June 9th, Tuesday. The accounts which continue to be received of the promising appearance of the crops, owing to the late refreshing showers, are quite exhilarating. The young wheat looks remarkably well in Argyle, the heavy dews having greatly refreshed and nourished it. The weather (in Sydney) for the last few days has been most enchanting, causing one to fancy we are breathing the delicious air of an English autumn. The late rains have caused all Nature to rejoice.
- June 11th, Thursday. Our warmest hopes respecting the rains extending to Hunter's River, of which district the most deplorable accounts have been received, are more than realized. When we bear in mind that a fortnight ago the whole of that fine part of the country was a scene of wretchedness—the grass withered to the root—the wheat and barley scarcely alive, and the settlers almost broken-hearted,—we cannot be sufficiently thankful to an indulgent Providence for the sudden revolution produced by the late rains.

1829.—June 18th, Thursday. We have received a letter from Lower Portland Head, dated 13th inst., in which it is said—We have to be thankful several days of heavy rain here of late, which has been most beneficial to the young wheat—a larger quantity of which has been sown this year on the branches of the Hawkesbury than usual.

July 16th, Thursday. The young wheat in the Hawkesbury district generally looks well, and the few refreshing showers which have lately been experienced will rapidly bring it forward. It looks comparatively better than at this time last year. The cold in the interior is intense, very sharp frosts having set in. In the district of Argyle they have had snow six inches deep, and ice of considerable thickness.

July 21st, Tuesday. We extract, from a letter dated the 10th inst., the following observations on the weather in the county of Argyle:—Winter has set in severe, but the weather is still variable. I insert a few days journal:—25th June, cold piercing wind; 26th, ditto; Saturday, 27th, snow about 2½ inches deep here, it has been general more or less at Lake Bathurst, and in that direction a fall of 12 and 6 inches Sunday, 28th, severe frosts; 29th and 30th, ditto; July 1st, 2nd, and 3rd, frosts; 4th, hoar frosts, day mild and cloudy; Sunday, July 5th, rain nearly the whole of the day; 7th, dry, clear, light frosts; 9th, severe frosts; this day 10th, sharp wind.

August 4th, Tuesday. A violent tempest burst upon Sydney at 10 o'clock on Saturday night, almost equal to the memorable storm of January last; hail and rain poured down in overwhelming torrents, accompanied by tremendous bursts of thunder and vivid flashes of lightning. The hail-stones were as large as bullets, and came rattling down the chimneys into the very centre of the parlours and bed-rooms of many of our quiet citizens like so many volleys of artillery. The weather continued throughout Sunday to be wet and dreary, but yesterday it considerably cleared up, the clouds, however, promising more of what our farmers so much need—copious rain.

September 12th, Saturday. Notwithstanding the flattering appearances of rain we have had lately, the clouds have again taken their flight, and drought still clings to our thirsty land. The atmosphere has been intensely cold for the last day or two, and on Thursday night there was a very sharp frost, thin ice being seen on Friday in several parts of the town. There has been a good deal of snow and rain at Bathurst.

October 1st, Thursday. Since our last publication the weather has continued unsettled, and several heavy showers have fallen. On Tuesday night the rain descended in torrents, and completely saturated the ground; and we are delighted to hear that they have had a considerable quantity in the interior, particularly at the Hawkesbury, where it has produced a cheering change in the whole face of Nature. Though much of the wheat is irrecoverably gone a great quantity will be saved, so much having been sown late. At Bathurst the showers have descended almost unintermittingly for several days.

October 3rd, Saturday. The most cheering accounts of the state of the weather continue to be received from the interior. The late rains have been general, and in many places profuse. We learn that all the low lands in Campbelltown and the neighbourhood were flooded on Wednesday last. The aspect of the heavens too is indicative of a continuance of rain, and we trust that the gloomy prospect which lately presented itself to the Colony will shortly brighten, and the hopes of the settler revive. Should we be bountifully favoured with a continuance of rain for a few days longer, even at this late season of the year, we may still look for at least half a crop, which will be adequate to the wants of the people till the next harvest.

1829.—October 6th, Tuesday. In consequence of the profuse rains which penetrated all over the Colony at the new moon, there will be a trifling deficiency in the wheat crop, and plenty of grass, and it is thought that cattle will recover a little in price.

October 10th, Saturday. We learn from our correspondent, as well as from other quarters, that the rains have produced a most delightful effect in the district of the Hunter River. In some places the maize is above ground and looking remarkably well. Similar accounts we have from Bathurst, Argyle, Cowpastures, Hawkesbury, &c., &c. A better prospect, so early in the season, of a plentiful maize crop the Colony never had.

October 13th, Tuesday. On Saturday and part of Sunday the heat was excessive, the thermometer being at 80° in the coolest apartments, and the wind coming in hot gales from the north-west. On Sunday afternoon the wind got round to the southward, the sky became covered with thick clouds, and in the evening there was a shower. Throughout yesterday it continued cool, the clouds are still remaining, giving promise of copious rain.

October 20th, Tuesday. On Saturday we had two tremendous hurricanes from the south-west, one at noon and the other at night; both were accompanied by heavy rain, and the former by thunder and lightning. On Sunday the wind was very high and cold; at night it was almost as piercing as the March winds of England.

October 22nd, Thursday. On Thursday there was a tremendous storm of hail, rain, wind, thunder and lightning. It fell at Parramatta at 4 o'clock in the afternoon, and did a great deal of damage to windows, &c. Some of the hail-stones measured 3¼ in. in circumference. It performed a circuit to the south-east, and back again to the north-west, and did not reach Sydney till about half-past 8 at night, when it came down with tremendous fury, the hail rushing in torrents down the chimneys. Yesterday we had a similar visitation. For some hours before its arrival the horizon at the south-east wore an awful appearance, which gradually drew nearer and nearer, and soon after 1 o'clock it burst upon us with appalling violence. For a few minutes it seemed as though all the waters in the heavens were rushing upon us at once; it was so dark that one could scarcely see across the street; the mingled hail and rain fell in a considerable mass, and the streets presented a succession of roaring torrents and cataracts. The thunder was not very loud, but the lightning was extremely vivid. The tempest did not last much more than half an hour, when the sun again broke out, and all around was calm and bright. A great many windows were broken by the hail-stones, and other damage done.

November 12th. A public thanksgiving for providential relief from a long and destructive drought (Ford's Almanac).

November 14th, Saturday. In those fields in the Hunter River district in which the great hailstorm that fell last Wednesday fortnight was felt, the crops were cut us as cleanly as if the sickle had been at work. We have it from unquestionable authority, that not only were strong fences beaten down and the great arms of trees knocked off, but the surface of the timber was indented with marks like those caused with shot. It did not spread more than a mile in extent. Owing to the late rains, the lower parts of the Hunter River are bank high and many of the creeks are impassable.

December 1st, Tuesday. Some delightful showers fell yesterday morning, the wind from the east, and there is every appearance of more rain, and plenty of it.

December 4th. Torrents of rain fell for six days after this (T. Woore, Esq., letter to *Herald*, January 3rd, 1876.)

1829.—December 10th, Thursday. We lament to state that at Bathurst and Argyle there has been, within the last few days, so severe and unusual frost, that the crops have sustained the most serious injury; in some instances, we are told, the wheat has been completely cut up.

December 19th, Saturday. On Thursday night we were visited by another plentiful fall of rain, accompanied by thunder and lightning. Yesterday the air was excessively sultry. The clouds were heavily charged with electric fluid, and the thunder muttered at a distance. We are glad to learn that the crops in Argyle are not, as reported to us, injured to a great extent by the rust and smut; on the contrary, we are assured that the wheat is particularly fine and luxuriant.

December 22nd, Tuesday. We were favoured with more rain yesterday. The showers were gentle and refreshing. Since Saturday the air has been positively cold, an extraordinary circumstance considering that it is the very zenith of our summer.

In April, 1829, Sturt found the River Darling salt, and as a river it had ceased to flow (vol. 2, page 117). Everything was burnt up and "the natives were dying fast, not from any disease, but from scarcity of food"; and at the river he found "one of the largest gum-trees he had ever seen on the ground; it had died for want of moisture (page 157, vol. 1). The appearance of the Darling led him to think it had not been in flood for years.

Sturt's Expeditions into Southern Australia.

Introduction, vol. 1, page 54.

Those seasons during which no rain falls appear, from observations of former writers, to occur every ten or twelve years.

"When the interior is dry the seasons are dry, and *vice versâ*. Indeed, not only is this the case, but rains from excessive duration in the first year after a drought, decrease gradually year after year until they wholly cease for a time. It seems not improbable, therefore, that the state of the interior does in a measure regulate the fall of rain upon the eastern ranges, which appears to decrease in quantity yearly as the marshes become exhausted, and cease altogether when they no longer contain any water. A drought will naturally follow until such time as the air becomes surcharged with clouds or vapour from the ocean, which being no longer able to sustain their own weight, descend upon the mountains, and being conveyed by hundreds of streams to the western low lands again fill the marshes and cause the recurrence of regular seasons.

Page 145.

End of March. During the short interval (five months) I had been out, I had seen rivers cease to flow before me, and sheets of water disappear; and "so long had the drought continued that the vegetable kingdom was almost annihilated, and minor vegetation had disappeared. In the creeks weeds had grown and withered, and grown again, and young saplings were now rising in their beds, nourished by the moisture that still remained; but the largest forest trees were drooping, and many dead. The emus, with outstretched necks, gasping for breath, searched the channels of the rivers in vain for water; and the native dog, so thin that it could hardly walk, seemed to implore some merciful hand to dispatch it. How the natives subsisted it is difficult to say, but there is no doubt a scarcity of food among them." March 1829, on the Logan, and Castlereagh, &c.

Page 7, vol. 2.

Rain had fallen in the interval (10 November, 1828, to 3 November, 1829), but not in such quantities as to lead to apprehension that it had either influenced or swollen the western streams.

Page 32.

1829.—December 2nd. Heavy rain on the Murrumbidgee.

Page 132.

December 28th. The weather had been tempestuous and rainy for three or four days, but it began to rain again to-day. As we passed down several rapids we observed the marks of recent floods to the height of about 7 ft.

Bennett, page 643.

Sturt's party were cheered by finding, on the 4th February, 1829, a fine river 240ft. wide, deep, and covered with wild fowl. Much to their astonishment, however, its water was found to be salt. They named the river the "Darling." "They traced the Bogan for 50 or 60 miles, and then proceeded towards the Castlereagh. That which ten years ago (see 1817) had been a fine river was now found to be merely a dry channel, overgrown in many places with reeds and brambles." Sturt was exploring South Australia in February this year, and found there dry lagoons and other marks of drought, but not so severe as in New South Wales.

Gazette.

1830.—January 9th, Saturday. The late rains have had the effect of promoting the growth of abundance of grass. There is a fair prospect that the ensuing season will not be a season of distress for the cattle, as there will now be good winter food for them.

January 30th, Saturday. We hear there has been a good deal of rain up country, especially in the neighbourhood of Lake Macquarie; the maize is, however, in many places languishing from want of moisture.

February 2nd, Tuesday. There was a severe hail-storm experienced in the neighbourhood of Hunter's River on Friday last, and strange to say, that whilst considerable damage was sustained in consequence, its effects were so closely confined that one field of corn was completely cut up, whilst the neighbouring one did not experience the slightest injury.

February 18th, Thursday. On Tuesday afternoon the wind got round to the southward, and blew a stiff and sturdy gale, accompanied by light showers of rain and heavy showers of dust. Yesterday the breeze had died away, and although we had several delightful showers, which laid the dust and refreshed the gardens, yet the atmosphere was dull, close, and sultry. There is, however, some ground of hope for cool weather, to repair the exhausting effects of the late excessive heat; and appearances throughout yesterday promised further supplies of seasonable rain, which would be highly acceptable to our farms.

March 2nd, Tuesday. From Saturday morning till about 10 o'clock yesterday morning, it rained almost without intermission. It appears to have been general. The maize will be much benefited by it, and the ground finely prepared for the plough.

March 6th, Saturday. On Wednesday last, during a heavy storm of thunder, a stack of wheat at Wilberforce was struck with lightning, and although there was a very heavy fall of rain at the time, the stack was instantly in flames, and entirely consumed. The same storm was partially felt at Sydney.

The supply of fruit and vegetables at last Thursday's market was more than usually abundant. The late refreshing showers have been productive of the most beneficial effects on vegetation of every description.

1830.—March 9th, Tuesday. The heavy rains of the last week have swelled the maize crops in every part of the country, and covered the fields with grass.

March 25th, Thursday. We have continued to be favoured with occasional showers, sufficiently copious to refresh the ground and to keep vegetation in a luxuriant state. The late maize is coming on in the most promising manner; the only apprehension is lest the frost should visit it at too early a stage.

Several of the late mornings, particularly Sunday last, have been very sharp, nearly approaching to frost, but not, we are thankful to say, sufficiently so to do any injury. Grass and vegetation in general are very fine throughout the country.

April 1st, Thursday. The weather since Sunday last has undergone a change, which must have gladdened every heart. The heat of Saturday and Sunday was insupportable, but the subsequent days have been so deliciously cool that one might fancy himself transported to another zone.

April 10th, Saturday. As the rain appears to have again set in, we may expect to receive intelligence of lands being flooded. We have already received intelligence from the country stating that much damage has accrued from the late rains. Some bridges on the roads have been swept clean away, and the roads are said to be in a deplorable condition from the many ruts which the heavy rains have occasioned.

Flanagan, page 337, mentions a destructive flood in the Hunter this year; *Bennett*, page 624, says the flood was in April.

April 15th, Thursday. We regret to learn that considerable damage has been done in the neighbourhood of Richmond by the overflowing of the river Hawkesbury, which disastrous event occurred in that neighbourhood on the night of Tuesday, the 6th, or early on the morning of Wednesday, 7th instant. The rains fell for several days previous, and on Wednesday morning the waters had completely carried away the banks of the river, and ascended as high as Richmond township, about the distance of a milé and a half, sweeping away in their impetuous progress families, dwellings, cattle, corn, wheat, everything in their course. Corn-stacks were floating in all directions, with people clinging to them fearful of instant death. Several of the bridges on the Liverpool Road were washed away. The one at Windsor still remains, but so completely inundated that the tops of the posts alone were observable, the only method of passing being in a boat. The whole of Freeman's Reach was under water, and Mr. Atkinson's farm in the same predicament. The lagoon in front of that gentleman's house had 15 feet of water in it. The poor settlers were sadly deceived by the fine weather on Wednesday last; expecting the rain had subsided they set about opening their stacks for the purpose of drying their grain, but had no sooner finished their job than the rain again descended in torrents, and in a few hours caused more destruction than the previous floods. All the farmers' hopes are blighted, for by this time the incessant rains must have destroyed or washed away nearly the whole of their property. Four lives are reported to have been lost.

April 20th, Tuesday. The rain had not left us. On Saturday and Sunday it came down in torrents, and will probably continue until the 30th, which will come in on Friday next. The ground has now a h soaking, especially the flats.

1830.—May 29th, Saturday. The country about Hunter's River never looked so beautiful as at the present time. The late rain has refreshed everything. Nature so long pent up by drought is bursting forth in overflowing fecundity.

June 17th, Thursday. The air yesterday was intensely cold, although the thermometer was not much below 60 degrees. It was scarcely possible to keep one's self warm even by the fireside.

June 24th, Thursday. The weather in the interior is cold to an extraordinary degree. At Parramatta there is a thick hoar frost every morning, and beyond the mountains the snow is nearly knee-deep. We are told that persons who have lately arrived from England complain of the cold in the interior as being little less severe than their native land.

July 17th, Saturday. The mornings and evenings have been for some days past remarkably cold, accompanied by a smart frost. In the mornings ice nearly as thick as a penny-piece has been seen in several places. Snow has fallen abundantly in the neighbourhood of Bathurst.

July 31st, Saturday. In consequence of the wet state of the weather the market was thinly supplied on Thursday.

August 17th, Tuesday. The continued favourable state of the weather interspersed by numerous showers, has produced the most beneficial effects in all parts of the Colony.

September 21st, Tuesday. The late equinoctial gales have been productive of numerous accidents. Among others, on the morning of Friday last a boat laden with wood was swamped crossing from North Shore to Market Wharf, and a small sailing-boat was capsized; in each case all hands were fortunately saved, being able to swim. Another boat was capsized on the same day off Darling Harbour, and unfortunately the two men employed in navigating her were drowned.

October 5th, Thursday. Owing to the floods occasioned by the late rains on the mountain road, the mail from Bathurst was some hours later in its arrival on Saturday last. The inviting state of the weather after so much rain drew considerable numbers from home on Sunday last, and the Domain was literally thronged.

October 12th, Tuesday. Never did any country in the world exhibit a more luxuriant aspect than is at this moment exhibited by the agricultural districts of New South Wales. From every quarter we hear the most flattering accounts. The field, garden, orchard, vineyard, and forest ground, are all teeming with abundance. The districts of the Hunter especially give promise of the most overflowing wheat harvest ever experienced in the Colony. Nature continues to lavish her richest treasures alternately, refreshing the earth with fructifying showers, and warming it with the genial rays of a vernal sun. *Ibid.*

Summer has come upon us all at once, yesterday was very oppressive, there being a warm sickly gale from north-west, which through the greater part of the day blew with excessive violence. This was the first hot wind of the season. Thermometer over 80°.

October 26th, Tuesday. There was heavy and continuous rain throughout Sunday, accompanied by occasional hurricanes. Monday and Tuesday were remarkably fine, yesterday we had occasional showers and some heavy bursts of thunder, and about 3 p.m. one of the heaviest hail-storms ever witnessed in the Colony, not even excepting that which occurred in January last year; some of the stones measured nearly two inches in diameter.

October 30th, Saturday. The very heavy shower of hail with which Sydney was visited on the afternoon of Wednesday last, has been productive of much damage in the gardens.

1830.—November 4th, Thursday. Rain has fallen in great profusion in the neighbourhood of Bathurst, and we regret to say has done very considerable damage to the crops. The roads on Monday last were altogether impassable, and one bridge has been swept away by the flood.

November 9th, Tuesday. During the squally winds that prevailed in the early part of Sunday the ship "Lord Melville" drifted her anchor and went ashore on the point of rock by the Fort; happily she was got off in less than half-an-hour without sustaining much injury. The fine weather of the last three days after so much wet has contributed to enliven and invigorate both the animal and vegetable creation.

November 13th, Saturday. An idea may be formed of the prospects held out by the crops in the district of Hawkesbury when we mention the fact that the applications to the Bench of Magistrates at Windsor for the loan of prisoners to assist in getting in the wheat amounted in number to nearly 400.

We regret to hear that the heavy and frequent falls of rain have overflowed the country in several directions. On the banks of the Hawkesbury and the Nepean much land is standing under water, and mountain rivers, across which there are no bridges, have so far outswelled their usual limits that passengers find much difficulty in fording them.

November 16th, Tuesday. During the last few weeks we have had very heavy falls of rain, with occasional intervals of sunshine. Last week it rained almost every day with but little intermission. Serious apprehensions began to be entertained for the crops, which in parts of the country are now ready for the sickle. We have not heard however that material injury has been done, and as the weather seemed to take a favourable turn with yesterday's new moon, we may hope that the promised blessings of an all-wise Providence will yet crown our harvest home.

The heavy and continued rains of last week have created serious floods in various directions; in some instances whole acres of corn which were rising from the ground lie buried in the waters.

November 23rd, Tuesday. We regret to hear very unfavourable reports of the effects produced by the late rains in various parts of the country. The grain is said to be scalded, and that wheat, maize, barley, oats, and potatoes, have all suffered severely. Tobacco also, with the exception of those plants which are situated on a rising ground, are greatly injured. On the Hawkesbury, Cowpastures, and Nepean Rivers a considerable portion of the adjacent land on which corn chiefly was planted lies buried in water, and in most places the ground has become so sodden and yielding that the cattle used for agricultural purposes sink to their bodies unable to move.

November 27th, Saturday. It was hoped that with the full moon on Tuesday the weather had taken a favourable turn for harvest; yesterday, however, set in with very ominous appearances, and throughout the day the sky was covered with an unbroken mass of dark vapour, and a heavy and searching rain fell with scarce any intermission. The consequences to the crops cannot but be anticipated with great anxiety. We hear that those in the low grounds at the Hawkesbury have been under water for some days, and that much injury has been done in several other parts of the country.

December 4th, Saturday. The bridges on the Liverpool Road have been swept away by the late rains. The roads leading from Sydney to Paramatta, Liverpool and Windsor, have also been very much cut up.

1830.—December 7th, Tuesday. A gentleman of much experience in farming concerns last week performed a tour in the Hawkesbury districts, for the purpose of judging for himself as to the prospects of the harvest. He reports that, with the exception of the great flats on this side of the river, the crops have suffered no considerable injury from the rains, and give every promise of abundance. He went over a thousand acres of growing wheat in the finest imaginable condition. The river had risen to only about 10 feet of its banks.

December 14th, Tuesday. The heat on Saturday, Sunday, and yesterday was more oppressive than has been experienced during the present summer. Yesterday in particular, the fierceness of the sun, aggravated by one of those strong sickly gales from the north-west, properly enough called "hot winds," was intolerable; the thermometer averaged 90 degrees in the shade. What made the heat more intensely felt was, that for some weeks previously the weather was intensely cold and damp, so as almost to render fires desirable.

During the last few days accounts have poured in upon us from all parts of the Colony, conveying the most gratifying information respecting the crops. So bountiful and luxuriant a harvest has not been realized for many a year, and in a fortnight or so we may expect such an abundance of grain in the market as will compel the unwilling millers to drop their prices of flour to a very low standard.

December 23rd, Thursday. Yesterday the air was almost stifling until about sunset, when the wind veered suddenly to the southward, and brought a tremendous thunder-storm, accompanied by rain. The lightning was magnificent beyond description, and some of the peals of thunder deafening.

December 28th, Tuesday. A settler on the Hunter has just reaped off 35 acres as much as he did last year off 200, and this is no uncommon instance of the overflowing bounty of the present harvest. During the tempest on Tuesday evening last a stack of wheat at Pitt Town was struck by lightning and totally consumed.

1831.—February 1st, Tuesday. The showers of Saturday and Sunday last have imparted a delightful appearance of freshness and health to the gardens around Sydney.

February 5th, Saturday. Thursdays market was full, every description of produce being in abundance.

February 12th, Saturday. The maize crops on the Hawkesbury, Cowpasture, and Nepean River are, we are informed, in a very promising appearance.

February 24th, Thursday. Sydney was visited with a smart storm of thunder and hail about 1 o'clock on Monday last. The stones were of an unusual size, some of them measuring 2 inches in circumference. Plenty of work was made for the glaziers in several parts of the town.

March 1st, Tuesday. The very seasonable weather we have enjoyed for some time past has produced the most favourable effect on agricultural produce. The maize crops are prolific in the extreme, and we shall at any rate have plenty of food both for man and beast.

March 5th, Saturday. During the last few days the air has been much cooler, a sturdy sea breeze having generally prevailed. Yesterday we had very heavy rain which lasted a greater part of the day. In the afternoon the heat was very disagreeable, the rain leaving a sickly vapour; the dust, however, is laid, and the vegetable world greatly refreshed.

March 22nd, Tuesday. During the past week the weather has undergone an entire change. The occasional winds and showers have considerably cooled the temperature of the air.

- 1831.—March 31st, Thursday. We have heard much of the “march of intellect,” but Sydney has witnessed an extraordinary “March of heat.” March is usually in this climate a mild, temperate month; its first half is now and then oppressed with a few warm days, but on the whole it has been considered a pleasant month, growing gradually cooler, week after week, until at last it becomes delightfully refreshing. This year, however, has formed a strange exception, for the month of March has been a march into burning days and sultry nights. Monday and Tuesday were perhaps the most overpowering days experienced throughout the summer; it was scarcely possible to breathe, especially on Tuesday night, when the atmosphere was as still as death, and the mosquitoes swarming in clouds, and attacking the panting inhabitants with tenfold fury and violence. Early yesterday morning this extraordinary heat, as usual, terminated in a tremendous southerly gale, which cooled the air, though it buried us in clouds of dust.
- April 5th, Tuesday. Until the day before yesterday (Sunday) the heat continued extremely oppressive, and quite extraordinary for so advanced a season of the year. On Sunday afternoon it began gradually to moderate, the rays of the sun being mitigated by light clouds and a cool breeze coming from the sea. In the course of the night the expected gale from the southward set in with tremendous fury, accompanied by torrents of rain, and throughout yesterday the inhabitants of Sydney had the long wished for luxury of breathing an atmosphere below 70 degrees. The rain was much needed by vegetation, to which it has already been of great service.
- April 21st, Thursday. During the storm on Saturday night, many of the ships in the harbour dragged their anchors. The brig “Norval” completed drifted, and was in very great danger until the boats under the direction of the master attendant hastened to her assistance.
- April 23rd, Saturday. We are sorry to learn that the accounts from Hunter River are truly afflicting. The agricultural farms near the rivers have suffered most seriously from the late rains, many of them being at this time completely inundated. Hundreds of acres of stubble maize are entirely washed away, and there having been less early corn planted in that quarter than for several years past, the crop of maize may be feared to be a complete failure. A great quantity of potatoes which a few weeks since promised a fine crop are also totally destroyed. The accounts from the banks of the Hawkesbury are not of a more pleasing nature, the floods being immense and at some places truly terrific. We fear we shall have to inform our readers, when we are in possession of more particulars, of very many sad accidents. The market on Thursday last, owing to the heavy rains which rendered the roads almost impassable for teams, was but thinly attended.
- Tuesday, April 26th. During the heavy storm on Saturday week, the signal post at South Head was struck by lightning and shattered to pieces.
- May 3rd, Tuesday. We fear very much that the injury occasioned in the interior by the late incessant rains is much greater than appeared. At Windsor, we understand, very considerable damage has been done to the wheat stacks, as well as to the standing corn. The bridges at the Cowpastures, Myrtle Creek, and Bong Bong were not fordable a few days ago, so that travellers have been obliged to swim their horses, and one man, together with his horse, were unfortunately drowned in attempting to cross the bridge at the Cowpastures.
- May 7th, Saturday. We understand that the Parramatta and Liverpool Roads have been so much cut up by the late rains that the stage coaches find it almost impossible to travel. However, it may be observed that the same cause which occasioned the damage, namely, heavy rain, has also prevented its being repaired.

(High flood in the Hunter early in May, probably about 1st.)

1831.—May 10th, Tuesday. The fine seasonable weather we have enjoyed during the past week has not failed of the desired effect. The water has receded pretty generally from the lands which were flooded, and we are happy to hear that the damage sustained has been by no means so extensive and disastrous as the fears of the sufferers had led them to anticipate.

May 24th, Tuesday. There have been still further falls of heavy rain. On Saturday, Sunday, and the earlier part of yesterday, it poured down very copiously, but in the afternoon of yesterday the sun broke out and we had a serene and most pleasant evening. From all we have heard, there does not appear to have been any serious injury done to the farming districts; even at Hunter's River, where there has been partial floods, the loss has been trivial, and confined to a small number of individuals. (See April 17th, 1832.)

June 4th, Saturday. The continuance of fine weather begins to encourage the settlers with the hope of being able, after all, to get their wheat into ground; at any rate it will occasion late crops the ensuing year.

June 7th, Tuesday. The charming weather with which we have been favoured during the last fortnight has been terminated by piercing blasts and torrents of rain. On Saturday afternoon the sky became suddenly overcast, and the rain began to fall fast and thick; during the night there were some excessively heavy showers, which continued at intervals throughout Sunday; and yesterday was one of the dullest, darkest, dampest and wettest samples of a gloomy Australian winter.

July 21st, Thursday. Snow has fallen in the neighbourhood of Bathurst during the past week, and in some places it lies 3 feet deep. The Sydney folks never witnessed snow in their town, yet there are great falls of it about 30 miles distant from the Nepean.

August 6th, Saturday. The genial showers which we have enjoyed during the last two days have produced a most enlivening effect on the gardens round Sydney, in which they were much needed.

August 9th, Tuesday. The moderate fructifying rains we experienced the latter end of last week have produced the effect which might be anticipated. The fruits of the ground have received a new impulse, and show the benefit received by their invigorated appearance. The atmosphere, too, has been considerably milder, and the genial tokens of returning spring begin to manifest themselves on every side.

August 11th, Thursday. The rains of last week have occasioned the spring grasses to shoot up plentifully, which will prove a most seasonable relief for our cattle and sheep, the herbage having become very scanty for their support.

August 16th, Tuesday. On Saturday last we had one of our strongest westerly gales, amounting at times to a perfect hurricane. Its violence was unusually prevalent, being felt at the Hawkesbury and upwards of a hundred miles to the southward of Sydney.

September 1st, Thursday. The want of rain has retarded the growth of wheat very materially at the Illawarra district; in fact, vegetation is at a standstill. The colour of the wheat has changed to a sickly yellow. The land is uncommonly dry and hard, and getting worse every day in consequence of the long continued gales of wind, amounting at times, and not unfrequently either, to a hurricane. No rain has fallen there since the last quarter of the moon in June—not a shower, however, of sufficient importance to refresh the herbage.

1831.—September 6th, Tuesday. The growth of wheat at the Hawkesbury is quite at a standstill for the want of rain; in some dry situations it looks quite yellow and stunted, and were it not for a night's light rain we had at the beginning of the month the crop would have suffered much. The frosts have been very severe, and in fact have not yet left us. The refreshing showers which fell on the 5th at Nepean greatly improved the verdure of the crop, which generally wears a healthy appearance, though in some parts, where exposed to the west the dry harsh winds of the 22nd and 23rd have given it a sickly hue, but that will probably be renovated by the genial rain of the 31st. On the whole, the wheat may be considered very promising throughout the district.

September 10th, Saturday. The heavy rains of the last few days, although of course highly beneficial to the agricultural districts, have occasioned a great hindrance to the mechanical classes whose callings require them to be in the open air.

September 27th, Tuesday. Some of the latter days of last week were very sultry and oppressive. On Sunday and yesterday we had some heavy falls of rain, which are highly acceptable to our farms and gardens.

November 3rd, Thursday. The maize crops on the Hawkesbury have been destroyed by the grubs and been replanted. This enemy has committed a great many ravages in the gardens of that district, but has now, for the most part disappeared.

November 5th, Saturday. The fine weather and favourable rains of the last month have greatly improved the wheat crop in the Hunter River District; I have not heard of any rust or smut; the only damage reported took place in the neighbourhood of Falbrook, where a very heavy thunder-storm caused a partial damage to the crops. In the lower part of the district a great proportion of the early maize together with a great many acres of potatoes and young tobacco plants have been destroyed by the grub. At Argyle the weather throughout the month has been extremely dry, with parching westerly winds, and many sharp frosty nights; the effects have been very prejudicial to the growing crops and vegetation of every kind.

December 24th, Saturday. The late tempestuous weather has done much damage in the orchards, shaking young fruits off the trees by the bushel.

December 30th. Thunder and hail on the Namoi River. (Jevons.)

(It appears from the Journal of the late Surveyor G. B. White, who formed one of Sir T. Mitchell's exploring party on the Namoi River, that the latter end of 1831 was very hot and dry in that district, and the beginning of 1832 was of like character, but in March, 1832, there were heavy rains in the Upper Hunter.)

1832.—Tuesday, January 3rd. The agricultural districts have suffered much from want of rain, and though on some of the deep rich soils of the alluvial flats it still wears a flourishing appearance, it is to be apprehended that in the approaching season the produce will be very small in comparison with that of other years. The effect of the heat and winds at Illawarra has caused a large lagoon called Tom Thumb to become so dry and hard that a person may walk over it as on the high road. It is 6 miles in circumference, and was never known to go dry before.

January 7th, Saturday. During the last month the weather has been so oppressively hot and sultry, accompanied by tempestuous and drying winds. With the exception of some two or three slight partial showers, we have experienced no rain since the beginning of

The meadow land is, generally speaking, completely burnt by scorching sun, and as a natural consequence the cattle are in the condition for want of a sufficiency of fodder.

- 332.—January 12th, Thursday. A thunder-storm on last Friday night was the prelude to copious and refreshing showers, which have continued to visit us with their invigorating influences up to the present time. The effects on the vegetable kingdom are already apparent, and the farmers are in fresh spirits at the seasonable relief, many of them having been reduced to the extremity of felling trees for the support of their cattle.
- January 24th, Tuesday. On Saturday and Sunday the sky was covered with dark clouds, promising every moment those copious showers of which the field and garden have for some time stood so much in need. In and about Sydney however, we had merely a slight sprinkling, but we learn from good authority that in several parts of the country such as the Hawkesbury, Nepean, and Liverpool, the rain was very heavy, and has been productive of the best effects.
- January 28th, Saturday. During the extremely high wind that prevailed on Thursday afternoon, a stack of chimneys was blown from the roof of a house on Brickfield Hill. The late rains we are happy to find have extended pretty generally in the interior, and produced the most beneficial effects. The grass is springing afresh with great vigour, and there will soon be abundant supply for the cattle.
- January 31st, Tuesday. Owing to the very heavy strong southerly winds that prevailed along the coast, the "Sophia Jane" steamer did not reach Sydney till Sunday morning.
- February 2nd, Thursday. "Bathurst, Thursday, 26th."—Some gentle showers have fallen within the last day or two, and the appearance of the sky indicates a continuance of moist weather. The air has become chilly; the south-east winds now blowing are raw and piercing, and the surrounding mountains are thickly enveloped in vapour.
- February 7th, Tuesday. At Bathurst they had three very heavy showers during last month, which have been of very great advantage to the natural pastures. The thermometer has had a most singular range, being as low as 38° and as high as 95°.
- February 18th, Saturday. Until yesterday this has been the wettest week Sydney has experienced for many months past. The rain fell in abundance, giving the ground a thorough soaking, and we are happy to hear it has extended far into the interior. Yesterday was remarkably fine, the clouds had dispersed, and the sun poured the full power of his fructifying rays into the refreshed soil. The garden and field could not have had a more seasonable or beneficial rain.
- February 21st, Tuesday. Saturday was one of the hottest days we ever remember. The recent rains having saturated the earth, the atmosphere was impregnated by an aqueous vapour not unlike steam issuing from a boiler, while the sun poured down all the fury of his heat. It was dreadful. Man and beast groaned beneath the oppression, and numbers of working oxen dropped down dead on the public roads. In the evening we were, "as usual," relieved by a stiff southerly gale, wafting health and vigour on its blessed wings. On Sunday night we were visited by a tremendous storm of thunder, lightning, rain, and hail. The lightning was magnificent beyond description, spreading over the whole canopy of heaven, and assuming a thousand various forms. The storm broke heaviest over Parramatta, where the artillery of the skies roared and cracked in deafening peals, making the very houses totter. We have not yet heard of any accidents.
- February 25th, Saturday. During the thunder-storm on Sunday night, the barn of Mr. Single, a respectable settler on the Nepean, was struck by the electric fluid, and entirely consumed. It was stocked with a large quantity of wheat and other produce, and the loss is estimated at £1,000.

1832.—February 28th, Tuesday. A cloudy sky and humid atmosphere, with nightly visitations of lightning and thunder, has prevailed during the early part of the present week at Bathurst, but little rain has fallen in the vicinity of the plains. The weather, notwithstanding, may be pronounced to be favourable for agricultural operations. New grass is springing up luxuriantly, to the great comfort of the cattle, joy of their owners, and consequently improvement in the dairy.

March 8th, Thursday. At the Nepean the weather has been extremely close and sultry, and on the 19th ultimo this district was visited with one of the most awful thunder-storms remembered by the oldest inhabitants. The rain descended in torrents, and one respectable settler had his stacks destroyed by the lightning. Considering the duration and severity of the storm, it is surprising its injurious effects were so limited. At Argyle the weather throughout the month has been of the most favourable description. Frequent warm and copious showers have given a rapid and luxuriant growth to the native grasses and vegetation of every kind.

At the Hawkesbury, in many places the soil is in a state of preparation for wheat-sowing—the late fine soaking rains have mellowed the earth. The Illawarra district has been visited with immense falls of heavy rains, and, between the fall of rains the weather has been close and sultry. Saturday, the 18th, was insufferably warm. The thermometer at 1 p.m., in the sun, was 130°. The cattle suffered much. Working bullocks dropped dead. On Sunday night, the 19th, we had heavy rain, accompanied by vivid lightning. On Wednesday night, the 22nd, we also had very much heavy rain, and the lightning splintered large trees. The rain fell in torrents also on the night of Friday, 24th; the roads were all afloat. This district has had more than enough rain.

March 18th. Surveyor G. B. White mentions “the constant wet we have had at Singleton, prevented the treatment of diseased sheep.”

March 20th, Tuesday. This has been one of the most delightful autumns we remember to have seen since our arrival in the Colony. The gentle showers which have fallen at intervals have caused every kind of vegetation to spring forth with surprising luxuriance.

March 24th, Saturday. The rains have extended very far into the interior. A Windsor correspondent informs us that within these few days the river and creek were rising fast, and that a flood, or at least a high fresh, was daily anticipated.

At Bathurst the weather has been delightfully seasonable since the commencement of the present month, excepting that the early appearance of frost may be considered a premature denotement of the approach of winter, and which has done some small damage to the young maize. On the 3rd instant, being the new moon, and succeeding days, heavy rains fell, which were sorely wanted, accompanied by thunder and lightning. Since the cessation of the rain a rarified atmosphere and clear breezy day continue.

March 19th. Great flood in the Hunter. (See Mr. White's letter, page 165; see also April 17th, this year.)

April 3rd, Tuesday. During the thunder-storm on Sunday the residence of Mr. Raymond, the postmaster, was struck by the electric fluid, and received severe injury.

April 5th, Tuesday. The heavy rains which have fallen during March, at Bathurst, occasioned the rivers in the vicinity of the mountains to attain a height which in some places impeded for a time all travelling. The Macquarie has risen so rapidly on Thursday last that horsemen were unable to pass. Coxe's River, and the rivulet near Mount Renice rose in like manner, stopping the progress of mountain teams,

and the Nepean was bank high, forbidding expectation of the working of the punt for some days. The low lands about Bathurst were partially flooded.

1832.—April 5th, Thursday. The heavy rains and protracted duration of wet weather have greatly retarded the operations of the plough at Nepean.

April 7th, Saturday. At Illawarra ploughing has not yet commenced, on account of the late heavy rains, which have left the ground too wet. On Sunday, 18th March, it commenced raining, and continued the whole of that day and all Monday without intermission, and on Tuesday and Wednesday it fell in torrents. Thursday and Friday following it was at intervals showery, and on Friday evening the Tom Thumb Lagoon broke out, to the great satisfaction of the inhabitants, for the waters were running with great rapidity and were much swollen. The residue of the month was very close and warm. (This lagoon is sometimes shut in by a sand bar thrown up by the waves.)

April 12th, Thursday. Some very heavy falls of rain have been experienced in the last month at Argyle, particularly about the 19th and 20th. Most of the rivers and creeks overflowed their banks, but we have not heard of any damage of importance.

April 12th, Thursday. The last few days have been fine, and the temperature is now cool and refreshing, reminding us of the approach of winter.

From gentlemen recently returned from the remote southern stations, we learn that the Murrumbidgee has risen considerably above its banks and covered most of the extensive plains in the neighbourhood with an ocean of water. We have also before us several letters from the Hunter, describing the inconvenience and loss sustained by the writers during the prevalence of the flood. In some cases the loss has been very severe, but on the whole far less injurious than was anticipated.

April 14th, Saturday. The late flood at the Hunter has destroyed all the stubble maize, and much of the early maize is injured by the water causing the grains to sprout. Since the 18th all work has been suspended.

April 17th, Tuesday. A correspondent at Paterson Plains informs us that the late flood on March 19th was by far the greatest that had occurred in that part of the country during the last ten years—that is, since the foundation of the settlement. The one of May of last year was considered an extraordinary one, but this was full five feet higher. As an instance of the frightful extent of the inundation, he mentions that Mr. Lang, a settler on the Paterson, sent his boat on two occasions loaded with flour across the bush to Maitland. No lives were lost at the Paterson, but at Maitland six or seven persons were unfortunately drowned. (Mr. A. Macdougall gives the date of this flood in the Hunter as March 19th at Maitland, and Mr. Close at Morpeth gives the date as March 20th. Mr. Eckford gives the date as April 6th, and the height as 29 feet at West Maitland, or 8 feet less than the great flood of 1820. (I am unable to decide whether there were two floods or not, but the western rivers were flooded in March.)

April 17th, Tuesday. We are sorry to hear that the late rains have had an unfavourable effect upon the potato crops, which being for the most part planted in low ground have suffered considerably.

April 19th, Thursday. We have been visited this last two or three days with heavy and unremitting rains. The quantity of water that fell during the evening and night of Tuesday, 17th, was excessive. The streets were literally converted into canals; wells rose as much as 8 and 10 feet, and many inhabitants were compelled to forsake their lower apartments.

1832.—April 19th, Thursday. With very little variation the whole of last month at Bathurst was so rainy as to prevent the ordinary operation of the farm to be carried on with any degree of regularity. In the early part of the month s.e. winds prevailed, and the silver clouds floated high to the n.w. and on a change of wind they returned, when the rain descended in torrents. When the weather took up, the nights became clear and frosty. On two occasions the atmosphere was remarkably cold, and the succeeding mornings were accompanied with a thick hoar frost.

April 24th, Tuesday. We regret to hear that the late rains have produced the most prejudicial effects on the low lands in all parts of the country.

May 3rd, Thursday. At Bathurst the weather has been cold and wintry, which, though not actually unseasonable, has protracted the ripening of the maize crop beyond the usual period of gathering it. Notwithstanding the early frosts and other lower casualties, it promises to be tolerably abundant and of fine quality, the grain broad and large. The waters have been up during the last fortnight, which is exceedingly unpropitious for the expedition under Captain Forbes, whose course is in the immediate vicinity of rivers which are known to attain great height in rainy weather. Consequent, on every rise of the Macquarie River, some unfortunate creature meets his death in endeavours to cross it. On Thursday evening, 26th of April, a team arrived at the river side, where several persons at the time were waiting to get over if opportunity offered. The driver of the team made the attempt with four men in his cart, but before reaching the centre the whole were overturned by the rapidity of the current and swept down the stream a considerable distance until their progress was checked by an angle of the bank; one of the men and also a bullock were drowned. Such an instantaneous accumulation of waters is uncommon; at 9 o'clock in the morning no indication of a flood appeared. Numbers waded across in the usual manner, having business, which detaining them an hour or two, they found themselves at mid-day unable to return to their homes, and still suffering the inconvenience of detention.

At Nepean the predominance of wet weather during the month of April has considerably retarded the preparations for sowing, which had only partially commenced.

May 12th, Saturday. At Illawarra the sowing of wheat has been much prevented by the heavy rains of the preceding months and the very unsettled state of the weather during the last month, and which has unfortunately thwarted the design of the settler to plough the land he intends to sow; superadded to the additional labour of removing a species of wild nettle which, from the moisture of the season has unavoidably covered the fields.

At the Hunter's River, the fine weather which has generally prevailed during last month has enabled those settlers who cultivate the higher grounds to proceed with the sowing of wheat. The low lands are drying rapidly, and if the present favourable weather should continue, the wheat sowing will be concluded in good time. The stock of old wheat has been much affected by the fly and weevil.

May 15th, Tuesday. At Argyle the weather throughout the month of April has been remarkably mild and open, with the exception of one day's heavy rain which somewhat retarded the field operations, but the succeeding fine weather soon restored the land to a working state. As yet there have been no frosts of any consequence.

- 1832.—June 2nd, Saturday. At Argyle, the weather throughout the last month has been dry, with frosty nights and clear pleasant days in the northern and eastern districts, but in the southern and western districts there have been several days heavy rain.
- June 5th, Tuesday. At Nepean, the fine open weather following the moisture of April has brought the ground into good working order, and rendered the labour of the agriculturist comparatively light. Of the last year's crop, on several farms, a considerable quantity is injured by the ravages of the fly, which prevails both in the stack and the granary. During the heavy gale of wind that blew from the westward on Friday, the "Burrel," merchantman, dragged her anchor and was within a few yards of striking on the rock at Fort Binrelong; she was, however, luckily brought up with another anchor.
- June 12th, Tuesday. The weather during the last month at Bathurst has been very seasonable. Frosty nights and mornings, the characteristics of winter, have been general, and the atmosphere clear and bracing, and but little rain.
- June 23rd, Saturday. At Hunter's River, the weather during the last month has been dry, and strong westerly winds prevailed, and consequently the growth of the wheat has been retarded. A heavy shower on the morning of the 29th was of great service.
- July 5th, Thursday. At the Hawkesbury the wheat does not shoot up very rapidly, owing to the dry weather; but this perhaps is better than its running into rankness in an early stage of vegetation, being subject to an arrest of growth from the frosts of July and August, however, a little moisture would do no harm now. At the Nepean the early sown wheat presents a healthy and luxuriant appearance, whilst the effects of the frosts which have set in with unusual severity thus early in the season has checked the progress of the latter sown considerably. The tilled land is more encumbered with weed than heretofore, attributable mainly to the rains and luxuriant vegetation of the autumn.
- July 12th, Thursday. No rain has fallen in the Hunter River District during last month, but the tops of the mountains have been covered with snow, and westerly winds have been in consequence peculiarly dry and piercing. The wheat has not advanced in consequence. The sowing is completed, except in the lower district, where numerous grubs have destroyed large portions of the wheat as soon as it has shot above ground. Hopes are entertained that the cold weather will destroy them, and the settlers who have suffered by them are ploughing and sowing the ground anew. The stock of old wheat is much affected by the fly.
- July 19th, Thursday. At Argyle the weather throughout the last month has been invariably dry and frosty, nights cold, and days for the most part clear with sharp winds. The ground has got extremely hard and dry, and ploughing is performed with difficulty.
- July 21st, Saturday. At Bathurst more severe weather has been experienced than for many years previous. Snow has already fallen in larger quantities than during the whole of last year. The frost has been intense. Rain fell in the beginning of the month, but not generally.
- August 11th, Saturday. The district of Illawarra has had continued wet weather for the last ten days, which has very much improved the appearance of the growing crops; but great apprehensions are entertained for the low sown lands should this wet continue. The rain has descended in torrents for the last forty-eight hours; and Illawarra naturally lying low begins to assume the appearance of too much having fallen. The creeks and waterholes are overflowing. The rain was however very much required, both for the comfort of man and beast: the water had not only become exceedingly scarce, but also very unwholesome from remaining so long in a state of stagnation.

At Argyle the weather for the greater part of the month has been clear and dry, but during the last week many showers have fallen with mild temperature. The late wet weather has for the present put a stop to all field operations; but until then preparations were going on with activity for sowing peas, barley, and maize. It has also for the present completely suspended all travelling: the roads have got into a horrible state, and travelling with heavy loaded carriages will for a long time be impracticable.

32.—August 14th, Tuesday. During the stiff breeze of Friday evening last, the schooner "Governor Bourke," which was moored off the dockyard, dragged her anchor and was in great danger of drifting on the point till luckily brought up by another anchor. The "Defiance" experienced very rough weather off Twofold Bay, which carried away the cap and other iron gear belonging to the foretop-mast, rendering it no longer worthy, on which account she returned to Sydney on Sunday to repair the damages.

August 16th, Thursday. At the Hunter's River the young wheat has been much improved by the rain which has fallen during the last month, and generally looks well. The cold and dry weather of the month of June has retarded its growth, and it is so backward as to require a mild and genial spring to enable it to attain a growth sufficient to protect it from the effects of the hot weather. The grub has extended its ravages since my last report, but since the rain of last week, has not been so destructive as before.

September 1st, Saturday. At Argyle the weather the first part of the month of August was warm for the season, with frequent rains; the latter part of the month has been more dry, with sharp frosty nights, but still very variable. In the evening of the 24th of August a considerable quantity of snow fell.

September 6th, Thursday. The young wheat at the Nepean has been much improved by the rain and subsequent mild weather occurring towards the end of the month, and the early sown particularly presents an appearance not often experienced so early in the season.

September 8th, Saturday. The weather during the whole of the month of August (at Bathurst) has been exceedingly fine, with the exception of the last three days which were very wet indeed.

September 22nd, Saturday. At Hunter's River the weather during the last month has been wet; the growth of the wheat crops has been considerable; the plant is luxuriant and promises an abundant produce; the grub has ceased its ravages.

October 9th, Tuesday. At Argyle the first part of the month of September has been dry and frosty, and the want of rain was severely felt; some moderate showers fell about the 22nd and 23rd which much refreshed the growing crops, but they were still too trifling to produce any permanent effect. The latter part of the month has again become dry, with sharp frosty nights and warm days; rain is beginning to be much needed. On the rich and alluvial flats at the Nepean, which form a considerable portion of the district, the wheat is in a forward and promising state, its growth having been assisted by occasional showers not extending far from the range of mountains. On the forest lands the crop is not so forward, the dryness of the weather generally this month (September) preventing much verdure. The fine rain which fell on the 30th will no doubt cause a gratifying change. At Illawarra the young wheats are growing very fast, and were never known more promising in this district than this year.

1832.—October 4th. Bathurst—The seasonable rains of the present week have greatly rejoiced the hearts of the settlers, who had began to review the droughty condition of the land with feelings little short of apprehension; fear is however dispelled for a season at least. Sufficient moisture has fallen to saturate the ground, and a warm sun succeeding has clothed the fields in Nature's vivid livery of green. The frosts continued unusually late in the season, the change of the weather of the last few days having only terminated their intensity.

October 18th, Thursday. At Hunter's River the small quantity of old wheat which remain have been greatly injured by the fly.

November 10th, Saturday. At Argyle, in the early part of the last month, some very fine and much needed showers fell; but the greater part of the month has been dry, rather warm for the season, and without frosts; at present rain is much wanted.

November 15th, Thursday. At Illawarra the wheat is very much in want of rain; there are some few indications of rust and smut. The harvest, notwithstanding, promises fair to be the best that has ever been reaped here.

November 20th, Tuesday. At the Hunter's River the month of October has been dry, with an occasional thunder-storm, and the wheat crops have made considerable progress. The fields generally present a flattering appearance, but in some places complaints are made of the rust, and smut is also observed.

November 27th, Tuesday. The long continued dry weather, although favourable for getting in the harvest, begins to be sensibly felt in the gardens as well as by various sorts of field produce. A little rain at the present period would prove of incalculable value.

December 4th, Tuesday. We are sorry to hear that the early crop of potatoes has proved a failure over the country in general, in consequence of the severe drought; and that most other products, especially tobacco, are suffering from the same cause.

Feelings of gloomy apprehension already predominate in the minds of the settlers of the Bathurst district, consequent on a protracted period of droughty weather. A powerful sun, parching winds, and a dense atmosphere charged with blight, give a melancholy indication of disappointment to the farmer's best hopes, and forbode a painful scarcity of "the staff of life."

This hot troublesome weather was immediately preceded by frost, which continued unusually late in the year.

At Argyle the weather throughout the last month has been extremely dry and parching, with constant westerly withering winds; the effect has been most destructive to vegetation in general.

December 6th, Thursday. The accounts from the interior continue to describe the sad effects of the long-continued drought. The herbage is burnt up, the waterholes are dry, and the cattle are suffering severely.

At Illawarra the weather has been dry, with a scorching sun and parching winds the whole of the month. The wheat is much affected with rust and smut. The harvest is very general now, and requires great exertion on the part of the labourers, or one-third would shed from the excessive heat of the sun and boisterous weather.

December 11th, Tuesday. The rains of Friday night have produced the most beneficial effects on the gardens and meadow land round Sydney. Nature has reassumed her "livery of green," and vegetation has received a new life.

December 13th, Thursday. The vine crops we are sorry to find will prove a partial failure this year, the young grapes in exposed situations having been blighted and withered by the late winds.

1832.—December 15th, Saturday. At Hunter's River the weather during the month of November has been hot and dry, and the prevailing westerly winds have been extremely prejudicial to vegetation. The wheat crops ripened quick, and reaping became general early in the month. Smut prevails in every part of the district, and rust partially appears. The wheat from this district will be inferior, but the quantity will be greater than anticipated.

December 20th Thursday. The fine growing rains which we enjoyed in Sydney on Monday morning and Monday night we are sorry to hear that it did not extend so far into the interior even as Parramatta. (See Jan 12th, 1833.)

The *Morning* newspapers give weekly weather tables showing the rainy days, but not the amount. The number for the whole year was only 66; the latter part was dry, for September had only two days rain, one in October, one in November, and two in December.)

1833.—January 1st, Tuesday. At Argyle in the early part of last month several heavy thunder-storms fell in the southern and western parts of these districts, and their effect in reviving the languid and perishing vegetation has been extremely beneficial. In the northern and eastern part of the district the showers were very slight, and produced no permanent effect.

January 3rd, Thursday. In the Nepean district the wheat harvest has terminated, and although the grain has partially suffered from dry hot weather occasioning a premature ripeness, the crops appear to be a fair average. Maize, potatoes, tobacco, and the native grasses are all considerably suffering for the want of rain.

January 12th, Saturday. At Illawarra the weather during the month of December has not only been very dry, but the sun scorching, accompanied with strong winds. The young maize is dying, as must now be naturally expected for want of rain, a single shower of which has not fallen here since August. The poor animals suffer more now than they ever did in the droughty years of 1827 and 1828; the whole of the grass is burnt, the waterholes are all dried up, and what subsistence they do procure to keep themselves alive they derive from the few green bushes which fortunately escaped the fury of the raging flames. The potato crop also is burnt up and are not larger than a marble.

The Hunter's River district has been much refreshed by the rain that has fallen during the last month. The harvest was finished before the rain commenced, and the crop stacked in excellent order. It is stated that the dry weather has been the cause of the disappearance of smut in the wheat, which, if true, is a new fact for the consideration of scientific agriculturalists.

January 22nd, Tuesday. At Bathurst, in the first week of the month of December, rain fell in some considerable quantities, and was generally distributed over the district, the consequence was the filling of the ears of corn, and restoring the hope of reaping a moderate crop. Tobacco for want of rain it is feared will prove in general a defective crop.

February 5th, Tuesday. At Nepean the continuance of dry weather throughout last month has occasioned a serious disappointment to the settler; the early crops have suffered much, and their produce will be small. The latter corn is more promising, and should a favourable occur shortly, may yield abundantly. Smut prevails in the a large extent, and on some of the forest land the grain did ill.

- 1833.—February 9th, Saturday. At Hunter's River the weather during the month of January has been dry and hot, with an occasional thunder-storm; the ground is very hard, and but little progress has been made in ploughing up the stubble. The early planted maize will return but a trifling produce, and the stubble maize has come up weakly; it has suffered severely by the dry weather. The only maize which looks healthy is that which was planted in the latter end of October and beginning of November. In some favoured situations the tobacco plants have attained a large size, and consequently the produce will be great, but the crop generally speaking has failed, as the season has been so very unfavourable. The live stock continues to support its good condition, as the grass has been kept in a growing state by the late rains.
- February 12th, Tuesday. The weather (at Argyle) throughout the month of January has been extremely parching and dry, but not unusually hot for the season. Thick mists have frequently come on at night, exciting strong hope in the anxious farmer of a speedy fall of rain, but these hopes have thus far ended in disappointment; the country is everywhere burnt up, and presents a most desolate and dreary appearance.
- February 14th, Thursday. The sudden squall which came on yesterday afternoon capsized a wood boat which was making the best of its way to the Market Wharf. The two men who were in it were fortunately rescued.
- February 26th, Tuesday. The thermometer during the present month at Bathurst has seldom been lower than 95 degrees eight or nine hours in the day; and during three days it rose to 105, 107, and 107½ degrees.
- February, 28th, Thursday. The rains are said to have extended over a great part of the country, and are welcomed with joy by the settlers.
- March 7th, Thursday. At Nepean the preparation for wheat-sowing has been much retarded by the long drought, which rendered some of the close soils almost impenetrable to the plough. The fine showers of the last three days of the month have produced beneficial effects by remedying this evil, and the settlers are actively engaged preparing for the next year's crops.
- March 12th, Tuesday. The weather has been extremely cold for the last two or three days, accompanied by rain, which will prove highly beneficial to the late turnip crop. The accounts from all parts of the Colony in regard to the harvest are extremely good.
- March 14th, Thursday. At Hunter's River the dry weather continued last month until within the last few days, when we were visited with a refreshing rain, which has enabled our agriculturists to commence the tillage of the wheat fields. From the extraordinary state of the weather at Bathurst, very little was done in the field last month. Excessive heat has marked last month, simply but beneficially varied with an uncommon hurricane and some rain. 107 degrees in the shade several times showed the state of the atmosphere; and the mercury was seldom lower than 95 degrees for two-thirds of the month, during nine or ten hours a day. Campbell's River was scarcely better than a chain of standing ponds, in which the dead fish strongly marked the quality of the water. Also the Fish River barely managed to make a run.
- March 16th, Saturday. The report from Argyle for the month of January might almost serve again for that of last month. The weather has continued much the same, but towards the latter end some thunder-showers have fallen in places, which have had a good effect to a limited extent. On the nights of the 20th and 21st we had sharp frosts, which have partially injured the tobacco crops. Live stock are but in ordinary condition, grass being scanty everywhere.

1833.—April 6th, Saturday. At Argyle last month has been fair and open, with some fine showers occasionally, which have done much good, but have been insufficient to produce any considerable effect, or to penetrate deeply into the ground, and rain is still much wanted.

April 9th, Tuesday. The small quantity of rain which fell during last month at Nepean brought up the early sown wheat on the loo- rich soils, and it wears a healthy appearance. Besides repeated showers that fell at intervals during last month at Illawarra, it rained in torrents the whole of the night of Wednesday the 27th, which made the land in excellent order for the plough. The little maize that is grown here looks tolerably well, considering the lengthy drought it had to endure at the commencement of the season. Horses and cattle are looking well, there is abundance of water and grass for them now.

April 13th, Saturday. At Hunter's River, in the early part of last month, we were favoured with some refreshing rain, which enabled our settlers to commence the ploughing of their wheat lands; but the dry weather of January and February has caused the operation to be delayed too long, and I am not able to report that much wheat has been sown. The fine shoot of grass in the lower part of the district has caused the stock to improve. The rain did not extend to the upper district, and the pastures there remain parched and dry; but from the superior quality of the grass the sheep are in good condition. The cattle generally are in high order.

April 30th, Tuesday. At Bathurst, during the whole month, very little has been doing in the field on account of the extreme drought. Rain has been anxiously expected, but looked for in vain. Even the showers that have fallen are either so sudden or so slight that no perceptible good followed. One or two extremely violent storms have taken place, accompanied with hail-stones an inch and upwards in circumference. The thermometer begins to fall as low as 35 degrees, but rises in the course of the day to 70, and even to 80 before 3 o'clock.

May 4th, Saturday. The rains of last week have greatly improved the face of the country, according to the statements of the settlers from the various districts in the interior.

May 7th, Tuesday. The fine rain which visited Nepean on the 24th has produced a very gratifying change, as the ground is now in excellent working order, and a considerable quantity of wheat will be sown early this month; what is already above ground has materially improved in appearance and promise. The pasturage in general is very scanty, and it is to be feared that the rain of the 24th was too late to effect its restoration before the winter frosts set in. It has, however, done much benefit by filling the waterholes, whilst it occasioned a considerable rise in the Nepean.

May 14th, Tuesday. At Argyle the weather throughout the greater part of last month continued extremely dry; but towards the latter part we had abundant rains, but less so in the more southern and western districts. Since then the weather has continued mild and open, without any frosts of consequence. The dry weather has much retarded the preparations for wheat-sowing, owing to the hard state of the land and the weak state of the working cattle; but little new land will be brought under cultivation this year.

May 21st, Tuesday. So very violent was the hurricane of Thursday last that the hulk "Phoenix" dragged her moorings a considerable distance, but sustained no injury.

23rd, Thursday. Wheat-sowing is proceeding very rapidly at Illawarra now, but has been much retarded at intervals during the winter by the repeated heavy and long-continued falls of rain. During

the latter part of last month the weather was very wet and cold. We have had a sufficiency of rain to last us for a long period, particularly as it is the winter season now, and consequently the sun does not possess the power of drying the land quickly, which causes it to remain swampy in places for a long period. The creeks and waterholes are now well supplied.

1838.—June 1st, Saturday. At Argyle the weather throughout the last month has been mild and open, with very little frost; in the middle of the month we had some heavy rains, which flooded many of the creeks, but without doing any damage.

June 4th, Tuesday. The wheat-sowing at Nepean was nearly completed last month, the rains which fell in the earlier part of the month not having caused any interruption to the labours of the plough. The weather has been mild and open, with no frost till the two last days of the month, and being slight, vegetation has been but little retarded.

June 22nd, Saturday. The settlers of the Illawarra District are still busily employed ploughing and sowing wheat, and which employment has been facilitated very much by the fine weather that we have been favoured with during last month.

June 27th, Thursday. The country begins to assume a very verdant and beautiful appearance, and the crops looking well.

July 4th, Thursday. At Bathurst, the beginning of the month of May was little more favourable to agricultural purposes than the preceding month; but in the middle of the month severe cold set in, which was followed by rain, and immediately afterwards succeeded such a fall of snow as is very rarely witnessed in the Colony. There is little fear of contradiction in stating that more snow fell in one day than during the whole of last winter. The ground now became mellow, and ploughing and sowing were no longer a task. The thermometer began to fall as low as 8° below freezing point, but rose in the course of the day to 56° and sometimes 69°. Some of the land however requires more rain.

July 18th, Thursday. The weather during the last month at Hunter's River has been dry and mild. The wheat and other crops are looking well.

July 20th, Saturday. At Argyle the weather throughout last month was dry and open with very few frosts, and upon the whole favourable for agricultural purposes; but rain is beginning to be somewhat wanted.

August 20th, Tuesday. In the northern and eastern parts of Argyle, the weather was mild and open for the most part of last month with considerable rain, but in the southern and western parts dry weather has prevailed. In the former the ponds are full and the streams running, but in the latter the ponds are low and water is even scarce; towards the end of the month some sharp frosty nights were experienced throughout the district.

September 3rd, Tuesday. The weather during the month of July has been dry and mild at Hunter's River, except about the middle of the month, when we were favoured with showery weather for a few days; in consequence the crops generally present a luxuriant appearance, and unless checked by the late spring frosts afford the promise of an abundant produce.

September 5th, Thursday. The usual mildness of the present season has produced corresponding effects on the growing crops at Nepean, which have shot up vigorously during the last month.

September 12th, Thursday. After the heavy rains of Friday and Saturday last, the roads and streets of the city were in a dreadful state, being in some places 6 inches thick with mud.

33.—December 21st, Saturday. The weather throughout the last month at Argyle was of the most favourable description.

34.—January 9th, Thursday. At Nepean, the weather having continued with trifling exceptions fair and open since the rain, which occurred at the commencement of last month, has enabled the wheat to be carried in good order, and the harvest has proved the crop to be heavier than was anticipated.

January 11th. Thunderstorm.

January 14th, Tuesday. At Illawarra the harvest is finished and the stacks secured, but the greater part of the settlers have sustained great loss by a flood which took place on the 3rd December last. The whole of the bridges were swept away, and many of the settlers in the lower part of the district were washed away, houses and all, and the whole of their wheat that remained cut in the fields was also carried into the sea; all communications with the boat harbour have almost ceased by any means, but entirely so by the settlers' drays and carts, who are unable to convey the small remains of their hard-earned industry to any market. The wheat that remained uncut at that period was beat to the ground and covered with sand and dirt, and therefore partially if not altogether lost.

January 25th, Saturday. We are sorry to hear that the late rains have done considerable damage to the wheat crops up the country which have not yet been harvested. The rain has been very general.

February 6th, Thursday. At Illawarra the weather was remarkably fine during the whole of last month. At Nepean the weather has also been fine, and the crops are looking well.

The *Sydney Magazine* for March, published on March 1st, 1834, under the heading "local incidents," says—"The district of the river Hunter has, during the past month (February) been visited with a heavy and destructive flood. A smart rain during the period of three days caused the rivers Hunter and Williams to rise and inundate the fertile plain in the vicinity of Maitland, in fact so much so that it is feared the maize crop in this district will, if it is not utterly ruined, yield but a sorry return. Many settlers have suffered severely from stock being carried away, fences levelled, and gardens totally destroyed.

"It is somewhat a matter of surprise that during the same time the rain in Sydney was anything but to betoken such a result.

"It is a lamentable fact that the past month has been more unhealthy than has been known for many a year in the Colony; those carried off are chiefly children, caused, it is said by too free use of fruit, and adults suffer severely from bowel complaints."

February 13th, Thursday. At Argyle the weather has been for the month past hot and dry throughout. Some few showers fell in the early part, but not sufficient to materially impede harvest operations. Rain begins to be much wanted.

February 15th, Saturday. The scarcity of water about Sydney is at present so urgent that the various vessels requiring supplies have to send their boats as far as Rose Bay, and wait on the spot several nights together before a sufficient quantity can be obtained for their use.

February 22nd, Saturday. The late rains have not penetrated the ground sufficient to put the plough into requisition. They have, however, revived the parched grasses, and invigorated the produce of the garden generally.

March 4th, Tuesday. At Illawarra the weather has been very warm throughout the last month. The crops are looking well, but the tobacco has been attacked by the black grub.

1834.—March 8th, Saturday. We regret to hear that the crops along the Hawkesbury present an appearance anything but flattering. The scorching rays of the sun, relieved in so very partial a degree by showers, has tasselled the corn stalks without half filling the cobs.

March 18th, Tuesday. During the strong southerly gale yesterday two sailing-boats were seen apparently unmanageable off Bradley's Head.

April 1st, Tuesday. We present our readers with a chapter of accidents, occasioned in Sydney by the tremendous fall of rain on Sunday last. (The previous Friday was Good Friday.) The morning was dull, but gave no notice of the coming storm. The rain began about 10 o'clock in the morning, and ceased its violence about 4 o'clock in the afternoon. One of the most remarkable accidents was the fall of the main-guard; a large portion of the stone wall of the Soldiers' Barracks in Clarence-street was also washed away; a strong wall erected by Mr. Cooper at his distillery was beaten down by the power of the stream, which dashed over his mill-dam. To particularize the damage would be impossible. Every man in Sydney has suffered in a greater or less degree. To such an extent did the water rise in Bridge-street that, in order to save some school girls, the officer of the guard walked up to his middle in water to carry the inmates to a place of safety.

A flood similar in extent to that which happened on Sunday occurred some seventeen years ago—the destruction to property was very great; but the rain descended for several days, while the present only continued for a few hours.

(A young lady seventeen years of age was carried some distance by the flood, having fallen in while attempting to cross Pitt-street. She was rescued by her friends.)

April 8th, Tuesday. At Nepean the operations of the plough have been retarded by dry weather, but as a favourable change occurred on the 30th, there will yet be time to get the seed in. Considerable quantities of the produce of the last wheat harvest have been attacked by the fly.

April 15th, Tuesday. At Illawarra ploughing for wheat was at a stand during last month on account of the great want of rain, which, however, came down in torrents during the last two days of the month.

May 1st, Thursday. The roads and bridges of the interior have, during the late heavy rains, been very much cut up. Some of the rivers were swollen to a great height, and for some time obstructed travelling.

May 6th, Tuesday. Although the preparing of the land for the ensuing crop at Nepean had been much retarded by the continuance of dry weather up to the middle of last month, the heavy rain of the 21st, followed by light showery weather, has enabled the settlers to commence sowing.

May 22nd, Thursday. At Illawarra the weather was for the greater part of last month very wet, the rains at times falling in torrents, and there are few that have not sustained damage more or less. The settlers situated in the lower parts have been up to their knees in water in their houses, and through very many of the humble houses the water made its course. The floods have left precipices on the roads almost impassable for carts and drays.

May 27th, Tuesday. The late heavy rains have sadly cut up the roads in the neighbourhood of Sydney.

May 31st, Saturday. The rain which has fallen so copiously about town during the week, we learn, has been but partial some miles in the country. The crops however are looking well.

- 14.—June 5th, Thursday. At Nepean, the ground being in excellent order from the moisture of the latter part of April, sowing was zealously proceeded with during last month. The cold has checked the devastation of the fly, but great injury was done previously.
- June 19th, Thursday. During the severe squall on Sunday afternoon three boats were upset in Darling Harbour and the Cove.
- June 26th, Thursday. (Bathurst, June 16). At Bathurst heavy rains have fallen without intermission during the past week; and yesterday morning, June 15th, thunder and vivid lightning accompanied a hurricane of wind and an impetuous fall of rain. The low lands are flooded, and agricultural operations for the time suspended.
- July 15th, Tuesday. At Nepean the appearance of the growing crop is luxuriant. The frost during the latter days of last month has given a check to its too great exuberance, but in general the crops have never looked so well.
- July 17th, Thursday. At Illawarra the crops look very healthy and vigorous. The weather has been very fine and mild, and they have been visited with three or four frosty nights only.
- August 7th, Thursday. The want of rain is complained of in the vicinity of Sydney; but in the interior, rain has fallen abundantly within the last few weeks. At Nepean the weather having continued mild and open, has enabled the crops to attain an unusual luxuriance.
- August 14th, Thursday. The weather throughout the last month at Illawarra has been very windy, blowing generally from the westward. The crops look remarkably well since the late frequent showers which have fallen to refresh them.
- August 28th, Thursday. The oldest inhabitants do not remember any storm equally tremendous as that which shook every house in Sydney on Monday night. The few houses that have fallen were old, and therefore unable to resist a storm that rocked and shook the strongest buildings in Sydney. The light-house was shook to such an extent that Capt. Siddons and his family left it during the more furious part of the gale; the sheet lead nailed to the roof in lieu of shingles was torn up and rolled into bundles such as seen in plumbers' shops; the stables and railing were torn down, and the Captain, an old seaman, accustomed to tempests in every part of the globe, assures us that he never witnessed a more tremendous storm.
- September 4th, Thursday. At Nepean, the weather during the early part of last month continuing dry, accompanied with harsh winds, the wheat had in many parts of the district assumed a very unhealthy appearance; but the abundant supply of rain which fell on the 22nd and two following days has quite renovated it.
- September 18th, Thursday. Storm of snow at Maneroo Plains, beyond Argyle; the storm commenced about the 25th July, and continued with occasional intermissions for three weeks; fortunately there are but few cattle runs at the place where this was felt; and upon the plains of Maneroo little or no snow fell at this period. The only sufferers being the occupiers of the highest or most mountainous stations towards the west of Maneroo, or as they are called "Australian Alps," at the source of the "Murrumbidgee and Snowy River." The snow lay from 4 to 15 feet deep on the ground, burying the cattle in groups.
- September 30th, Tuesday. The whole country has within the last six weeks been visited by showers, and the crops in all the agricultural districts look well.

- 1834 — October 7th, Tuesday. At Nepean rain has fallen during the last month in sufficient quantities to produce and continue a vigorous growth in the crops, and their present aspect promise an early and abundant harvest.
- October 23rd, Thursday. On the morning of Monday last, during a very smart gale from the south-west, the s. "Redman" had considerable damage done her owing to the "Vittoria" running foul of her.
- November 1st, Saturday. By a communication received yesterday, we learn that a hail-storm fell at the Hunter on Tuesday, and inflicted great injury on the standing crops. The letter states that the storm raged with unexampled fury in that part of the country, and that some of the fields have been literally levelled. The hail-stones were full 1½ inch in circumference, and lay in many places a foot high on the ground. Out of one fine field of 30 acres, it is calculated that not more than 20 bushels of grain will be reaped.
- November 4th, Tuesday. During the severe thunder-storm which visited Sydney on Friday evening last, the roof of a new building, situated near the toll-bar, was completely carried into an adjoining field. The signal-post and other various buildings have also been considerably damaged.
- November 20th, Thursday. At Illawarra the weather has been fine and warm throughout the month; the crops are looking well. At Bathurst the temperature of the atmosphere westward of the mountains, varies greatly from the climate below them, which at this time is many degrees hotter than at Bathurst, where the summer heats have not yet been felt. Sharp frosts have been experienced during the present week, and a few days back a hail-storm of extraordinary violence visited the settlement; the stones which fell during the storm were fully an inch in diameter, and flattened like a halfpenny. The crops are generally in a very healthy state.
- December 15th. Thunder-storm at Windsor. (Jevons.)
- 1835.—January 1st, Thursday. The caterpillar made its appearance at Nepean, but the injury sustained was trifling, the wheat being too forward to be damaged in the ear.
- January 31st, Saturday. So hot a day as Thursday last was not experienced in Sydney since the commencement of the present summer. The physical energies were utterly prostrated by it, and we might also say that Nature herself seemed exhausted. In the course of the day the thermometer stood at 109 degrees in the shade. About sunset the wind shifted to s.s.w., and for some hours the town was enveloped in a cloud of heated dust.
- February 5th, Thursday. At Nepean, owing to the showers that fell at the end of December, the crops are looking well.
- February 7th, Saturday. The Illawarra district was never more in want of rain than at the present; the grass is so parched and dry that cattle cannot possibly obtain a sufficiency of food. Water is also very scarce; the holes are generally dry.

Australian.

- March 6th. On Saturday, February 28th, no water could be obtained in many parts of Sydney; many persons had to go without. If the drought continues much longer, disease must follow.
- March 17th. The present rainy weather will be of incalculable benefit to the settlers.
- March 19th. The great fig tree that fell at Pitcairn, near Maitland, on January last, was found to measure to the topmost branches circumference at root, 103 feet; at ten feet above ground, 59 feet; at the first limb, 46 feet from the ground, 34 feet.

Gazette.

1835.—March 19th, Thursday. At Bathurst an extraordinary change in the weather has taken place during the last week. To burning heat and a dense sultry atmosphere has succeeded raw, chilling air, and boisterous winds, with lowering clouds and a general wintry aspect. Some showers have refreshed the plains, while the mountains have been deluged by continuous torrents of rain. Trifling as the rain has been in the vicinity of Bathurst, the crops in general look well.

April 7th, Tuesday. The district of Nepean was generally refreshed by the showers which fell about the beginning of last month, but still the pastures evince a great want of moisture, and unless copious rains shortly occur the feed during the winter will be very scanty.

April 11th, Saturday. The rains that fell during the past month at Illawarra have caused the natural pastures to grow most luxuriantly, but the crops from the late continued drought promise anything but remuneration for the labour and expense of tillage.

The Monitor.

May 6, Wednesday. In the district of Argyle the weather has been so dry that there is a great scarcity of grass in all parts, and in some parts none at all. About a week ago a sharp frost occurred, which killed the leaves of the yearling vines and of the Cape mulberries, and nipt the leaves of the elder vines and potatoes. During the latter end of spring and the whole of summer only four thunder-showers fell in Argyle.

Backhouse, writing in May, 1835, says, at page 287, "very little rain had fallen for many months."

May 16th, Saturday. The new moon has again set in dry, and nothing but hard frosts and barren heaths seem to be the portion of graziers during the next five months.

June 9th, Tuesday. The fall of snow on the mountains this season is greater than has ever been remembered; it has been so deep near Stony Range and Mt. Lambert that the mail was obliged to proceed with three horses.

June 10th, Wednesday. In Argyle the moon set in with a strong wind from the n.w., accompanied with trifling showers, like April weather in England. On the 1st inst. there was sleet in the evening and the morning; on the second the hills were whitish, while here and there snow laid in the valleys. An icy wind from the n.w. blew a gale all next day, accompanied with showers of sleet.

July 11th, Saturday. The Hunter's River agricultural establishment are sadly complaining of the want of rain for their crops. They have had nothing worth talking of for some time past, and the crops are sadly dried up. A similar complaint prevails in other directions.

July 18th, Saturday. The late heavy rains which have prevailed in Sydney have been much more partial in the interior. About Windsor and the rest of the Hawkesbury, Grose, and Nepean, the showers have been only occasional and light, and by no means calculated to invigorate the soil, which from excessive drought has become parched and dried up.

July 29th, Wednesday. On Sunday, the 18th, and thereabouts, a good day's rain fell at Yass Plains, Goulburn, and some other parts, but Strathhallen district and the neighbourhood of Lake Bathurst and other parts of Vincent had only a light shower or two.

August 6th, Thursday. At Nepean the appearance of the crops has been slightly improved by the light rains of the 14th, 16th, and 20th, but unless followed by a more copious supply the improvement can be but temporary.

- 1835.—August 12th, Wednesday. At Argyle the rain fell about three weeks ago, in many places to the depth in ploughed land of 6 inches; in other places it did not enter the ground an inch—such parts, therefore, continue as parched as ever.
- August 26th, Wednesday. On Sunday, the 16th inst., there was rain and wind in the vicinity of Argyle, but more of the latter than the former yet it came from the s.e. The ground was penetrated about an inch and the ploughed land about two inches.
- September 5th, Saturday. On Friday, the 21st, a gentle rain fell in Argyle for about twelve hours, but it only penetrated about 4 inches in ploughed land and 2 inches in the pastures. A warm wind blew violently all the day of Wednesday, 26th, which was succeeded next day by a cold one from the same point of the compass still more violent.
- September 15th, Tuesday. The drought has been dreadfully fatal to the stock of the country. At the Cowpastures one gentleman lost ten working bullocks in one day. Everything bears a most unfavourable aspect, and if we are much longer without rain the want of grass will destroy the cattle in every direction.
- October 14th, Wednesday. The rain which fell at Bathurst on the 30th penetrated the ground about 4 inches. The thermometer has often been at 75° during the past week, and while we write (October 7th) is at 71°. On Monday, the 5th inst., a heavy thunder-shower fell during half-an-hour at Lake Bathurst; it was so copious as to soak the ground more than any rain which has fallen during the last twelve months.
- October 21st, Wednesday. The last four or five weeks have produced a most material change throughout the extensive district of Bathurst by a succession of mild and seasonable rains, whereby the drooping spirits of the agriculturists have been joyously invigorated.
- October 24th, Saturday. There has been a considerable fall of rain, extending over a wide space of the interior to the westward. The face of the country in that direction, generally, now assumes a luxuriant appearance, the influence of the recent favourable change on the herbage being already conspicuous. A heavy shower set in yesterday at 2 o'clock, which continued nearly an hour, but the wind amounting almost to a hurricane arose and carried it off.
- October 31st, Saturday. On Wednesday, the 28th, rain fell more or less from Sydney to Bong Bong, but none worth mentioning beyond; it was heavy for four or five hours at Bong Bong, and "made safe" all the early sown crops in the district.
- November 3rd, Tuesday. By the frequent fall of fine and refreshing showers during last month a great improvement has taken place in the growing crops at Nepean, and the settlers are now anticipating half a crop where they had began to despair of any.
- November 5th, Thursday. We learn from a correspondent that they have had copious showers at the south of Mittagong.
- November 10th, Tuesday. From a gentleman who arrived from the Hunter yesterday we learn that the crops as far as Black Creek, on the upper part of the Hunter, are a complete failure, and that below Black Creek scarce one-fourth of a crop can be expected. The grass is completely burnt up, and the flocks and herds in a bad state.
- November 11th, Wednesday. At Argyle three-fourths of the fruit were cut off, about three weeks ago, by three severe frosts in succession; the first a black frost, the two last white ones. Ice was in the vessels about the house the first morning.

1835.—November 25th, Wednesday. Yesterday a gentle but soaking rain fell in Sydney, and our letters from Bathurst and Argyle describe it as being general in the south and west.

December 30th, Wednesday. The grass, except among the hills of Molonglo and at Bong Bong, is in a dry and withering state from Liverpool to Maneero, and the ponds are again dried up. The rains in November did not soak the ground, hence there was no drainage, and the subsequent dry weather has dried the earth again; still the rains did incalculable benefit, and the crops from Mittagong upwards are generally good; some of the moist rich fields will yield 40 bushels an acre, to wit—Bong Bong, Molonglo, and Illawarra. The weather has been so cold this spring and summer at Maneero that the settlers have only just commenced to shear their sheep.

Hon. B. Russell: About the end of 1835 stock about Maitland had to be driven up country for feed, owing to the extreme drought then prevailing in the Lower Hunter. Cattle were for the most part taken on the Namoi River.

The Australian Newspaper.

1836.—January 22nd. It is stated no rain had fallen from November, 1834, till March, 1835.

January 19th, Tuesday. Reports upon the whole of the harvest are pretty favourable, although failures have been experienced in the Upper Hunter districts. The crops below have proved invariably good, and generally on the other side of the mountains, throughout the districts south of Sydney, and thence inland, are reckoned promising.

February 4th, Thursday. The wheat at Nepean, which had apparently benefited much by the rains that fell in the early part of December, suffered extremely by the great heat and the winds of the latter part of it, and the produce generally will be very light and indifferent.

February 13th, Saturday. Sydney and its vicinity was visited on Tuesday and Wednesday nights with heavy shows of rain, which have refreshed the fruit and vegetables finely.

February 16th, Tuesday. We have received accounts from Campbelltown, Penrith, and Hawkesbury, that those places have been visited with welcome and refreshing rains, which were much wanted to save the crops from complete ruin. The grass is reviving, and the water-holes, hitherto completely dry, are filled, and the cattle already experience the effects of this timely relief.

February 25th, Tuesday. The late heavy rains have fallen pretty generally.

March 24th, Thursday. At Hobart Town, on Friday 11th, there was a considerable fall of rain. The temperature was about 60°, the barometer 30·2, falling; in the evening it had fallen to 29·8, at 8 a.m. on Saturday to 29·5, the rain then falling in a continuous heavy stream. The wind hovered between s.e. and s.w., which at 2 p.m. had increased to a gale from the former quarter, the rain having fallen unceasingly since the preceding evening. On Sunday it abated, and on Monday the barometer, slowly rising, had reached 29·1, and with the exception of some light showers on Tuesday it has since been fine. This flood was the heaviest that has been experienced here since the year 1828, when about the same period there was similar heavy rain.

The Monitor.

1836.—April 2nd, Saturday. At last there is every prospect of the country generally receiving a thorough soaking. On Wednesday night the rain commenced falling in Sydney, and continued without intermission till Friday night. We learn that at Maitland rain was falling heavily on Thursday. At Campbelltown, too, there was copious rain, and we have no doubt the country has been blessed with a general rain.

April 9th, Saturday. At Argyle we have had rain for two days at intervals, namely, 1st and 2nd of April. It has penetrated the hard forest land 15 inches, and the ploughed land 2 feet and more. All the waterholes have been pretty well filled. Such a soaking rain in Argyle has not fallen for several years past.

May 3rd, Tuesday. Accounts from the country are gratifying, and have been so since the heavy falls of rain. The appearance of the grass now is everywhere green, and vegetation is rapidly advancing.

May 12th, Thursday. According to all accounts the weather for the last three or four weeks has proved remarkably tempestuous in the neighbouring seas. An outward-bound fleet became regularly wind-bound between Saturday and Tuesday night last, owing to the very tempestuous state of the weather.

May 19th, Thursday. In consequence of the late heavy rains the subterraneous channels which supply Sydney with water have overflowed, and it was necessary to scoop out channels to carry off the surplus element.

June 16th, Thursday. During the last two or three weeks the weather off the coast is reported as having been the most boisterous ever yet experienced in these seas, and the severest gales were those which were not much felt inland.

June 29th, Wednesday. Sydney was visited by a fall of snow yesterday morning. The previous night was cold, but not more so than we have felt it before. We believe snow has never been seen in Sydney before. (See July, 1808.)

July 6th, Wednesday. A gentleman who arrived on Monday last from Argyle, states that the snow in that part of the country fell to the depth of a foot and a half.

July 7th, Thursday. The fine soaking rain of Tuesday night and yesterday morning last has, we are glad to hear, spread for a considerable distance beyond town.

July 9th, Saturday. Warm sunny days are coming round again, which will be doubly agreeable after the late unprecedentedly cold and rainy weather. Snow is stated to have fallen plentifully throughout the new country. From the late rains the young wheat generally in the interior assumes a most luxuriant appearance, as do likewise both maize and barley.

July 12th, Tuesday. The ground has not been so completely saturated during any season for above twelve years past as it has been this year. Last week the snow at Bathurst lay upon the ground more than a foot thick. Enough rain has already fallen, should there be no more, to last another three months.

July 19th, Tuesday. The severity of the present winter, not only along the whole line of coast to the southward, but for above 300 miles in the interior, is unprecedented in the memory of the oldest colonists.

July 28th, Thursday. The late heavy rains have played the deuce with the streets of Sydney. Not a turn can you take without seeing the axle of a cart being broken.

August 6th, Saturday. At Argyle the grass is beginning to grow, and the crops are looking exceedingly well.

September 15th, Thursday. The late heavy rains have injured the farmers very materially. There was a great deal of hay cut, which got soddened with the wet, and a quantity of it spoiled.

October 4th, Tuesday. The extreme variableness of the climate lately must be the cause of the severe colds which are now more prevalent than we ever remember them to have been in the Colony. One day last week we experienced a hot wind and a burning sun, the next we had heavy rain with a piercing southerly gale.

October 20th, Thursday. This is said to be one of the most plentiful seasons ever remembered in the Colony.

October 27th, Thursday. The few scorchingly hot days last past have had a serious effect on vegetation. Vegetables in particular have suffered, their moisture being totally absorbed by the rays of the sun.

Sir W. Macarthur says the drought began at Camden this month, and continued to October, 1839.

November 2nd, Wednesday. A correspondent from the Upper Hunter District informs us that the late hot winds have greatly injured the blossoming wheat in that quarter.

November 29th, Tuesday. The weather has now become uncommonly cold for this time of the year. Some of the oldest hands say that this has hitherto been the coldest summer that they ever remember since their arrival here.

December 6th, Tuesday. At Bathurst, about three weeks ago, the whole country was so exuberantly fruitful that hope was predominated universally—one single night destroyed all. The frost came, fruit trees bending with their beautiful burdens were stripped of their ripening produce, and hundreds of acres of young grain were withered up beyond all redemption. The effect is beyond description.

Mitchell, vol. ii, page 120.

1836—Murray was then in flood June 4; natives said with glee it had been much lower, but it flowed *always*.

June 5th. Murray full to the banks.

Page 126.

Murray had risen $8\frac{1}{2}$ feet.

June 14th. Steady rain.

Page 148.

June 24th. Along the side of the stream (creek) "a narrow line of rushes which had grown on the margin of the water when it stood at a much higher level. A concentric border of grass of uniform breadth grew on the slope above the rushes, and one of fragrant herbs below the line of rushes, all being at nearly equal distances, while a single row of bare poles, measuring from 3 to 5 inches in diameter stood where a row of saplings had grown in what had at one time been the very centre of the stream. The poles were the remains of Yarra trees eight or ten years old, and marked the extent, doubtless, of a long period of drought which had continued until some high flood had killed them."

Chas. Bonney, Esq., South Australia.

The winter of 1836 was very wet on the western side of the range, and the rivers in the Albury District in high flood about the end of July.

July 20th, Thursday. The weather for some time past has been uncommonly severe at Bathurst and Penrith, the fall of snow having proved very heavy, so much so that it was eighteen inches in depth on the road. Everything has suffered much from the severe weather.

July 29th, Saturday. We are glad to hear there has been a very plentiful fall of rain in the interior, and that we are likely to have abundant crops of oats and wheat.

August 5th, Saturday. A shock of earthquake was perceptibly felt in various parts of Sydney, between the hours of 10 and 11 o'clock on the night of Wednesday last.

August 8th, Tuesday. The settlers complain sadly of the total want of rain, and say that unless they soon receive some the hay crops will be a total failure.

August 22nd, Tuesday. Extract from a letter dated "Upper Hunter, 15th August,"—"The late rains in the vicinity of Patrick's Plains and Upper Hunter Districts have made a great improvement in the appearance of the crops."

August 31st, Thursday. From a letter dated "Cowpastures, August 26th,"—"We had a good shower of rain yesterday, at which the wheat stared up in astonishment, and the frogs croaked for more to wet their parched pallets, but it was no go. The crops look very badly, and if this weather continues must be almost a certain failure."

September 5th, Tuesday. The district of Yass, different from all other districts in the Colony; has for the last four months been visited with continual rain and sleet, which has had a very destructive effect on the sheep; one gentleman, Mr. M'Farlane, has lost no less than 6,000, and other sheep-owners in proportion.

September 9th, Saturday. By a letter from the Cowpastures, dated 7th September, we learn that the wheat crops are in a wretched state for the want of rain. The frosts have been very severe. The late refreshing showers we have been visited with did not reach more than a few miles beyond Liverpool.

In September, 1837, Mr. G. M. Pitt went to Maitland (the Hunter) and found wheat in the ground dry and without any sign of germination that had been sown in May.

September 14th, Thursday. The district of Bathurst, unlike most parts of the Hunter, bids fair to be blest with most abundant crops at the ensuing harvest. Unless rain falls very shortly at the Hunter, not a grain need be expected from that part of the Colony.

September 28th, Thursday. The upper districts of the Hunter are suffering severely for the want of rain, there is consequently little food for the cattle, which are dying off in large numbers; at Campbelltown and Appin the want of rain is also much felt; this is one of the driest seasons experienced for many years.

October 31st, Tuesday. There has been a hail-storm at Maitland exceeding in violence that with which Sydney was visited on Saturday last.

November 7th, Tuesday. Colds are particularly prevalent just now in Sydney owing, no doubt, to the variableness of the climate and the late hot winds.

November 14th, Tuesday. During the gale on Saturday night between 11 and 12 o'clock, a boat containing three men was driven ashore on Goat Island.

November 30th, Thursday. Yesterday morning broke in with a heat almost unprecedented. Throughout the whole of the day the weather continued very oppressive, with a strong hot wind from the north. Old hands say that it was the hottest day they ever knew; bush fires raged at North Shore for a distance of over 15 miles; great damage was done by the fire.

1837.—December 23rd, Saturday. Wednesday last, the 20th, which was unusually sultry day, was succeeded in the evening by a violent thunder storm; the lightning was unusually vivid, each flash rendering objects distinct for a considerable distance. The crops have been much benefited by the late rains, which extended pretty generally in the country.

Mr. F. Cooper informs me that in 1837 the trees began to die near Lake George, and the disease extended to Taylor's Creek, where the dying stopped for a year or two, and afterwards came on to Cooper's Creek.

Mr. Chas. Bonney.

I started with the first overland party to South Australia, at the end of January, 1837; we followed the Goulburn to its junction with the Murray, and then followed the Murray to the ranges east of Adelaide. The Murray was very low, and the Darling nearly dry at its junction.

Gazette.

1838.—January 13th, Saturday. The afternoon of Thursday, 11th, was ushered in by a violent thunder-storm, which had the effect of cooling the atmosphere, which had been very close the preceding part of the day.

The Monitor, January 15th.

December 26th. Yass.—The weather has not, for the last month, tended much to the benefit of either man or beast. As a specimen of the changes I beg to note down a few. The 11th and 12th were very hot; 13th, cloudy and chilly; 14th and 15th, dreadfully hot, with scorching wind; 16th, cloudy and cold, with occasional heavy showers; 17th, warm; 18th, very cold wind but clear atmosphere; 19th, cloudy and sultry; 20th, sultry, with light showers, thunder and lightning frequent; 21st and 22nd, fine, and since very hot.

February, 14th.

February 8th. Bathurst.—The weather has been exceedingly variable since our last, alternating from extreme heat to intense cold, but without rain; the crops are all in, and there are few complaints.

Gazette.

March 1st, Thursday. Considerable damage was done on Tuesday evening last, February 27th, among the windows and fruit trees of Sydney and its vicinity, by the excessive violence of the hail-storm which fell; the rain fell in torrents of water, but the whole duration of the storm could not have been much more than ten minutes.

March 17th. Yass.—Since my last we have had no rain, and the country around here has a deplorable appearance; a thunder-storm came on about a fortnight ago, destroying the Yass mill; on 23rd and 25th ultimo we had sharp frosts.

March 19th. Bathurst.—The weather has been fine since our last; the gardens are looking well, being refreshed with fine showers.

March 24th. Yass.—The rain set in on night of 21st; alternate light and heavy showers, with occasionally a few hours cessation, have fallen since that day, and still continue. (See October 22nd, 1838.)

April 5th, Thursday. A material change has occurred in the temperature of the atmosphere within the last fortnight, superinduced by the prevalence of southerly winds and frequent showers.

April 11th. Bathurst.—Since our last the country has been refreshed with frequent showers of rain; on the 25th and 26th ultimo the rain fell steadily, and the country begins to look green once more.

April 12th, Thursday. The last accounts received from the Hunter districts are of a most cheering nature, everything assumes the most promising appearance.

The Monitor.

1838.—April 23rd. Yass.—We have had but little rain since my last; on the 21st it rained all day; towards the evening it cleared up and remains fine to this hour.

Gazette.

April 24th, Tuesday. Recent accounts from the Hunter districts give us to understand that the tobacco crops in that district do not present the most gratifying aspect; in addition to which, considerable damage has been sustained by individuals residing on the banks of the Williams and Paterson Rivers, from the overflowing of their tides.

A large whale was observed yesterday gambolling along the shores of the bay on the eastern side of the Government Domain; many spectators had assembled to witness the sight, and we regretted that none of our enterprising native youths had not been apprised of the presence of this unusual visitor, as a fine chase would undoubtedly have been the result.

The Monitor.

May 21st, Monday. Maneroo and Argyle are said to be suffering severely for want of rain. In the former district, a settler informs us that in a space of twenty miles so much grass won't be found as is on the Racecourse, Hyde Park.

At Bathurst the weather has been extremely cold. The rains which continued for some time have greatly refreshed the country, and the accounts from the interior state that the pasture is good.

June 25th. Yass.—On the evening of the 8th instant the rain commenced in heavy showers, and continued until the morning. Rain continued up to the 15th in alternate showers.

Gazette.

July 21st, Saturday. Sydney was yesterday visited by a pretty smart shower and a thunder-storm of short continuance. The want of rain has been severely felt in many parts of the country, especially in the Bathurst and Hunter's River Districts; Sydney was also visited by a squall of extreme violence on the morning of Friday, 20th, at 4 o'clock.

July 31st, Tuesday. About half-past 10 on Sunday morning last, at the beginning of the gale, a boat containing two gentlemen and a lady was capsized off Ball's Head. Several other boats were driven ashore by the strength of the wind, but little damage was sustained.

August 8th. Yass.—Rain has not fallen since my last. The crops are scarcely visible above ground, and a blade of grass is hardly discernible throughout the country.

August 18th, Saturday. Accounts have reached Sydney that rain in large quantities has lately fallen in the neighbourhood of Twofold Bay, and also at Maneroo.

September 1st. Yass.—It appears by the public journals that rain has fallen plentifully in Sydney and the northern parts of the Colony—indeed from the appearance of the heavens one evening we were sanguine enough to anticipate we were going to have a heavy fall of rain; our expectations were however disappointed in wind, as on the night of the evening I allude to a dreadful storm came up from the s.w., and continued with unabating fury until noon on the following day, therefore we have not been blessed with a drop of rain since my last communication.

September 8th, Saturday. The country around the district of Wollombi and Patrick's Plains is said to be in a most lamentable state for the want of rain, and that scarcely a blade of grass is to be seen. The prospect of a wheat crop is said to be heartrending.

The Monitor.

1838.—October 1st. YASS.—We have had no rain since I last wrote. High wind from the s. and w. prevail. The weather has been, for this time of the year, unusually dry although one or two showers of rain fell in the early part of last month.

October 1st. Lachlan River.—Unless Providence favours us with rain very shortly the consequence will be that we will have no harvest. From Bathurst to the lowest stock station on the Lachlan, a distance of 180 miles, and for many miles right and left of that once noble river, the surface of the country is one scene of wretched barrenness. No vegetation, no water, either in creeks or river. The bed of the river is completely dry, with the exception of an odd hole in a few places which still retains a little water. From Mr. G. Wentworth's to Mr. H. Fuller, a distance of 6 miles, not *one* waterhole is to be found.

Gazette.

October 6th, Saturday. In consequence of the continued drought the country dealers have been enabled lately to send in but a very limited supply to the Sydney market, and unless a change of weather shortly occurs the supply will become very limited indeed, or fail altogether.

October 16th, Tuesday. The expectations raised by the very timely fall of rain on Saturday and Sunday last, and of its continuance, appear to be disappointed. Yesterday turned out a scorching day, and the evaporation speedily exhausted the small moisture with which the ground had been blessed. The fall of rain did not penetrate above 2 or 3 inches into the earth.

The Monitor.

October 22nd, Monday. At Yass, on the 10th instant, we had, for the first time the last fifteen months, a heavy thunder-storm accompanied by a heavy fall of rain for a few hours, when it cleared up; but about midnight the rain recommenced and poured in torrents until daylight, when it abated to a small mizzling rain, and continued so nearly all the night of the 11th. (See March 24, 1838.) At 10 a.m. on the 12th a second shower fell (very large drops) accompanied by a thunder-storm. About half-past 1 p.m. the rain again fell in torrents, accompanied this time with large hail-stones, loud thunder, and vivid lightning. About 5 p.m., it broke over the banks of the river, and quickly precipitated itself into the deep ponds which had been dry for many a month. At 7 p.m. the rain re-commenced, and has continued steadily without ceasing to this day, the 14th, Sunday.

Gazette.

October 30th, Tuesday. Friday next, the 2nd November, has been appointed to be observed throughout the Colony as a day of general fast and humiliation on account of the present very severe drought.

November 1st, Thursday. Yesterday was one of the hottest days that has been experienced for some time past. The line of country extending along the Parramatta River and Lane Cove formed one extensive conflagration. Considerable damage was sustained by the fires.

Saturday, November 3rd. The town is in a most deplorable state for the want of water. In consequence of the continued drought the supply has been gradually lessening, and within the last few days has been very small.

November 10th, Saturday. During the progress of the thunder-storm on Wednesday night last, the electric fluid struck a portion of the general hospital in Macquarie-street, and damaged one of the pillars, a portion of which was shattered off by the shock.

Monitor.

838.—November 19th, Monday. Showers, but no continued soaking rain, has prevailed in Sydney for the last week or ten days.

Gazette.

November 17th, Saturday. The late rains are stated to have been general throughout the located districts. The vegetable gardens have experienced the greatest benefit from the rain, which has had the effect of destroying caterpillars and other insects with which the vegetables had become swarmed in consequence of the drought.

December 18th, Tuesday. The town of Parramatta was visited on Friday afternoon last by a very heavy hail-storm. An eye-witness informs us that the stones were as large as pigeon eggs. All the windows that were not protected by verandahs or otherwise were broken during the storm. It was confined to Parramatta.

December 20th, Thursday. A gentleman who has lately taken a trip up the Hunter, Paterson, and Williams Rivers, informs us that the general appearance of the country is promising in the extreme. The hail-storm which visited Parramatta was also experienced on those rivers, but no injury sustained thereby.

Sydney Herald.

January 2nd, Wednesday. The following is extracted from a letter dated "The Hunter, December 27th, 1838." The country is in a dreadful state. No rain, or hopes of rain—everything is burnt up. The water in the river even is beginning to dry up in parts. A correspondent from Maneroo writes and says :—About a fortnight ago we were appalled by the sudden visit of two floods. The last was upon some parts of the plains attended by serious loss to those who were at that time washing their flocks. An instant before all was order, and a second after all confusion. So tremendous was the flow of water that it swept clean away men, sheep, washing poles, pens, hurdles, slabs, large trees, and even the dogs had not time to get out of its way. We had previous to the flood a very heavy hail-storm, attended by vivid lightning and thunder, which caused the water to be so excessively cold as to render it impossible to remain long in it at one time. Several persons have lost their wheat crops arising from the late thunder-storm; those who escaped its effects may well pride themselves on the appearance of them—they are encouraging in the extreme.

Gazette.

1839.—January 5th, Saturday. The weather on the 26th ultimo was so extremely hot at Newcastle that all the grapes about that place and the lower part of the Hunter were destroyed, and the leaves so parched as to crumble on the touch. Much damage was also sustained by the maize crop.

Monitor.

January 7th, Monday. A letter from Argyle, dated January 2nd, states that the weather since Christmas has been enough to roast you—save on the 27th, when there was just sufficient rain to clear the air and lay the dust. On the 26th there was a dreadful hot wind. In a sheltered place in a verandah the thermometer was at 102, and in a darkened room with everything shut up at the cool side of the house, it was at 80. The continuance of this weather is most extraordinary; we have not had as much rain these two years as would suffice for two months of summer.

Herald.

January 28th, Monday. At Illawarra we are told that the last crop of wheat and general were as big as "quart pots," and that the wheat was very fine. The general fertility of this district is attributed to the soil and the rains, which are peculiarly congenial to agriculture.

Monitor.

January 30th, Wednesday. On Saturday, 19th instant, Port Macquarie was visited by a severe thunder-storm. A barn, the property of Mr. Jones, full of grain at the time, was struck by the lightning and destroyed. The storm was succeeded by a drenching rain which lasted several days.

January 31st, Wednesday. At Yass the weather during the last month has been a succession of warm winds; and within the last ten or twelve days the wind was scorching, exceeding any that has been felt since the summer of 1817. The thermometer at noon on Tuesday, 29th instant, was as high as 120°, whilst in the shade of a verandah it was 100°. Many of the crops, owing to the frosts and the blighting of the vines, have been totally unproductive.

February 13th, Friday. So great is the effect of the late drought that the Chowwiesse River, at the bridge, has ceased to flow for the first time since its discovery, a period of upwards of forty-eight years.

Gazette.

March 9th, Saturday. A gentleman from the Murrumbidgee, yesterday, informed us that the waters of that river have so decreased lately that in many places the waterholes are dry, and fish weighing from 30 to 40 lbs. may be seen lying in a putrid state in the bed of the river.

March 14th, Thursday. The drought still continues, and there is every appearance of a famine or something very closely approximating to it. In all parts of the country we have the same disheartening accounts. In most places the crops have entirely failed; in some few about half a crop has been realized. In all quarters the sides of the roads are said to be literally strewn with the carcasses of cattle that have perished for want of sustenance.

March 28th, Thursday. The present year must be looked upon as one of the most calamitous the Colony has ever experienced—occasioned by the long continued drought. Reports from all parts of the country give the most alarming picture of the state of things. The following are a few extracts from accounts lately received:—"At Bathurst the drought continues, and no words can express the miserable appearance of the country. At Bathurst Plains there is neither food for man nor beast; the plains are as destitute of grass as a turnpike road. At Phillip the grass is completely burnt up, and great difficulty is experienced in obtaining food for the cattle; the rivers have become mere chains of ponds. The country all round the western side is destroyed. At King the stock are beginning to fall off for want of food. The Murrumbidgee has decreased so much as to be almost dry in many places. At Wellington the country is burnt up; in hundreds; the cattle have all long since been dead; in some months there has not been rain for two consecutive

1839.—April 11th, Thursday. We believe we may at length congratulate our fellow-colonists on the termination of the excessive drought under which the Colony has suffered so long. On Tuesday night, 9th, Sydney was visited with several very heavy showers of rain, which continued at intervals during the whole of that night and succeeding morning. It also reached the Cowpasture and adjoining districts. The country intervening between Sydney and Windsor, and the Illawarra district as far as Shoalhaven. On the Hunter there has also fallen a considerable quantity of rain lately.

April 13th, Saturday. We learn that the late providential rain has extended to Yass, Berrima, and other places, and has in fact been general all over the country.

April 18th, Thursday. The rain still continues with the best results; the same gratifying intelligence is pouring in from all parts of the Colony.

April 25th, Thursday. At Maitland, during the last week, there has been copious rain; but it has only been partial, as places no further than Black Creek have scarcely had a drop. At Yass, on Thursday, 11th, there was a day's rain. At Berrima, during the last fortnight, there has been plenty of rain—gentle and refreshing showers—and the appearance of the country is again becoming fresh and green.

June 8th, Saturday. The state of the country on Hume River and in Manis and Camden Forest districts is beautiful. Although the quantity of rain fallen lately is limited, the grass is good. About Kyamba and Billy Bong Ranges the rains have been very heavy, and the creeks and flats are flooded. On the Murrumbidgee River, from the lowest down stations to Yass, the country is in a most deplorable condition—not a blade of grass to be seen—and in passing along the road you may travel 20 miles before you can get a drink of water for either horse or bullock, or even as much as would make a quart of tea.

July 2nd, Tuesday. The weather during the past few days, especially in the morning and evening, has been unprecedentedly cold.

Australian.

June 11th, Tuesday. At Bathurst, the prospects of a crop next year are anything but promising. The ground is as hard as a rock, and there is not a blade of grass on the whole plain. No rain of any consequence has fallen lately.

Herald.

July 3rd, Wednesday. After several days of intense frost, on Friday, 21st, the district of Bathurst was well soaked with twenty-four hours' steady and warm rain. On Monday, 24th, slight showers, cold, and mingled with sleet and snow, fell generally, and on Wednesday, 26th, the mountains were covered with snow. The plains still continue barren, but many of the farms in the "vale" are looking well, and the prospect cheers everybody.

Monitor.

July 24th, Wednesday. Yass, July 15th, 1839. During the whole of the last month, the rain fell copiously in this district, and also in the more remote parts to the southward of the Murrumbidgee. The lower part of Argyle, towards Bong Bong and Berrima, has also had an abundant supply of rain; the creeks and waterholes are overflowing, and the natural grasses are springing up rapidly.

July 31st. A report is current in Sydney that the district between Bathurst and Wellington has been visited to an alarming extent by locusts in prodigious swarms, which destroy the herbage wherever they alight.

July 31st. Yass.—It rained at Yass all the night of the 15th, and continued to fall out 1 p.m. of the 16th, and ceased. The rain recommenced at daylight and continued all the 17th; 15th was fine; 19th cloudy all day, and at night the rain came on again and continued to the morning of the 20th; afternoon was fine, but the rain again began at night and continued to 10 a.m. next day with wind at south. At 11 a.m. a hail-storm came and lasted half an hour, then rain and hail showers alternate during the day. At 10 p.m. snow fell so freely that the ground was covered in all directions.

It is a heartfelt pleasure to see the wheat springing up. The waters of the Fish and Gondaroo Rivers are accumulating, and it is expected that two days' and nights' more rain will cause the Yass River to overflow its banks, but probably not to such an extent as took place in August, 1836, when the waters spread 7 to 10 yards from the river channel, which at the town is very deep.

Monday, August 5th. Camden, July 29th. The present month has been dry, with windy weather and slight frosts at intervals. During the last two or three days we have had some genial showers, which have refreshed the surface and the growing crops.

Rain Gauge at Port Adelaide:

January, .453 inches.	March, .850 inches.	May, .245 inches.
February, .446 inches.	April, .379 inches.	June, 3,495 inches.
		Total, 5-868 inches.

Such has been the great prevalence of rain in the Illawarra district of late that the roads are completely flooded with surface water, and almost as impassable to drays and bullocks as a perfect quagmire.

Friday, August 23rd. One of the watermen showed us on Wednesday morning last a large ball of congealed hail which he had collected from the corners of his boat. The night before it was unusually cold, and some of the most severe hail-showers fell that we have witnessed in Sydney for some years. The rains with which Sydney has lately been favoured have greatly cut up the streets, those which are unmetalled being almost impassable.

December 4th, Wednesday. Murrumbidgee, Kyemba, August 15, 1839. During the months of June and July we had fine gentle rains on the Murrumbidgee and Hume Rivers, The last three weeks have been dry, with slight frosts at night. Vegetation is advancing fast; cattle are doing well.

December 6th, Friday. "Extracts from letters lately received from the country." At Yass the growing crops look well, and, owing to occasional showers, the effect of frost has not retarded the growth of crops on forest lands, whereon there is now a short nibble for cattle.

It is pleasing to observe there have been several very heavy showers lately, which we have seen of great benefit. The weather has been rather warm of late, and the frosts have not been so severe as they were in the beginning of the month.

August 18th, 1839. The growing crops in the vicinity of the river look well, and the lands in Lower Argyle are now covered with short grass, which improves the sheep. The Goulburn Downs have a drossy appearance, in colour a dirty brown, with scarcely a trace of green. Within the last week rain has fallen pretty freely at Goulburn.

Gazette.

We regret to learn that the Cowpastures are the Cowpasture bridge is several feet under gighbourhood have suffered much in conse-

[Handwritten notes, partially illegible]

Monitor.

19.—September 13th, Friday. The late gale and showers have visited the south as far as Marulan, but at Goulburn and beyond they have only had refreshing showers. The ponds in consequence remain half-full, and the two lakes dry. Reports from the Murrumbidgee (to which the country from Argyle falls, and where the weather is in general less cold) say that the late rains have fallen there more freely.

Extracts from letters from the country.

County Murray, September 5th. We may look for good crops up here, we have just had a day and two nights steady rain.

Illawarra, Dapto. September 9th. We were visited by a flood on Thursday last, when 8 acres of this farm were under water. The wheat crops in many places are severely suffering, and a great deal of it on many of the low lands will be entirely killed by the water lodging. The roads are in a deplorable state.

Upper Portland Head, September 9th. We have had some very heavy rain lately; it came in torrents, ending in a thunder-storm. The Hawkesbury rose about 9 feet above high-water-mark; a good deal of loss was sustained.

Parramatta, September 6th. The rain in this quarter has been very heavy. A fresh occurred in the Parramatta River which detained the steamer. The water rose above the dam about 8 feet.

Monitor.

October 11th, Friday. While the Sydney folks are complaining of the excessive heat of the weather, we are at Berrima almost frozen with cold; we had a fall of snow on Friday last. Reports from all parts since the late general raining are very promising.

Sir William Macarthur.

The drought broke up at Camden in October.

Monitor.

October 14th, Monday. Goulburn, October 8th. We have had this day a smart fall of snow from daylight till half-past 8. The high winds have not made any serious impression on our crops, but the fruit trees have all been dismantled of their bloom. At Bungonia strong winds have been prevalent for the last eight or ten days, October 6th.

Gunning, October 12th. Since the 1st we have had a succession of strong breezes and cloudy weather, accompanied with occasional light showers.

October 18th, Wednesday. The latest accounts from the interior represent the crops to be in a flourishing condition, especially on the Hawkesbury and its surrounding districts.

October 18th, Friday. In the whole of the southern districts there has been an abundance of rain of late, which has had a wonderful effect in promoting the success of pastoral and agricultural operations.

November 8th, Friday. In years gone by the springs of New South Wales used generally to bring a due supply of rain, and the plague of caterpillars was then common. Droughty springs have prevailed during the last ten years, and caterpillars have seldom done any damage. This spring has been showery and they have made their appearance again at Wellington and Hunter's River.

1839.—November 11th, Monday. The weather at Marulan and at Goulburn has for the last fortnight been very warm, with hot winds, which in some instances has so far shrivelled up the barley and rye, that it has been cut and made into hay. Thunder-showers are frequent.

November 18th, Monday. About 3 o'clock yesterday (Sunday, November 17th) afternoon Richmond and its vicinity for several miles round was visited with one of the most violent hail-storms ever remembered by the oldest inhabitants of the place. The greater part of the windows in most of the houses are broken, and a good deal of wheat broken and beaten to the earth.

Gazette.

November 19th, Tuesday. The caterpillar has made its appearance amongst the young corn at Appin. In some parts they are as thick on the ground as if they had been sown, and are making great havoc amongst the young grass and oats.

November 26th, Tuesday. On Thursday, 14th instant, the district of Hawkesbury was visited by a hail-storm of great violence. The crops suffered severely, whole tracts being beaten down by its violence.

Herald.

December 16th, Monday. During the violence of the gale on Friday last several vessels parted from their anchors and drifted.

Monitor.

December 20th, Friday. Marulan, December 16th, 1839. The weather during the whole of last and the commencement of the present month has been extremely tempestuous and changeable. A hail-storm occurred on the 13th instant; it fell principally at Bombala, Bosworth, and Cowoora, about nine miles hence; the stones were very large, some being from six to seven inches in circumference; the glass in the windows was broken, and the injury done to fruit trees and vegetables was very great.

December 23rd, Monday. We never remember at this time of the year such cold weather as has prevailed the last fortnight; some days it has been wintry weather, and never warmer than spring. This extraordinary weather, accompanied by high winds from the s.e., is attributed to the icebergs which have floated this summer further from the Arctic regions than usual.

Russell (Visit to Australian Colonies in 1839), at page 238, says droughts were then unknown in Western Australia.

Mr. John Chisholm remembers the great drought broke up in October, 1839. During the early part of October the wet lagoon and Tarago lagoons, not far from Collector, were both dry, and the bed of Tarago was ploughed and sown with wheat; but the rain came and covered it, and neither of these lagoons has been so dry since. The Tumut River was then quite dry above the town of Tumut.

Mr. James Manning saw the Murrumbidgee all dry above Tumut in 1839, and walked over it dryshod.

Stokes, in his account of the voyage of the Beagle, says, "for some time previous to our leaving Sydney, October 1838, during the whole of our absence and for some time after our return, March 1839, not a drop of rain fell in Sydney."

(The preceding extracts for 1838 and 1839 will show how much truth there is statement.)

Chas. Bonney, Esq.

- 1 February, 1839, I started on a second overland journey to South Australia, keeping nearer the coast, passing the south end of the Grampians, and keeping about the same latitude until I struck the coast at Lacepede Bay. I found the country very dry, and had great difficulty in getting through for want of water. I have never seen the country so dry as it was then, and am therefore led to infer the drought of 1838-9 was excessive, and extended over a large part of Australia.

Gazette.

340.—January 22nd, Wednesday. Maitland. This district has been visited with refreshing and regular showers for the last four days, which has wrought a very satisfactory improvement on the maize crops.

February 3rd, Monday. Upper Hunter. For the last fortnight we have scarcely had one fine day; the river is bank high in many places. The late maize crop is looking well, and bids fair to make up for the failure of the early ones by the caterpillar. Flood in the Hunter on the 30th, began to fall again on the night of 31st. Mr. Pickford estimated that the water rose 26 feet. The flood began to leave High-street, West Maitland, on Sunday morning.

February 18th, Tuesday. By advices from Liverpool Plains, we are sorry to learn that a flood has occurred there to such an extent as to sweep away and drown upwards of 3,000 sheep, and two white men were only saved by remaining two whole days in high trees without anything to eat. From Hunter's River also we have the melancholy intelligence that the Peel and Namoi Rivers poured down impetuous torrents, carrying away and destroying herds of cattle and thousands of sheep.

Monitor.

February 17th, Monday. Extracts from a letter from the Upper Hunter :—There has been in this district a very heavy rain, of a week in continuance. The low lands are all flooded, to an extent unknown to the oldest hands in this quarter—thousands of sheep have been lost; and it is also reported that a great number of cattle have been lost on the Big River.

March 16th, Monday. Argyle, February 26. The weather here was very hot on Sunday and Monday last, but it changed on Monday evening, and became so cold that we have been obliged to keep a large fire alight since.

March 7th. Marulan.—This district has for the last six weeks experienced very dry and hot weather, which still continues; on the night of the 2nd we experienced a most terrific thunder-storm, accompanied by heavy rain from the east, taking its course south and west.

March 18th, Wednesday. Marulan, February 29. The extraordinary scorching influence of the sun has within the last fortnight nearly burnt up all the pasture grass.

March 23rd, Monday. It is not a little surprising that during the time public have been receiving accounts of floods in one part of the country the inhabitants of other portions of the Colony are suffering from excessive drought. While the district of Namoi is covered with the most luxuriant herbage after the late floods, the country about Mudgee is literally parched, and the aboriginal blacks themselves are daily dying for want of water.

1840.-- March 25th, Wednesday. At Marulan on Friday night at about half-past 8 p.m., we had a thunder-storm accompanied by the heaviest fall of hail I ever witnessed, which lasted about an hour. A vast deal of damage was done to the windows of the town.

Gunning, March 17. The weather here continues dry and windy, the waterholes are beginning to dry up very fast, and scarcely a bite of grass is to be seen about this neighbourhood.

April 10th, Friday. Bathurst, April 1. This part of the Colony is again assuming its late awful appearance, the grass is parched and everything drying up for want of rain. At Bathurst the weather is still dry and warm, and the pasture lands bare of grass.

Gazette.

April 28th, Tuesday. Sydney was visited with most severe rains on Saturday and Sunday last, with strong winds from the south. The streets have been in a most disgraceful state since, being almost impassable.

Monitor.

May 15th, Friday. Since last Saturday, May 9, Sydney has been visited with constant rain; the roads in the vicinity of the town are almost impassable.

By accounts from the Hunter, we hear that there has been continued rain in that part, the river has risen considerably, and the inhabitants are making preparations to avoid the evils attending a flood.

May 22nd, Friday. By our correspondents' letters from various parts, it appears that most of the inland districts have benefited by the late rains; the crops looking well, pasturage plentiful, and the rivers and water ponds fully replenished.

May 25th, Monday. Extract from a letter dated Yass, May 15. We have had heavy rains up here lately; one thunder-storm was very violent, and caused the waters of the river to overflow its banks.

Friday, June 26. The continued heavy rains have reached the interior, and will for some time prevent the bringing to town of vegetables, grain, fodder, &c, or such part thereof as is usually brought by land.

Gazette.

June 25th, Thursday. The weather for the last few days has been extremely cold in Sydney, and a great deal of rain has fallen.

Monitor.

July 4th, Saturday. A gentleman who arrived in Sydney on Wednesday last from New England and the Namoi River states that snow of considerable depth was at New England, and very severe frost was general there and at the Namoi River; at the time of his leaving these places he also states there was an excellent supply of grass in *both* places.

July 23rd, Thursday. Tuesday night, the 21st instant, was very windy and a great deal of rain fell in Sydney and its vicinity.

Gazette.

July 25th, Saturday. A great quantity of rain has fallen in Sydney within the last few days past, and the streets are in a dreadful condition.

Monitor.

1840.—July 31st, Friday. Yass.—We have had some moderate showers in the intervening period; sharp frosts at night and thick fogs in the mornings are the chief characteristics of the weather.

Gunning. The weather for the last fortnight has been of a mixed character; some days are hazy, cold, and wet, others fine, with strong breezes from the south and west, with a little sleet, and very frosty nights.

Herald.

August 12th, Wednesday. On the Hawkesbury the weather continues fine, and the crops retain their good looks.

There was a slight fall of snow at Berrima on Friday last.

August 19th, Wednesday. Accounts from all parts of the country are very promising, the weather generally being all that could be wished for.

Gazette.

September 15th, Tuesday. The weather at and around Sydney has been very beautiful for some days past, and highly advantageous for the crops, the air being dry without being hot enough to scorch.

Herald.

September 28th, Monday. Although the summer season has scarcely commenced, yet the weather yesterday was oppressively hot.

Gazette.

October 6th, Tuesday. The weather in Sydney lately has been variable. About dusk on Sunday evening last some drops of rain began to fall, which gradually increased until midnight, when it descended in torrents. The atmosphere has been very sultry for some days past.

October 17th, Saturday. The weather has been very close and sultry for some days past.

October 20th, Tuesday. The weather has experienced an agreeable change since Saturday; we also had a shower of rain on Sunday. Hot winds prevailed every day during last week.

October 24th, Saturday. The intelligence from the country is of the most favourable description. The harvest promises to be most abundant.

October 29th, Thursday. The quantity of rain that has fallen within the last few days will be a great benefit to the crops.

November 5th, Thursday. The weather for the last few days has been clear and dry; the nights and mornings have, however, been bitterly cold.

November 14th, Saturday. The harvest has commenced in almost all the forward districts, and the crops this season are probably the largest ever reaped in the Colony.

November 24th, Tuesday. Sydney was visited with a severe thunder-storm on Saturday afternoon last. It commenced about 3 o'clock; the rain fell in torrents, and continued for about two hours. About 6 it became rather fairer, though the lightning and thunder continued throughout the night. About 3 o'clock on Sunday morning the rain commenced again, and continued with redoubled fury till about 6.

December 10th, Thursday. We are sorry to hear that the crops in most parts of the country have suffered very much during the late rains, especially in the neighbourhood of Stone-quarry, where it rained almost incessantly during last week. The wheat that was cut and standing in the fields was totally destroyed, and a good deal of damage was done to the standing crops.

1840.—December 15th, Tuesday. The weather still continues to be very disagreeable, and in fact most unwholesome. Sickness is very prevalent in Sydney at present, nor is it to be wondered at,—the sudden changes which have of late taken place in the atmosphere have been sufficient to hurt the strongest constitutions.

December 22nd, Tuesday. About 10 o'clock on Sunday night last a thunder-storm came on, during which the rain fell in torrents, which lasted about an hour.

December 29th, Tuesday. The weather during the last few days in and about Sydney has been delightful.

Rev. A. Glennie's Journal.

By the kind permission of the family of the late Reverend A. Glennie the following extracts from his most valuable journal are published:—

Extracts from the journal of the late Reverend A. Glennie.

PATERSON.

1837.—January, thunderstorm 4th, fine soaking rain for several hours; 16th, dreadful hot n.w. wind, southerly and thunder at night, drops rain; 17th, east wind met thunderstorm from west, torrents of rain, all low lands flooded, made the river run, it was quite dry before; rain continued to 21st when the river rose a little and Salt Brook was impassable; rain, 22nd, heavy. February 12th, nice little showers; 24th, scorching day, afternoon thunderstorm and hurricane. March 1st, thunderstorm good deal of rain; 4th, three hours steady rain; 5th and 9th, rain; 13th, thunderstorm; another 14th, and light rain all night; 15th, 16th and 17th, rain; 20th, showery. April 3rd, thunderstorm, soaking shower; thunderstorm 7th, rained all night and next morning hard. May 4th, rain hard all night; 5th, rain; 19th, two hours rain; 25th, 27th, 28th, rain. June shower; 22nd, two hours rain; 27th, rain nearly all day; 30th, rain. July 1st, rain all day; 11th, heavy showers; 23rd, smart shower. August 2nd, shock earthquake this evening; 8th, gentle rain; 9th, rain forenoon; 10th, 17th, 21st, 22nd, 24th, and 25th, light rain. September 9th, drops rain; 13th, rain with thunder; 14th, thundershower; 24th, thunderstorm and rain; 30th, shower. October 4th, thundershower; 8th, thundershower; 26th, little rain. November 18th, heavy rain, 15th to 18th. December 10th, thundershower; 17th, few drops rain and thunder; 19th, two thundershowers; 20th, thundershower; 21st, rain; 22nd, rain; 23rd, rain; 24th, rained hard all day to 4 p.m.; 26th, thundershowers; 27th, light rain; 30th, several hours rain.

1838.—January 2nd, thundershowers, good deal of rain in night; 3rd, thundershower; 16th, two hours rain.

[Here Mr. Glennie's journal ends, and begins again.]

1839.—January, rain on twelve days, moderate weather, mostly thunderstorms. February, rain on six days, moderate weather, rather dry. March, rain on four days, very dry month. April, rain on fifteen days, rain abundant and heavy; river rose a little on 30th. May 1st, river impassable to-day, but fell again in the afternoon; 30th, river almost impassable from last night's rains; rain on nine days, moderate and some heavy. June, rain on eleven days, moderate and some heavy. July 2nd, river very high this morning; 22nd, distant hills covered with snow; 31st, rivers swollen; rain on twelve days, some heavy. August, rain on eleven days, light, month dry. September, river very high on 5th; rain on fifteen days, moderate; October, rain on seven days, dry weather. November, rain on twelve days, moderate light. December, rain on thirteen days, light, dry weather. One hundred and twenty-seven days during the year.

1840.—January, very heavy steady rain 23rd to 29th inclusive; this is the heaviest fall of rain we have had since the autumn of 1832; rivers very high on the 30th; rain on eleven days. February, rain on seven days, moderate. March, rain on four days, rather dry. April 29th, river running strong; rain on seven days abundant. May 11th, river very high, began to rise on 10th, falling 11th; 14th, river again very high; rain on ten days, abundant. June, rain on eleven days, moderate. July 22nd, river up a little; rain on ten days, moderate. August, rain on three days, very dry. September, rain on nine days, moderate. October, rain on eleven days, moderate. November, rain on ten days, rather dry. December 3rd and 4th, rivers impassable; rain on thirteen days, abundant. One hundred and six days in the year.

- 1841.—Shock of earthquake 8 a.m. on 28th January; abundant rain, January. February 20th, river very high to-day; nine days rain. March, plenty of rain; nineteen days. April, rain on nine days, not very much. May, abundant rain, fifteen days; river very high on 21st. June, not much rain, five days. July, rain twelve days, moderate. August, rain on six days, dry. September, rain on eight days, dry. October 12, thunderstorm in afternoon with enormous hail some as large as turkey's eggs, weighed one stone found it two ounces; rain on eight days, abundant. November, rain on twelve days, rather dry. December, rain on nine days, dry. Rain has fallen on one hundred and twenty-eight days this year.
- 1842.—Early part of this year wet. Small fresh 18 inches, January 30. Small fresh 2 or 3 feet February 22nd. River very high 7th March. River very high 21st April. River as high to day as we have ever seen it, May 20th. June, dry. July 16th, 17th, 18th, and 19th good rain, dry to end of month. Month August very dry, rain much wanted. September, moderate rain. October one of the driest and most windy months I ever knew. November, very dry hot month; the river has ceased running and the country is terribly parched up. December, very dry, drought partially broken with violent storm of thunder and rain on December 16th; rain on ninety days this year.
- 1843.—January, everything suffering very much from drought. February, dry; rain on 7th, but drought broke up on 14th February. Abundance of rain to end of February. Abundant rain in March. April, river rose about 3 feet on the 4th; rain ten days abundant. May, dry; rain seven days. June dry; rain ten days. July, very dry; rain nine days. August 16th, river rose 6 feet; 20th, river rose 10½ feet this morning; rain on thirteen days, abundant. September 18th, river rose 6 feet; 21st, rose again 5½ feet; rain on ten days, abundant. October rather dry; rain on four days. November, rain on eight days, moderate. December, rain on eight days; dry. Rain on 119 days this year.
- Memo. of floods heights, 1843.—April 4, 3 feet; August 16, 6 feet; August 26, 10½ feet; September 18, 6 feet; September 21, 5½ feet.
- 1844.—January 23rd, river rose 5 feet; 31, river rose 5 feet; abundant rain on 15 days. February, river was falling on morning of 1st, but the very heavy rain made it rise 9 feet by sunset; on the 2nd it was 15 feet, which is nearly as high as we have ever seen it; 6th, river up again to 6 feet, but fell again during the day; rain on twelve days, heavy. March, rain on five days, moderate. April, rain on three days, very dry month. May, rain on six days, dry month. June, rain on six days, rather dry; July, rain on ten days, very windy, very dry to end of month, then heavy rain, river rose 2 feet about 28th. August, rain on 16 days, but some of it very light; vegetation is very forward, mowing lucerne. September, rain on nine days, moderate. October, very cold on 26th, 27th, and 28th, last day slight frost; rain on ten days, moderate, cool, and pleasant. November 11th, frost again. Last few days very cold; rain on 7 days, moderate. December, rain on nine days, rather dry; 108 days.
- Memo. of floods, 1844.—January 23, 5 feet; 31, 5 feet. February 2, 15 feet; 12, 6 feet; 19, 5 feet nearly.
- 1845.—January, light rain on six days, rather dry. February, light rain on eight days, many thunderstorms. March, rain on six days, very dry month, four of six days the rain was very light. We have now finished another summer which has been by far the coldest I have experienced here—scarcely a day that could be called unpleasantly hot. But it has been *too* cold for many things. Tobacco crop is almost a failure, the maize is likewise not much good. There have been many thunderstorms, with loud thunder and hail, and most of them, contrary to their usual custom, have come from s.w. without the wind-squalls which precede those from x.w. April, rain on nine days, moderate. May, meteor streak, east of north, in the sky. Just after 7 p.m. it was bright and thin with a zig-zag; it spread out and got dimmer, and was scarcely perceptible an hour after. Rain on twelve days, moderate. June, rain on six days, moderate. July, light rain on six days, dry month, very cold. August, light rain on four days, very dry, very cold. September 7th, river rose 4 or 5 feet; rain on eight days, abundant. October, rain on ten days moderate. November 10th, river up 4 or 5 feet this morning; rain on 5 days, abundant. December 19th, river rose several feet; on 22nd was 2 feet higher; rain on 17 days, abundant. During the year rain has fallen on ninety-seven days, which is rather below the average of the last seven years (110). It has been a very favourable year, with regular seasons, and rain generally when it was most wanted. The summer has been hot so far. I never saw finer crops of maize than they promise to be this year.
- 1846.—January, rain on six days, moderate, many thunder-storms. February, light rain on seven days; the whole put together would scarcely amount to a good shower; everything very dry and country suffering from drought; river very low. March, rain on two days; the driest March I ever knew; the river almost ceased

CLIMATE OF NEW SOUTH WALES.

running; the Paterson has been dry for some time; the whole country suffering from the drought. April, rain on four days, very dry month. May, rain on two days, dreadfully dry month, frosty mornings, and windy generally. June, light rain on seven days, very dry; five of the seven days rain very light. July 4th, tremendous frost in the morning, ice in a bucket in a kitchen; 11th very severe frost; rain on six days. August 5th, very severe frost, snow on the distant mountains; light rain on seven days. September 21st, rained hard all day without ceasing a moment, the most glorious rain we have had I may say for years; rain on thirteen days, moderate, cool, and pleasant. October, rain on nine days, moderate. November 23rd, rained very hard during the morning, came down in torrents, sometimes for half an hour together; the river began to rise between 1 and 2, and had risen 5 or 6 feet by the evening; rain on seven days. December 16th, great storm came on about 4 p.m., with very high wind and heavy shower of rain; came on again between 5 and 6, and continued a steady rain for two or three hours; rain on ten days, many thunder-storms. Rain on eighty days during the year.

1847.—January 17th, rained nearly all day, very hard mostly—the river rose very much, higher than we have seen it for some years; 18th, rained very hard between 5 and 6 in the afternoon, and set the river rising again; 19th, river rose 6 feet on a piece of land never known to be flooded before; one of the wettest days I ever knew—no doing any garden or field work in consequence; rain on twenty days. February 3rd, river very high again; rain on twelve days, moderate. March, light rain on ten days, merely showers, many thunderstorms. April, rain on seven days, moderate. May 11th, frost for the first time this year; light rain on eleven days. June 12th, began to rain about 6 a.m. and continued pretty smartly for about three or four hours, a very cold rain; on the 26th, 27th, and 28th very sharp frosts; rain on three days, moderate. July 1st and 2nd, very tempestuous days; great squall of wind with rain and hail about noon on the 2nd; on the 6th very sharp frost; 20th, very tempestuous day, great wind all day, blowing down trees, shingles off roofs, &c.; very light rain on four days; high winds prevailed rain much wanted. August 9th, a very hot wind came on about daylight which sent the thermometer up 20 degrees in half an hour; frosts from the 11th to 15th rain on three days; very dry month; rain is very much wanted, the wheat crops are very backward and bad in most places, and though there is still plenty of dry grass on the hills, all the waterholes are dry, and the cattle have to come for water to the river; this has been the driest winter I ever knew. September, light rain on two days; frosty; very dry; the driest September I ever knew. October, rain on six days, four of them barely sufficient to lay the dust. November 1st, very hot, thermometer 127° in the sun; 29th, 104° in the sun; rain on five days, though only one good shower fell, namely on the 29th; very dry and hot month. December 25th, thermometer 104°; 29th, 102°, very hot atmosphere quite thick with smoke from bush fires; many thunderstorms; rain on three days, light; the driest December I ever knew. Since the great rains of January and February last, we have had about as severe a drought as ever we experienced; the rivers have been dry for some time. Rain on eighty-eight days during the year.

1848.—January 1st, very hot, thermometer 108° and 128° in the sun; 3rd, thermometer 109°, at 10:30 p.m. the thermometer was 92°; 4th, began to rain at daylight and continued a steady rain the whole of the day; 5th, steady rain all day, very hard during the afternoon; the river running 8 feet deep or thereabouts at daylight on the morning of the 6th, but fell very fast and was fordable by noon; 20th rained all day, very hard during the afternoon; 21st, some heavy breaking-up showers, river about 10 ft. high this morning and has fallen very little; 25th, began raining about 8 a.m. with thunder from the westward, and continued a regular thunder-storm the whole of the day—never knew such a day, every now and then it poured in torrents, making all the place a complete sheet of water; the Paterson was impassable in the afternoon—it cleared about sunset; rain on sixteen days, moderate; very wet month. February 5th, rained all day, river about 10 ft. high next morning; rain on eight days, moderate—many thunderstorms. March 9th, about the rainiest day I ever knew—poured in torrents the greater part of the day; it ceased about sunset; the river was then about a foot higher than in January, 1847; rain on twelve days, moderate—many thunderstorms. April 4th, began raining about midnight last night and continued steadily till about 9 this morning, when a tremendous heavy pouring rain set in which continued most of the forenoon; the river by noon was impassable; rain on nine days, moderate. May 15th, 16th, and 17th, frost in the mornings; 30th, a tremendous storm of wind came on about 11 o'clock at night, it blew down large trees, &c.; very light rain on six days. June, rain on twelve days, though some very light; frosty. July, rain on twelve days, very light. August, rain on five days, very light; a delightful month. September, rain on five days, very light; rain very much wanted. October 4th, began with a drizzling sort of rain, which increased to a regular set in heavy rain in the after-

noon, which continued all the evening and the most part of the night. 6th, slight frost; rain on eleven days, moderate; about the most delightful October I ever knew—no hot weather and a moderate supply of rain, everything flourishing most luxuriantly, promising an abundant harvest. November 6th, very hot day, hot wind, a little after sunset a great gale of wind sprung up blowing down trees, &c. 21st, close sultry day with smoky atmosphere, high wind came on about 9 p.m., a hot wind or at least a warm one (thermometer at 86°) at 10:30 p.m.; rain on six days, but very light mostly; fine harvest weather, but the ground is very dry, and except for the harvest, rain is very much wanted. December 19th, sun rose very red among some suspicious-looking clouds, some thunder-clouds began to appear about noon, and though there was no appearance of anything great, about half-past 2 commenced the heaviest shower of rain I ever saw in my life, it lasted about 2½ hours pouring as hard as it could; the river which was very low rose about 6 ft.; rain on six days, moderate. During the year rain has fallen on 108 days; it has been a very fine year as regards the seasons—splendid harvest and everything flourishing well.

1849.—January 12th, awfully hot day, thermometer 106°, wind and lightning from the south in the evening; rain on five days, light. February 9th, terribly hot, thermometer 104° and 87° in the house; rain on eight days, but very little altogether. March 24th, piping hot day, regular hot wind, thermometer 105°; light rain on four days; dreadfully dry month. April, light rain on five days; very dry—suffering much from drought again. May 30th, cloudy and threatening all day, began raining lightly about sunset, set in in good earnest about half-past 8 in the evening, and continued a steady hard rain the greater part of the night; rain on eleven days, but with the exception of that of the night of the 30th it was very slight. June 16th and 17th, sharp frosts; light rain on two days; very dry month—it is not however much required yet, as vegetation is thriving well. July 23rd and 25th, sharp frosts; light rain on eight days. August 13th, 14th, and 16th, sharp frosts; rain on four days. September 3rd, frost; 17th, frost; 24th, a storm came on about 2 p.m., when a splendid shower commenced and lasted all the afternoon—many thunderstorms; rain on seven days, but with exception of the 24th very slight; crops are suffering much from drought and high winds. October, rain on nine days, moderate. November, rain on eight days, moderate—many thunderstorms. December, rain on two days, moderate—very hot, many thunderstorms. Rain fell on only seventy-three days during the year, being the driest year since I began to keep an account in 1838? (1837).

1850.—January 20th, regular hot wind; thermometer 105°; rain on five days; light; dreadfully dry.

The journal ends on the 18th February, which so far seems to have been a hot and dry month. The journal is not resumed until 17th August, and then at Brisbane Water, hither Mr. Glennie had in the meantime removed. It opens with the following note:—

1850.—August 17th, since we came to this district I have been too much occupied to carry on my journal, but I must try if I cannot resume it again. We have had a great deal of rain during the last two months, in fact the drought seems to have broken up, for the rain has been general all over the country; in the agricultural districts they have had a very fine seed time, and the wheat crops I heard are looking luxuriant; the winter hitherto has been very mild; scarcely any frosts; and a great prevalence of southerly wind. August 18th to 31st, light rain on one day. September, rain on seven days, moderate; many thunderstorms. October 3rd, commenced raining at 11 a.m., and rained tremendously the greater part of the day, with very high wind s.e.; 10th, heavy rain morning and forenoon; 22nd, a succession of heavy showers all day; many thunderstorms; rain on ten days, moderate. November 16th, very cold indeed for the time of the year, especially towards evening; some very heavy rain before day-light; light showers during the day; 17th, very cold, windy, and rainy; 18th and 19th, very cold, with strong breeze; rain on eight days, moderate. December 21st, very hot morning; about noon thunderstorm came on with heavy rain and a little hail; very high wind 21st; a succession of thunderstorms with loud thunder and tremendous rains, the heaviest I have seen here; rain on eight days moderate; many thunderstorms.

1851.—January 15th, great storm came on in afternoon with very heavy rain; rain on seven days, moderate; many thunderstorms. February, light rain on six days; windy. March, light rain on six days; many thunderstorms. April 15th and 16th, very heavy showers in each night; rain on thirteen days, moderate. May 1st to 10th, rain on two days, moderate. December 16th to 31st—on the afternoon of the 30th great thunderstorm; great wind and rain, loud thunder, little hail and lightning; rain on three days, moderate.

- 1852.—January, rain on seven days, moderate; many thunderstorms. February, rain on six days, moderate; many thunderstorms. March, rain on thirteen days, moderate; many thunderstorms. April 5th, very warm all the forenoon; great thunderstorm came on in the afternoon with heavy rain and hail, which lasted off and on for several hours; at Mangrove the hailstones were very large, one measured by a Mr. Ferguson 8 inches in circumference; rain on nine days moderate; many thunderstorms. May 22nd, about 6 p.m., it began to blow hard from the s.w., with rain; it increased to a most frightful gale, the greatest we have ever experienced here; about 10 p.m. it began to lull, but continued very violent nearly all night; rain on thirteen days, moderate. June 22nd and 23rd, rained very hard, almost without ceasing, till noon 23rd; every place about is much flooded in consequence; rain on nine days, mostly heavy. July 9th, I observed frost in the garden after 9 o'clock; on the mornings of the 10th, 19th, and 20th there were sharp frosts; rain on seven days moderate. December 31st, very hot—thermometer 103°; the first time we have known the thermometer to reach 100° since we have been here.
- 1855.—January 28th to 31st—29th, burning hot day, thermometer 125°, and 78° in the house; 30th, burning hot day, thermometer 103°, and 80° in the house. February, rain on twelve days, moderate. March, rain on thirteen days, moderate. April, 1st, succession of heavy showers during the day and night; 2nd, the most tremendous rain I ever knew, flooded all the place about; 23rd, rainbow in the morning, smart shower in the forenoon; 28th, smart shower in the afternoon, followed by the most beautiful sunset I ever beheld; rain on seventeen days, moderate. May 5th, a thorough soaking day, scarcely ceased the whole day; rain on six days, moderate; night getting very cold. June 1st to 22nd—18th, a most tempestuous day, evidently a struggle between the wind and rain, about 7 p.m. wind lulled, and the rain came down in torrents; rain on nine days, but very slight, except on the 18th; away from home from 22nd June to 12th July; during that time the weather for the most part was delightfully fine. July 13th to 31st—13th and 14th, sharp frosts; 27th and 28th, sharp frosts, light rain on five days, cold winds prevailed. August 10th, sharp frost; light rain on five days; high winds. September 16th, very stormy tempestuous day, with heavy rain early in the morning and the afternoon; rain on eight days, moderate. October 1st to 13th, fine weather, no rain; 13th, very hot; hot wind. November 9th to 12th—9th, hot wind, very strong, weather has been dry for some time past; 10th, hot wind, great gale, and large bush fires; 11th and 12th, strong winds, but not so hot.
- 1857.—June 6th, wind almost to a hurricane at night, and rained in torrents; rain on eight days, moderate. July 1st to 22nd—8th, on the evening the rain came on tremendously from s.e., and lasted some hours; rain on three days, moderate. October, rain on fourteen days; but with the exception of three or four occasions only light. November, rain on four days, moderate. December 24th, exceedingly hot, oppressive, suffocating day; rain on five days, moderate.
- 1858.—January, rain on four days, moderate; very hot, especially on Friday 15th, when there was very hot wind. February 2nd, very hot morning; s.w. wind came on in the afternoon with a most tremendous rain and hail, also thunder and lightning; rain on four days, moderate. March 20th and 21st, very hot sultry days; light rain on thirteen days. April 17th and 18th, very wet rainy days; moderate rain on 11 days. May 8th and 10th, tremendous rain pouring all both days; 18th, thunder, lightning, and heavy rain in the evening; rain on nine days, moderate. June 29th, rained steadily all day; light rain on thirteen days. July 1st to 23rd—1st, rainbow in the morning, with smart showers throughout the day; rain on six days, moderate. August 21st to 31st—29th, very hot, thermometer 72° in the shade; no rain during that time. September, rain on six days, moderate. October, rained steadily almost without ceasing on 3rd, 4th, 5th, and up to about 11 a.m. on the 6th; 11th, tremendous shower about 8 a.m. from n.w.; showery all day; a comet was seen on the nights of the 9th, 11th, 12th, 13th, and 14th; 19th, very hot, sultry day; about 7 p.m. a tremendous squall from w., with loud thunder, vivid lightning, and heavy rain; 20th, comet growing dim and small; rain on thirteen days, moderate.
- 1858.—November 5th, very sultry day, comet getting very dim; 7th, exceedingly hot, about 2 p.m. commenced a heavy thunderstorm, tremendous claps of thunder, vivid lightning, heavy rain, and a little hail from the n.w.; rain on twelve days, moderate. December 9th, tremendous hailstorm about 5 p.m., with a little rain and thunder; 27th, very oppressive sultry day, with a tremendous hailstorm and rain in the afternoon; moderate rain on twelve days, with many thunderstorms.
- 1859.—January 18th, excessively hot, tremendous wind from the west about 7 p.m., with thunder, lightning, and rain; 31st, rained all day, tremendous rain at 12 p.m., don't remember such rain for a long time; rain on seventeen days, moderate, mostly thunder showers. February 18th, very heavy nearly all the day; moderate

rain on twelve days, many thunderstorms. March, rain on nine days, moderate. April, rain on three days, moderate, beautiful weather. May, rain on four days, moderate, beautiful weather. June, rain on twelve days, moderate. July 20th, rained steadily all day; rain on four days, moderate. August 10th, tremendous thunderstorm, which lasted from 5 a.m. to about 8 a.m., tremendous claps of thunder with heavy rain; rain on seven days, moderate. September 3rd, rained heavily throughout the day; 4th and 5th, heavy showers throughout the days; rain on twelve days, moderate. October 21st, loud thunder and vivid lightning, but no rain, about 7 p.m.; rain on six days, many thunderstorms. November 29th and 30th, very stormy and exceedingly cold days, with a little rain; rain on fifteen days, rather light. December, rain on eight days, moderate, several thunderstorms. Rain on 109 days during the year.

1860.—January, rain on nine days, moderate, several thunderstorms. February, rain on fifteen days, rather light, several thunderstorms. March, tremendous showers all the night of the 18th, and in the morning torrents of water were rushing down the sides of the hills, making a noise like a very strong wind in the distance; rain on fifteen days, moderate. April 22nd was rather warm; about 7 p.m. came on a very heavy thunderstorm, not much thunder, but a great deal of lightning with tremendous rain, and heavy showers during the night; rain on eleven days, moderate. May, light rain on three days, beautiful weather. June, moderate rain on six days. July, moderate rain on thirteen days, tremendous gale about 3 in the morning of the 24th from the s.e. August, rain on fourteen days, showery, rather light. September 9th, very warm and cloudy day, thunderstorm about 5 p.m., not much rain; 17th, very rainy day, blowing quite a gale from s., abated towards evening; rain on seventeen days, showery and rather light. October, rain on eleven days, showery and rather light. November 24th, thunderstorm, with severe southerly gale after sunset; rain on ten days, moderate, several thunderstorms. December 21st, rainy day, heavy gale commenced to blow from the south about 1 p.m.; moderate rain on eleven days, many thunderstorms. Rain on 135 days during the year.

1861.—January, rain on fourteen days, moderate, very warm and many thunderstorms. February 16th, very heavy hailstorm between 1 and 2 p.m., with a lighter one about 4 p.m.; rain on twelve days, generally light, many thunderstorms. March, gale from the s. about 4 a.m. on the morning of 27th, abated about 8 a.m., and rained all day; rain on nine days, moderate. April 3rd, heavy rain, scarcely ceased all day; 28th, pouring rain all day; 29th, rainy day, tremendous showers in the afternoon; rain on eighteen days, but with the exception of the above generally light. May 3rd, heavy hailstorm about 1 p.m.; rain on six days, moderate. June, rain on seven days, moderate. July 8th, frost; rain on nine days, moderate. August, rain on fifteen days, moderate. September, rain on six days, moderate, many thunderstorms. October, rain on six days, moderate. November, rain on six days, many thunderstorms and southerly squalls. December, light rain on six days, many thunderstorms and southerly squalls. Rain fell on 108 days during the year.

1862.—January 16th, exceedingly hot, suffocating and smoky, strong southerly gale about 7 p.m., with delightfully gentle showers; 19th and 21st, steady rain nearly the whole of each day; rain on nine days, moderate, several thunderstorms. February 5th, tremendous thunderstorm about 4 p.m., terrific gale of wind from the west, which, however, did not last many minutes, very heavy rain lasted about an hour; rain on seven days, moderate, many thunderstorms. March, rain on nine days, moderate. April 6th, very cold, with a s.w. gale of wind; light rain on two days. October 11th—with regard to the past winter it has been the finest, most perfect Australian weather, I have ever witnessed—only too little rain, which is now very much wanted. October 17th, very warm, atmosphere thick with smoke from bush fires; 29th, blowing a gale all day from s.e. threatening rain, cleared off in the evening; rain on three days, moderate, several thunderstorms. November 8th, very hot day, hot wind, and thick smoky atmosphere; 24th, a very strong southerly wind set in about 5 a.m. and continued all day; rain on nine days, moderate, many thunderstorms. December 6th, a regular hot wind all day; rain on five days, moderate, many thunderstorms.

1863.—January 5th, intensely hot (thermometer at noon 101°) till a quarter to 2 o'clock when the wind changed suddenly to s.e., never saw the water foam up so suddenly before—in fifteen minutes the thermometer fell 25°; rain on fourteen days, moderate; many thunderstorms. February 3rd, very hot indeed, thunder in the evening, fine shower of rain and a great squall of wind from the southward; rain on two days light, and two thunderstorms during that time. March 23rd to 31st, two very heavy showers on the 29th; rain on four days, moderate during that time. April 6th, very stormy (s.e.) day, a few showers; 17th, lightning and heavy rain at night; rain on eleven days moderate. May, light rain on seven days. June, rain on twelve days, generally light drizzling rain.

LOCHINVAR.

1863. --August 3rd, very cold, a little rain about sunset; rain on eight days light. September, rain on seven days light. October 8th, rainy day, very heavy showers between 2 and 3 o'clock; 17th, very sultry day, thunderstorm with heavy rain from the south about 5 p.m., steady rain continued all night; rain on seventeen days, great many thunderstorms. November 17th, very warm day with hot wind; 22nd, exceedingly hot gale from N.W., between 9 and 10 p.m. no rain but lots of thunder and lightning; rain on three days moderate. December 10th, dreadfully hot day, heavy squall from the west about 8 p.m. with thunder, lightning, and rain; 14th, very cold wind, heavy rain with thunder between 7 and 8 a.m.; rain on five days moderate.
1864. --January 4th, exceedingly warm, slight thunderstorm between 9 and 10 a.m.; thermometer 102°; rain on nine days, many thunderstorms. February, rain on sixteen days moderate; flood in the Hunter on the 13th; many thunderstorms. March, rain every day from the 1st to the evening of the 9th, causing the river to rise a good deal; rain on nineteen days moderate. April 1st, showery, heavy rain about noon and sunset, river a good height from the rains; 25th, very cold morning, a little thunder between 1 and 2 p.m., and soon after a hailstorm and heavy rain which did not last long; rain on eleven days moderate. May 14th, raw cold day; 24th, very thick fog in the morning which did not clear off till about noon; rain on seven days light. June 3rd, a most dreary day, pouring without any intermission until about 8 p.m., when the wind which blew in almost furious gusts abated; at one time in the afternoon the breeze felt quite warm the heaviest rain that has fallen since we have been at Lochinvar; 10th, light commenced about 8 a.m. and continued all day without intermission, increased towards evening; 11th, steady, rather heavy rain till about 4 p.m.; 12th, shower 13th, flying showers with high wind, very heavy rain during the night; 14th, flood almost as high as during February flood, higher in Maitland; rain on twelve days moderate, some very heavy (as above). July 29th, sharp frost; rain on seven days moderate. August 1st, sharp frost; 27th, sharp frosts; rain on seven days moderate. September 1st to 17th, light rain on four days; beautiful mild weather. November 4th, beautiful morning; storm came up about 2 p.m. with a little hail and very heavy rain, severe hailstorm at the Wilderness; 15th, dull morning, thunderstorm in the afternoon, not severe here, but at Singleton they had hailstones as big as hen eggs; rain on five days moderate; many thunderstorms. December 10th, very hot day, S.E. breeze sprang up about 4 p.m., and soon after a thunderstorm came on with great fury from the west, only lasting about half-an-hour, very vivid lightning and heavy rain, very little hail here, but a very heavy hailstorm further up the river, doing much damage to the vineyards; 19th, very sultry morning, between 2 and 3 p.m. violent storm from the N.W., wind quite a hurricane for about ten minutes, with heavy rain and a little hail, also thunder and lightning; dreadful hailstorm at Dalwood, destroying more grapes; rain on seven days moderate; many thunderstorms.
1865. --January 22nd to 31st. 22nd, Comet appeared to S.W.; 23rd to 29th, comet obscured by the clouds; 30th and 31st, comet visible; rain on seven days light. February 7th, dreadfully hot till between 5 and 6, when a gale came on from west with heavy rain and thunder, left nice cool evening; rain on eight days moderate; many thunderstorms. March 5th, exceedingly hot; light rain on one day. April 7th, very thick fog not clearing till about 11 a.m.; light rain on four days. May 14th, terrific N.W. wind especially late at night; light rain on six days. June, rain on ten days moderate; 7th, very cold with hard frost. July 2nd and 3rd, sharp frosts; 11th, very cold, N.W. gale of wind which continued with unabated fury all night; 18th, frost; 31st, frost; rain on six days moderate. August 15th, light drizzling rain all day, tremendous shower from S.E. about 3 p.m. with a little hail; 21st, slight frost; rain on eleven days moderate. September 16th and 17th, light frosts; rain on five days moderate. October, rain on four days moderate. November 2nd, exceedingly hot (thermometer 100° at noon); a thunderstorm came up about 5 p.m. and there were some nice showers; 22nd and 23rd, both intensely hot (thermometer 102° at noon on both days); rain on seven days moderate; many thunderstorms. December 14th, very hot (thermometer 102°); 15th, terribly hot (thermometer 106°), scorching N.W. wind with bush fires, thunderstorm about 6 p.m. (thermometer 85° between 9 and 10 p.m.); 21st, awfully hot (thermometer 106°), scorching N.W. wind; several terrific gusts of N.W. wind about 5 p.m., one of which blew down the Catholic Chapel, leaving only the chancel standing (thermometer 86° in the verandah at 8 p.m.); light rain on three days; many thunderstorms.

866.—January 7th, very hot (thermometer 104° at noon), s.e. breeze came up at night; 8th, awfully hot (thermometer 108° at noon, thermometer 95° at half-past 9 p.m.), s.e. wind afforded a tolerably cool night; 12th, kept as a fast day on account of the drought; 17th, very hot (thermometer 102°), air thick with bush fire smoke, as has been the case every hot day this summer; rain on nine days light. February, rain on twelve days mostly light, one or two heavy showers. March 1st to 13th, rain on two days light. April, rain on four days moderate. May, rain on eight days moderate. June 2nd, frost; rain on twelve days moderate. July 12th, fearfully stormy day with heavy rain and thunder; the s. "Cawarra" from Sydney to Brisbane, about 2 p.m., wrecked on the oyster bank at Newcastle, in an endeavour to take refuge in that harbour from the gale; terrible wild night, blowing a perfect gale from s.e.; 23rd, sharp frost; rain on seven days moderate. August 1st and 2nd, frost; 22nd to 27th, frosty mornings; light rain on six days. September, light rain on two days. October, light rain on five days; several thunder-storms. November 29th, fearfully hot (thermometer 104°), thunder-storm in the afternoon; rain on six days moderate. December 17th, very hot day with hot wind (thermometer 102°), nice thunder-storm about 5 p.m.; 26th, terribly hot with scorching wind; s.e. wind sprang up about 9 p.m. and cooled the air; light rain on seven days; many thunder-storms.

867.—January 1st, fearfully hot wind, thermometer 102°; 2nd, thermometer 107°; 16th very warm, beautiful thunder-storm from the west between 2 and 3 p.m., the loudest thunder I ever heard—the rain poured down for about twenty minutes, and then continued showery until 8 p.m.; rain on six days moderate; many thunder-storms. February, rain on twelve days moderate; everything growing splendidly; many thunder-storms. March, rain on fourteen days, though some of it was very light. April 6th, tremendous rain about 4 a.m., and again about 6 a.m.; put the water in the creek over the roadway; a good deal of rain fell on 7th, 8th, 9th, 10th, 11th—river getting very high; 28th, commenced to rain about 1 o'clock, continued a pelting rain the rest of the day, and coming down in torrents at night; rain on twenty days moderate, some very heavy. May 1st, steady rain on and off all day—river high to-day; 14th, very heavy rain before daylight, which put the creek over the bridge again; rain on seventeen days moderate, some very heavy. June 20th, tremendous rain the greater part of last night, and until dawn this morning; the creek was very high this morning, and the river, which showed no signs of rising last night, was half-bank high this morning, and continued rising rapidly all day; the punt at Windermere was carried away by the flood. 21st. Last night was a terrible night; great gale from the eastward, and heavy rain the most part of the night; the same kind of weather has continued all day. This morning communication between East and West Maitland by train was stopped, and I hear this evening that Singleton and Branxton are flooded. Towards evening the wind veered to s.e., when the rain seemed to set in with renewed vigour. 22nd. About 8 a.m. it commenced again in the same style, and continued two or three hours, sometimes pouring in great torrents. About 4 p.m. came down another tremendous shower, which set the place all streaming with water,—a perfect sea from Kaloudah to Windermere. Mr. Doyle's embankment, made in '64, is all gone, and the water at Mr. Ferricr's within three feet of the great flood of '57; the water is over a considerable part of the Long Bridge at Maitland, and the lower part of the town flooded; the High-street embankment broken away, and it is reported the Singleton Bridge is gone; 23rd, beautiful day; the river at its full height to-day; at some places it is higher than the flood of '57, while at others not so high. Rain on eight days only, but causing the most disastrous flood on record. The Hawkesbury at Windsor rose about 62 feet, perpendicular height, being about 15 feet higher than the greatest flood ever known. At Maitland the water was a few inches above the '57 flood. July 9th, the first real frost this winter, 24th, 25th, and 26th slight frosts, rain on seven days, a most beautiful month. August 1st to 5th, slight frosts, 30th and 31st, frost, light rain on seven days; like last month the weather has been surpassingly fine; the winter throughout has been about the mildest I ever knew, so little frost, notwithstanding the great prevalence of westerly winds and clear sky, the winds moreover have been unusually moderate; September, moderate rain on ten days, a very beautiful month, the country looking very green from the fine growth of spring grass; October, light rain on five days, dry and windy. November 16th, awfully hot, thermometer 104°, wind changed s.e., and we had a little rain about dusk; 22nd, intensely hot wind, thermometer 102°; rain on two days, very slight; one of the hottest and driest months I ever knew. December 11th, very hot, thermometer 100°, thunder-storm between 4 and 5 p.m., very heavy rain put the creek over the road, hail at Branxton, and great wind, which took the roof of Mr. Lindsay's new flour-store; 25th, awfully hot, thermometer 106°, light sea breeze in the evening;

20th, awfully hot, genuine hot wind, sea breeze between 9 and 10 p.m.; moderate rain on three days; thunder-storms, very hot and very dry month. Rain fell on 111 days during the year.

1868.—January 3rd, very hot, thermometer 100°; 4th, awfully hot, with hot wind, thermometer 109°, rain on eleven days moderate, country beautifully green again. February 1st, showery, very heavy shower indeed between 12 and 1, and another about 9 p.m.; rain on twelve days moderate, country looking green. March, rain on three days light, very dry month, several thunder-storms; April 14th, slight frost, light rain on two days; May, rain on seven days, but very little mostly, very droughty weather. June 18th, steady rain nearly all day, wind very light all day and shifting. Just before the clock struck 2 at night we were all suddenly startled out of our beds by the shock of an earthquake; it was accompanied by a loud indescribable sort of a noise, and seemed to give the house a great shaking, but no damage was done—the night was beautifully clear and bright starlight; 26th and 28th, slight frosts; rain on eight days, moderate. July 3rd, very sharp frost, very cold raw day; 4th, very boisterous, high wind, with a clear sky, quite a gale; 9th, sharp frost; 13th, 14th, and 15th, sharp frosts; rain on ten days, moderate; season very favourable. August, moderate rain on nine days; weather throughout the month very fine and seasonable. September 1st, frost; 10th, frost; 15th, rainbow, followed by light showers throughout the day; 25th, squally, rained for nearly half an hour about 9 a.m., with some very small hail, and a little thunder; rain on seven days, moderate; a very fine month; country looks well, but more rain will soon be needed. October, rain on four days, but very light; weather decidedly dry, but not over hot. November 20th, terrible hot wind till between 3 and 4, when southerly came on; thermometer 100½°; light rain on eleven days. December 16th, very hot, thermometer 101½°; 24th, awfully hot, not much wind; thermometer at noon 105½°, up to 100° till near sunset; 25th, awfully hot, thermometer 103°; sea breeze and rain at night; light rain on six days; a very hot and dry month. Rain fell on ninety days during the year.

1869.—January, light rain on eight days; thunder-storms; a hot and very dry month; country about very much parched, and water drying up. February, rain on twelve days, but being only in showers it penetrated very little depth into the ground, and the drying winds of the last week have told much on the grass, which was looking beautifully green for a time. March 3rd, terrible hot day, hot wind, thermometer 100°; light rain on eight days; very dry weather—splendid for the vintage, but rain would be very acceptable. April 3rd, began raining about 10 a.m., and continued a steady pour all day; came down in torrents in the evening; the creek set running again at last; rain on thirteen days, moderate. May, rain on six days, light. June 4th, sharp frost; rain on twelve days, moderate. July, rain on five days; beautiful month again. August 1st, slight frost; 5th, frost; 6th, sharp frost; 12th, frost; 19th, slight frost; 20th, frost. Rain on one day only. I think the driest month I have on record, but being very free from drying winds the country is not suffering as yet from drought. Now that we may reckon the winter nearly over, I may say that it has been the very finest I ever knew, even surpassing that of 1862. September 3rd, sharp frost; 5th, 6th, and 7th, slight frosts; light rain on six days; very dry month, and rain is now much wanted. October, moderate rain on thirteen days; beautiful spring month. November 5th, very sultry morning; thunder-storm about 3 p.m., and set to raining hard for about two hours; set the creek running pretty strong across the road; 25th, great gale of (N.W.) wind sprung up about 2 a.m., and continued with unabated fury throughout the day; rain on ten days; splendid weather, abundance of grass, &c., &c. December, rain on six days, moderate. Rain fell on 100 days during the year—total, 34.355 inches.

RAINFALL OBSERVATIONS.

Station—Lochinvar, New South Wales, during the year 1869.

Date.	Jan- uary.	Feb- ruary.	March	April.	May.	June.	July.	August.	Sep- tember.	Octo- ber.	Novem- ber.	Decem- ber.
1	...	...	...	...	...	2	...	...	...	...	11½	11½
2	...	...	...	57½	...	...	...	...	...	11	18½	...
3	...	...	...	9	...	...	...	...	...	...	6	...
4	½	...	4-18	7½	...	...	...	...	...	...	...	...
5	...	2½	50	5	...	...	...	...	...	32	91½	...
6	...	16½	...	12½	...	...	...	...	...	7½	...	...
7	7	24	...	10	49½	...	...	...	...	...	...	...
8	...	30½	...	...	...	10½	...	22½	...	...	...	84
9	...	...	...	2	92½	18	...	...	...	...	...	...
10	...	...	...	90	8	...	...	11	...	...	...	...
11	20½	29	...	9	...	...	...	...	...	17	...	...
12	3½	24½	...	...	...	...	...	...	...	...	...	...
13	...	43½	...	...	68	...	...	...	...	...	66½	...
14	1	28	...	9	50	...	...	...	...	...	...	...
15	...	25½	...	23	26	...	...	25	...	...	...	...
16	...	32	7	25	35½	...	...	...	...	52	...	14
17	...	5½	...	...	83	...	...	...	...	9	...	...
18	...	4	...	...	3	...	...	21	...	88	69	...
19	...	...	1-37	33	11	31	...	...	...	93	...	...
20	...	6	7½	...	1½	1-52½	...	...	...	13	11	64
21	27	...	9½	...	...	...	...	...	...	34	9½	...
22	45½	...	83	38	...	...	...	...	...	...	45½	...
23	...	...	5	...	...	14	...	19	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...
26	...	5½	8	...	...	8	...	...	...	...	...	...
27	...	...	2	...	...	...	...	...	2	...	...	...
28	...	...	...	...	...	...	...	...	...	22½	...	37½
29	...	...	...	...	...	...	30	...	...	...	...	...
30	17	...	...	1½	...	...	...	...	...	17½	...	...
31	10	...	5	...	...	...	...	...	...	48½	...	...
Total	1-32	2-77	2-64	7-42	2-08	3-15	2-29	19	81½	4-45	4-80	2-43
No. of days	9	14	9	13	7	12	5	1	5	13	10	6

1870.—January 12th, very hot, thermometer 102½°; 13th, very hot, thermometer 104½°; 14th, awfully hot, thermometer 106½°, sea breeze about 3 p.m., thermometer soon fell 30°; rain on seven days—moderate; 17th, total eclipse of the moon at night. February 1st, delightful day, aurora in the evening; 2nd, dim aurora at night; 19th, dreadfully hot, thermometer 103°, thunder-storm in the afternoon; rain on five days. March 6th, very wet day till about 6 p.m.; 9th, very wet all the forenoon; 10th, very heavy rain early in the morning, gradually ceased as the day advanced, rainbow in the evening, and beautiful sunset; 11th, river very high, but not yet over the banks, new flood gates at Wallis Creek gone; 12th, steady rain all day, a great flood seems inevitable, already they are heavily flooded round Maitland; 16th, very rainy, came down in torrents at times; 17th, very rainy, tremendous showers in the afternoon; 18th, heavy showers up to about 10-30 a.m.; light rain rest of day, river rising fast; the backwater visible this evening, backing up the creek from Windemere; 19th, smart showers before daylight, light rain all day; river still rising; I hear it has reached 36 feet at Singleton; backwater at Maitland increasing greatly, water over the platform at Elgin-street Station. Although there

has been rain on twenty-six days, and nearly 19 inches of rain has fallen, the flood in the river has not been equal to either the '57, '64, or the '67 flood, but around Maitland it has been one of, if not the most disastrous flood on record, coming at a time when all the crops were in the field. April 5th, rained steady (pretty hard at times) all night, and up to daylight this morning; 22nd, heavy showers before and after daylight; light rain all day; 24th, steady rain all night, till about 9 a.m.; 25th, river higher than either '64 or '67 flood; the river much higher than last night, never saw it so high before; rain on nine days, and though the quantity here was below 8 inches the flood in the river has been greater than any flood since 1826. May, rain on eighteen days, moderate. June 14th and 15th, slight frost, rain on six days, all light. July 5th, very sharp frost; 8th and 9th sharp frosts, light rain on ten days. August 9th, sharp frost, light rain on twelve days. September, light rain on nine days. October 1st to 21st, rain on nine days during that time, mostly light.

RAINFALL OBSERVATIONS.

Station—Lochinvar, New South Wales, during the year 1870.

Date.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1	...	...	...	...	...	...	...	...	1	...	...	...
2	...	...	35	...	5	3½	...	13½	44	...	...	...
3	...	...	52	...	16	30	...	1.26	...	...	...	...
4	19	...	7½	...	15½	...	...	...	...	...	...	...
5	...	...	8½	1.21	7	...	...	½	...	...	...	...
6	...	...	1.57	16	...	...	...	...	...	...	...	...
7	...	3½	60	...	3	...	...	9	...	...	...	...
8	...	...	43	...	...	...	...	...	7½	...	...	...
9	...	...	1.18½	...	...	...	...	...	6	...	...	...
10	...	...	1.45	...	3	...	...	...	...	9	...	...
11	...	...	4½	...	3	...	...	...	...	...	...	...
12	...	...	53½	...	2.25	...	...	33	...	46	...	...
13	...	...	1.1	...	1.30	...	...	15½	...	59	...	...
14	...	...	1	...	...	...	28	...	...	1.9½	...	...
15	1.83	...	12	57½	...	...	4½	...	...	30	...	...
16	...	...	43	...	...	1	8½	...	...	...	...	...
17	...	...	2.30½	...	...	...	38½	...	...	...	...	...
18	...	...	3.14	...	1½	1	18½	12	11½	11½	...	...
19	44	...	44½	...	10½	2	...	...	...	27½	...	...
20	...	5	39	...	57	...	...	...	35½	67½	...	...
21	...	...	60	...	5½	...	...	...	4	11	...	...
22	...	...	22	1.71	...	...	14	14½	...	...	...	...
23	...	...	...	18	38	...	26	...	...	...	...	...
24	...	23	...	3.18	1.73½	...	...	...	...	...	...	...
25	...	...	...	69	7½	1	5	...	18½	...	...	...
26	...	69	...	5	...	...	10	...	...	...	...	...
27	1.3	...	2	...	...	...	...	14½	...	...	...	...
28	...	37	7½	17	...	...	6	12	...	...	...	...
29	...	...	1.38	...	1	...	...	...	23½	...	...	...
30	...	...	1.9	...	...	...	...	13	...	...	...	...
31	19	...	86	...	3	...	...	4	...	...	...	...
Total	3.71	1.37½	18.99	7.92½	7.15	38½	1.59	2.67½	1.51½	...	...	...
No. of days	7	5	26	9	18	6	10	12	9	...	...	...

[Journal ends on 21st October.]

Extracts from Sir Wm. Macarthur's Diary.

- 1860.—October 19th, heavy rain; lighter rain 20th. November, thunderstorm early part and end of month; hail and sleet on 12th; heavy rains middle of month; *considerable flood during night 16 to 17, covering meadow and low grounds, rising at rate of 22 to 24 inches per hour; 19th, falling slowly, much cooler than usual.* December, weather during month generally fine, with a few thunderstorms and showers of rain.
- 1861.—April, heavy rain 3rd; 4th, flood nearly as high as November last, and another flood on 29th higher than the November one.
- 1863.—April 19th, river up to rail of bridge, heavy fresh.
- 1864.—April 30th, river up, low flood; June 11th, flood rising, very high 12th; July 16th, flood—high one.
- 1865.—October, very dry.
- 1866.—June 15th, low flood; 20th, slight rise of water. July 12th, flood about 2 feet higher than June 15th.
- 1867.—April 12th, flood, river rising again; 28th, *a fresh*; in addition to 21 days of April, with rain amounting to 12·67 inches, there were 5·28 inches from March 18th to 31st, making nearly 18 inches in 29 days rain, or more exactly 17·95 in the 34 days, nearly the whole from N.E. without wind and with temperature averaging from 63° to 66°; yet during the whole time until yesterday no flood, only high freshes and the present flood, quite a low one apparently caused chiefly by heavy rains of the afternoon and night of the 28th to the southward; eleven hours of continuous rain brought down another considerable rush of water, I have never seen surface more completely saturated; this flood, not so high by some inches as that of last winter. June 19th, high flood again 22nd June. September 8th, river in high fresh. November, considering the heavy rains in September the months of October and November have been the most disastrous to vegetation; the succession of blighting, biting land winds, hot and cold, seem to have had some unwonted specific evil effect—every description of fruit has suffered; the month of October opened with the promise of the greatest abundance; there is now no hope, and the coming season must prove one of the worst, if not the very worst, for fruit crops in my experience—there is no exception save the grape-vines, and they are beginning to lose their original vigorous appearance; the pastures are burning up, the wonder being that they have held out so well against above eight weeks of such weather; I consider this and the same period in 1865 as the worst two Octobers I have witnessed. November 30th, this is the driest period for its duration for the last twenty years, and probably for a longer period; as a whole November has been less severe (although so rainless) than October; there have been twelve days of land wind with eight or nine weeks the maximum temperature from 90° to 98°; the pastures are quite scorched up save in low places, and these becoming very bare; trees look upon the whole well, and with young foliage, the ground is cracked as much as I remember in the longest droughts; fruit trees generally look very well, orange trees excepted; the vines very flourishing, with fine crop; we are sixty-six days now with only a nominal supply of ·03 inch rain, and though frequently clouding still no rain.
- 1868.—February 16th and 17th, flood, followed by dry weather in March and April; very dry weather during September, October, November, and December.
- 1869.—April 5th, *river rising, a fresh.* May 8th and 9th, *river in flood.* September, very dry.
- 1870.—March 9th, flood; flood March 22nd. April 27th, flood. May 12th and 25th, floods. November 20th, *flood (low).* December 25th, *low flood.*
- 1871.—April 29th and 30th, flood—middling flood. May 1st, *flood*; and again May 26th, flood.
- 1872.—April, very dry, rain much needed. June, drought very serious, lagoons very low, all vegetation except in very few places suspended, rain has fallen on coast and westward of dividing range. Very dry in July and August. September, another very dry month, the driest belt appearing to be the west of the county of Cumberland and its borders; abundant rains in Victoria all the season.
- 1873.—January, grape-vines suffering from black blight and oidium. February 25th, highest flood on record. Dry in March and early April. June 16th, *flood.* July 26th, a fresh in river. September, weather very dry, rain wanted. November 12th, flood in creeks.
- 1874.—February 12th, river flooded from distant rains. February 25th, flood. August and September, dry.
- 1875.—May 3rd, moderate flood. May 29th, river in fresh. June 6th and 7th, river in low flood, very dry summer.

RAINFALL OBSERVATIONS AT CAMDEN.

Date	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.
January	4164	3526	3430	0850	1740	5400	1410	5460	3110	2856	6000	6410	4010	6230	1850	
February	3947	5185	8470	5850	3600	3580	6900	2200	0920	4100	1100	1050	7060	8110	15	
March	2933	0634	2820	7370	1700	5430	0450	0540	61240	26	2830	5280	0760	3080	1040	
April	11110	1330	5020	4330	1010	9700	12070	3700	7450	15	8900	0400	4000	2380	82850	
May	0944	0350	0000	0840	2500	1050	1000	610470	6	3000	10	6000	0030	0100	42800	
June	0634	0800	1500	13500	1120	9140	11280	0770	1530	8	1300	50220	8320	93480	5740	
July	1920	0070	0790	7630	0710	5430	1590	3820	1720	4	1190	80300	1250	4670	3700	
August	3582	0780	0650	1700	1800	61010	0780	1840	50530	3	1500	0200	1080	60320	0870	
September	1904	0310	2730	1720	0170	5350	1420	0840	31300	6	1300	0050	0640	50580	0100	
October	2820	0830	2975	3380	0010	0800	50020	1480	2350	12	3700	112000	2670	71270	61300	
November	8428	1440	0580	0500	4010	2410	0000	1640	84870	13	6000	114000	6440	135830	41170	
December	1944	0800	0490	2760	1200	5000	0040	3000	31080	9	6400	161800	5100	82140	80880	
TOTAL	1310930	3812303	1525044	2954553	5062091	1990073	2073082	4353078	2508674	8238094	55740128	8991092	2850078	5292087	3778080	3345070

11 years, 95,008 inches and 81 days
average for

ts.

of the 21st December, 1875,
and here, as it refers specially to

probability that a few words about our past
forming a reasonable expectation in

and now over a period of thirty-six years,
the recurrence of these droughts, yet there
is that we may, I think, reasonably estimate
the recurrence of rain at any particular
country out of the direct tropical influence,
the result of such a complex action that we are
with a probability.

question of drought in spring and early summer,
at in at the present time. For the purpose of
form the rainfall of the last five months of every
August, for the whole period, is 2·928 inches, for
extraordinary and wholly exceptional rainfall of
which fell during a hurricane, the average for
inches, and December (35 years) 2·801 inches, and
in the five months is 14·264 inches.

The Spring of every year, 1840 to 1875 inclusive.

September.	October.	November.	December.
4·870	1·750	1·950	4·940
4·200	7·050	4·350	4·250
1·100	0·070	0·140	3·040
3·630	1·100	0·750	3·540
3·720	24·690	4·510	4·570
3·620	1·890	0·800	7·740
5·940	2·750	3·970	5·480
1·190	1·200	1·590	1·540
3·370	5·350	0·480	2·920
1·330	1·950	1·560	0·410
4·500	8·660	1·690	1·520
0·580	4·320	2·500	3·610
3·170	2·280	4·800	1·510
0·120	2·710	4·480	4·780
2·500	1·080	1·540	0·390
5·350	2·380	2·350	5·270
2·200	2·550	11·130	4·770
1·540	5·260	1·510	1·260
0·790	1·420	3·720	2·480
0·290	10·900	0·300	1·310
9·480	2·540	4·080	7·290
7·720	1·770	2·710	1·620
1·950	0·630	0·720	1·030
0·390	3·270	3·480	0·680
3·030	1·140	5·410	1·250
2·990	1·130	0·920	9·880
1·070	0·140	1·390	3·610
0·980	3·350	0·210	0·200
2·600	2·010	1·460	2·420
0·670	1·630	1·760	5·370
2·820	1·050	4·188	5·493
0·467	0·572	3·468	2·130
2·972	2·282	5·770	3·290
2·979	1·594	2·135	9·447
1·855	2·100	3·876	3·330
0·520	1·700	1·055	0·881
105·213	92·158	123·692	112·011
			99·906

The years of drought are as follows:—

- 1842.—From the end of August, excepting one heavy thunder-storm on December 14 the weather continued excessively dry till 17th February, 1843, when an easterly gale came on, and heavy rain fell, without thunder.
- 1847.—The drought this year began in July, and continued to January. The country was very much burnt up, and the losses extensive.
1849. The dry weather began on the 7th of August, and continued till the 16th March, 1850, when it broke up with storm of wind, thunder, and lightning from south. Bush fires raged near Sydney for ten or twelve days, and the city was shrouded in smoke. So severe was the drought generally, that it is said many poor settlers would have been ruined but for liberal subscriptions. The year 1849 is the driest on record; only 21·49 inches rain fell during the whole twelve months.
- 1854.—From 7th September drought continued to 17th January, 1855, when it broke up with violent thunder-storm from south.
- 1857.—From end of October a very dry period, excepting a thunder-storm and some rain 9th December; lasted till 22nd February, and broke up with violent thunder-storm and southerly wind.
- 1861.—From November 22 a very dry period, with thunder-storm on 11th December; lasted to 16th January, 1862, and broke up with a thunder-storm from south.
- 1862.—Very dry from August 4, excepting a heavy thunder-storm December 15, to January 20, when weather broke with thunder-storm and southerly wind.
- 1863.—From 28th October to 7th February, 1864, a severe drought, which broke up with violent storm of wind, thunder, and lightning from south. Partial relief obtained from violent southerly squall and rain 10th December.
- 1867.—From 24th September a severe drought; lasted to 16th January, when it broke up with a violent thunder-storm from s.w. 11th December, Partial relief from heavy thunder-storm.

We next come to 1875.—The drought has extended from July 3 to 16th December, and it is remarkable that on this day a violent squall of wind and thunder came up and a little rain fell. The whole amount, 4·508 inches, which has fallen since the 3rd July, is less than one-third of the average fall for the period, and even this small amount has been distributed into so many falls that the relief has been very small. Indeed, when the weather once becomes dry, it may fairly be assumed that a fall of rain of less than a tenth of an inch at one time it does no good. Tried by this standard, the dryness of the past five months is manifest—for, from 8th of August to September 13th, no useful rain fell; then a small quantity fell between 13th and 21st, and nothing again to October 5th; a trifling fall between 5th and 10th, and again no rain to 20th and 21st, when 0·358 only fell, and dry, hot, and windy weather followed to November 3rd; 13th to 16th, 0·594 only fell, and it became again hot and dry to December 1st, when 0·199 fell, and thence to date no rain.

If we tabulate these results, some interesting facts become apparent, but they are not encouraging at the present moment, when our need is great and there is a promise of rain:—

DROUGHT.

Year.	Partial break.	Drought broke up.
1842	— 16 December	— 17 February, 1843
1847	— —	— January, 1848
1849	— —	— 16 March, 1850
1854	— —	— 17 January, 1855
1857	— 9 December	— 22 February, 1858
1861	— 11 December	— 16 January, 1862
1862	— 15 December	— 20 January, 1863
1863	— 10 December	— 7 February, 1864
1867	— 11 December	— 16 January, 1868
1875	— 16 December.	*

So that, out of nine droughts recorded in the latter part of the year, five have broken up about the middle of January, three in February, and one not till 16th March; but none in December, though in most cases there is a thunder-storm and some rain in December, after which the drought returns, and it is not until the later period that the break is followed by abundant rain.

It is worthy of remark that, with one exception—1842-3—the break-up has always been with a violent storm of thunder and lightning from the south.

It is instructive to look back and see how many days we have been without useful rain. The longest period without any rain was twenty days in September, 1866, but if we take the same amount as before, viz., 0·100 as the useful limit, the dry spaces in years under consideration are as follows:—

From 19 September, 1842, to 8 December—seventy-nine days—only 0·415 inches of rain fell; and that from 24 September, 1867, to 11 December—seventy-eight days—only 0·630 inches of rain fell. The three months October, November, and December, 1867, are the driest of the whole period. (See page 49. Remarks on Table 16.)

* This drought did not break up until the 7th April, 1876, and then only along the coast districts. Note added, December, 1876.

TABLE showing dry periods when there were no showers of rain in which the fall measured one-tenth of an inch.

Year.	From	To	No. of days.	From	To	No. of days.	From	To	No. of days.	From	To	No. of days.
1857	Sept. 17	Oct. 5	18	Dec. 10	Dec. 31	21	Oct. 23	Nov. 7	16	Nov. 3	Nov. 28	26
1858	Aug. 6	Sept. 3	29	Sept. 8	Sept. 23	16	Oct. 18	Nov. 2	16			
1859	July 23	Sept. 2	42	Sept. 14	Sept. 16	33						
1859	Dec. 1	Dec. 21	21									
1860	Dec. 23	1861. Jan. 6	15									
1861	Aug. 28	Sept. 10	14	Dec. 5	1862. Jan. 12	39						
1862	June 25	Aug. 2	39	Aug. 16	Sept. 7	23	Oct. 21	Nov. 12	23			
1863	July 24	Aug. 9	17	Aug. 18	Sept. 2	16	Sept. 8	Oct. 2	25	Nov. 12	Dec. 10	29
1863	Dec. 21	1864. Jan. 4	15									
1864	July 16	Aug. 5	21	Sept. 15	Sept. 29	15	Nov. 19	Dec. 2	14			
1865	Aug. 11	Sept. 8	29	Oct. 12	Nov. 1	21	Dec. 17	1866. Jan. 10	25			
1866	July 20	Aug. 6	18	Sept. 1	Oct. 4	34	Dec. 20	1867. Jan. 20	32			
1867	Aug. 22	Sept. 7	17	Sept. 26	Nov. 17	22	Dec. 25	1868. Jan. 9	26			
1868	Aug. 1	Aug. 16	16	Sept. 22	Oct. 13	22	Oct. 18	Nov. 2	16			
1869	Aug. 4	Aug. 22	19	Sept. 18	Oct. 3	16	Sept. 25	Oct. 8	14			
1870	Aug. 4	Aug. 26	23	Sept. 2	Sept. 19	18	Dec. 10	Dec. 31	22			
1871	July 25	Aug. 8	15	Aug. 10	Sept. 23	44						
1872	July 23	Aug. 12	20									
1873	June 29	July 20	21	Sept. 11	Oct. 5	25	Dec. 12	Dec. 30	18			
1874	Oct. 6	Oct. 20	15	Oct. 28	Nov. 14	18	Oct. 23	Nov. 13	22			
1875	July 10	July 28	18	Aug. 10	Aug. 31	22						

The question as to the extent of these droughts is one upon which there is very little recorded information, and what there is does not serve to answer to the question except in a very imperfect way.

The great drought of 1812 was certainly not felt in Melbourne; there they had an abundant rainfall, just as they have had now during the past few months.

When a drought has been severe at Sydney it does not appear to have been so inland; indeed a drought is often very circumscribed, and the rainfall observations made in the country point unmistakably to the fact that a very dry year on the coast is not so severe inland, and that the dry years of the interior are often the wet ones of the coast.

As much of the inland rain falls with a westerly wind, compound of tropical and polar winds, this oscillation of the rainfall is quite in accordance with the explanation offered below as to the cause of droughts, for when the two currents meet to the westward the moisture is deposited there, and the wind reaches the coast dry.

That the proximate cause of these droughts is an unusual southerly set of the equatorial currents is manifest, by the low barometer, high temperature, and great prevalence of north-westerly and north-easterly winds. As the prevalence of these winds excludes the southerly or our rain-bearing winds, we necessarily get less rain than usual; and when the sun has turned to go northwards, the equatorial currents move with him, and the southerly polar current rushes in with thunder and lightning—sure indication of the meeting of the two currents—and rain follows.

This letter is already too long, and I have purposely refrained from any discussion of the facts, but they force us to estimate the probability of rain before the middle of January as very small indeed.

H. C. RUSSELL.

Droughts in Tumut.

An account of the droughts and floods in the Tumut District during a residence of the last thirty-one years, by Edward Burr, Esq., kindly written for this work. September 13th, 1876.

After the great drought of 1839, felt throughout the whole Colony, we had, from that year to 1843, very favourable seasons, but by no means wet, in this district; and in 1844 occurred the first very heavy flood in the Tumut and Murrumbidgee Rivers, being in September of this year. From 1845 to 1850 were very favourable seasons, neither too dry nor too wet. The rivers were occasionally flooded during these years, but not to any injurious extent. The winter of 1849 was very dry, but rain enough for people to put in their crops, and that was all; there were nothing but light showers from the autumn of 1849 to the 14th May, 1851. That was the severest drought I remember, and most injurious in its consequences. During December, 1850, I travelled overland from Adelaide, South Australia, and witnessed most fearful sights on the banks of the Murray and Murrumbidgee Rivers with dead and dying cattle. I had to feed my horse with reeds from the river bed, notwithstanding I did the journey to Tumut (800 miles) in twenty-one days with the same horse. The greatest number of stock died after the first rain fell in May, 1851, but I believe this drought was almost confined to the western slopes.

The winter of 1852 was the wettest I remember, and in that winter occurred the great flood that swept away Gundagai and ninety-six of its inhabitants.

The greatest flood I remember in the Tumut occurred in August, 1851; but it always so happened that the Tumut and Murrumbidgee were never flooded at the same time, or the consequences would be alarming. Any floods we have had since the last-mentioned have not been serious, and from that time people who had their houses near the river removed to higher ground.

The next severe drought was in 1868, most felt in the Lachlan and Murrumbidgee Rivers and Billabong Creek, where large flocks of sheep travelled from those parts to these mountains for grass and water. I have every reason to believe we are now on the eve of another serious drought; and when it does arrive, I am of opinion that it will destroy immense quantities of stock, the country being so much inclosed, and so fearfully overstocked, including the mountain country, that it leaves no refuge to flee to, as in former visitations of that kind. People are daily arriving here in search of summer country, which will in a few days be bought up, and many of them have made up their minds to cut the throats of all aged sheep rather than incur the expense of travelling; others are unable to remove their stock for the want of water, and they must perish in thousands.

Extracts and information kindly given to me.

Start, "Central Australia," vol. 2, page 21.

Says, on October 7, 1845:—"If I except the rain of July, which lasted at intervals for three days, we had not had any rain for eleven months."

Page 24.

September 1st (about), 1845.—"When camped near Eyre's Creek, about 9 o'clock in the morning, we distinctly heard a report as of a great gun, discharged to the westward at a distance of half a mile. On the following morning, nearly at the same hour, we again heard the same sound, but more distant; and when I was on the Darling in 1828 (*i.e.*, 3 p.m., 7th February, 1829), I was roused from my work by a similar report, but neither on that occasion nor on this could I solve the mystery."

Page 117.

December 25, 1845.—The Darling at this time had ceased to flow, and formed a chain of ponds, and the lagoons and creeks in the neighbourhood were quite dry.

Page 119.

Last days of 1845 and first of 1846 were exceedingly oppressive, and the heat almost equal to the interior itself.

(*From Surveyor G. B. White's Journal.*)

October, 1845.—This month very hot at Singleton, hot winds very frequent, and everything burnt up.

November 1 and 2, 1845.—Fearful hot winds at Singleton; on 7th, hot wind again. I never remember anything so bad. Throughout this month we had hot winds and fearful weather, except the 20th, when there was thunder, lightning, and rain from 9 a.m. to noon. **December, 1845, was very hot and dry here, with only a few showers and thunder-storms; but it appears there has been plenty of rain in Sydney.**

(*J. Bowie Wilson, Esq.*)

In 1847-48, Mongarlo Creek was dry in places for two miles, and wells were sunk in some of the deep holes to get water near Braidwood. It has never been dry since.

(*R. Sempill, Esq.*)

The MacIntyre River, when I saw it in 1845, had flood debris in the trees 100 ft. above the plain, which the blacks said had been put there by a big flood. Flood in the Hunter, 7th May, 1854, rose to within one foot of the roadway of Victoria Bridge. A very serious drought in Queensland in 1858 broke up in 1859. Lake Gracemere at Rockhampton was dry in this drought.

(*H. Humphrey, Esq.*)

In the drought of 1846-7, when the Mucki River was all dry but the deepest holes in the rocky bed, I saw the marks where the blacks had worn away the stone sharpening their axes; and, looking down into the clear water as far as possible, I could see the same marks, proving that at some previous time there had been even a more severe drought than the country was then suffering from, and when I saw it the river never ran for three years. At the same time Dury Creek was quite dry, and in the deepest waterhole a well 40 ft. deep was sunk. From that well a supply of water was obtained. When the drought broke up, both these streams ran again, and have never been dry to my knowledge from 1852 to 1876.

In the drought of 1845-46-47 at one time the Hunter was only a chain of ponds at Singleton.

(*From Surveyor G. B. White's letter to the "Maitland Mercury."*)

1st July, 1857.—I have marked and noted the Hunter floods of the years 1826, 1832, 1840, and 1857. The first of these reached within 66 ft. of the north angle of the old Police Barracks of East Maitland; and the present site of West Maitland was then to all appearance a sea interspersed with islands, the tops of the bushes occupying the brush lands of the day. The flood of 1832 was not so high by 4 ft. as the flood of 1826, and yet, upon that occasion, I personally rescued in a whaleboat, from the roof-tree of his hut, old O'Donnell, the Patriarch of Wallis Plains, as he was then called. His hut was opposite the now Waterloo Inn, near the junction of Wallis's Creek and the Hunter.

(*G. Dougherty, Esq.*)

From 1852 to 1859 I was living on the Edward River, near Deniliquin. 1852-53.—Rains abundant, and severe floods over the Murray watershed. Township of Gundagai swept away. 1854, a good season; 1855, a dry season; 1856, a fine season, abundant summer rains—no heavy flood; 1857, dry; 1858, wet; 1861, a dry season. In 1864 I was on the Comet River, in Queensland. Tremendous floods. In March rained heavily for ten days and nights without intermission and without wind. All winter, light trade wind. Scarcely ever a cloud crossed the sky until December, when the wet season again set in, but not so bad. In January, 1866, I was on the Darling River, near Wilcannia. An eighteen months' drought broke up by three days' rain; 6 inches fell.

1867.—It is asserted, on good authority that the mosquitoes were so bad at Mr. Archer's station, near Rockhampton, in the year 1867, that they killed a whole flock of 1,500 sheep by biting them about the eyes.

SEVEN YEARS' METEOROLOGICAL NOTES on the river Bogan (80 miles above Gongolgon), by L. S. Donaldson, Esquire.

	1864.	1865.	1866.	1867.	1868.	1869.
January	Dry; feed scarce	Dry; feed moderate; two thunderstorms, very light.	Heavy storms 2nd and 18th; feed abundant after 20th.	Dry; no feed; stock getting very poor.	Several nice showers and one day's heavy rain; feed very good afterwards; river half a banker.	Dry; stock dying; river being deserted for want of water.
February	Very heavy rains; feed slightly improved.	Dry; feed scarce; river getting low.	Dry; feed abundant	Dry; no feed; stock very poor.	Feed abundant; two days' light rain; river stopped running.	Dry; heavy storm up the river caused it to run down to Gongolgon (80 miles); stock dying; no feed.
March	Heavy rains; feed abundant; great floods in the Darling.	Dry; feed scarce; river not running.	Dry; feed moderate	Dry; no feed; stock starving.	Dry; feed plentiful	Showers on 16th, 17th, 19th, 20th, 25th, 28th, 29th; none of this rain heavy enough to run the river; but enough for feed.
April	Dry; plenty of feed	Rain on 30th; no feed.	Dry; feed moderate	Heavy rains during this month; feed abundant.	Dry; feed plentiful	Feed abundant; very heavy rain on 7th, 8th; more water out back than I ever saw before; river bank high.
May	Dry; plenty of feed	Rain on 1st; river ran to Gongolgon; very little feed.	Good rain about the 20th; feed plentiful afterwards.	Dry; feed in abundance.	Twelve hours rain on the 18th; filled one water-hole in the river.	Several thunderstorms and heavy rain during the month; feed and water abundant.
June	Dry; feed moderate	Dry; sharp frosts; green grass about an inch long.	Feed abundant; rain on 19th and 13th, but no back water.	Plenty of rain; plenty of feed.	Dry; feed very dry but plentiful.	Showers on 15th, 16th, and 17th, and a thunder-storm on 20th; feed abundant; sheep looking well.
July	Dry; feed moderate	Dry; no feed	Rain on 11th and 12th; feed abundant; no back water.	Plenty of rain; high flood; plenty of feed.	Dry; feed very dry but plentiful.	One day's heavy rain; feed water abundant; sheep in good condition.
August	Four days heavy rain; water out back; too cold for grass to grow much.	Dry; no feed	Feed moderate; one and a half day's rain; also, one shower.	Dry; feed abundant	Dry; feed getting scarce.	One day's heavy rain and one night's rain; feed and water abundant.
September	Dry; feed moderate	Dry; no feed	Dry; feed moderate	Dry; feed abundant	Dry; no feed for ewes and lambs; sheep in good condition.	One heavy shower; feed and water abundant; sheep fat.
October	Two very short thunderstorms; feed moderate.	Dry; no feed	Dry; feed scarce	Dry; feed abundant	Dry; ewes and lambs very poor.	Three or four heavy showers during the month; feed and water abundant; sheep all fat.
November	One hour's rain; feed scarce.	Dry; stock getting very low.	Dry; feed scarce; a few light showers, just enough to stop shearing and do no good.	Dry; feed moderate.	One hour's rain on 8th, filled up river a little; stock very poor indeed.	Rain twice; water out back all dried up this month; feed abundant; sheep all fat.
December	Twelve hours rain on Christmas Eve; river ran to Pink Hills; feed scarce.	Heavy storm on 31st; no feed.	Dry; no feed; one or two very slight showers.	Dry; feed scarce	Showers on Christmas Day; stock starving.	Light rain once or twice; hot winds this month; feed abundant; sheep all fat.

* Twenty hours' rain on the 18th January, 1868, which rose the river bank high in four days.
 N.B.—The river has only stopped running about a month since April, and is still running (December 31st, 1869) but very nearly stopped.
 Remarks for January, 1871.—Great variety of frogs, and many butterflies, grasshoppers, and bush spiders this month. A very sticky season, owing to so much green grass and moisture

Magnetic Variation.

From the visit of Captain Cook up to 1858 all the determinations of magnetic variation show a gradual easterly *increase*, at the rate of about 2 minutes per annum. The observations made in 1860, and subsequently, show a *decrease* in the easterly variation at the same rate.

It will appear in reading the attached list of variations that they in some instances contradict each other, especially from 1813 to 1824; but it must be borne in mind that some of the needles used were only intended to work to $\frac{1}{2}$ degrees, and the mean of the general observations for this period may be taken as the true variation. If this is plotted into a curve with the more correct readings, no serious error is found.

There can be little doubt that Sir J. C. Ross's $9^{\circ} 57' 19''$ should read $9^{\circ} 27' 19''$, for two reasons—first, his own determination, 3° east of Sydney, was $9^{\circ} 42'$, *i.e.*, less than at Sydney, when it should have been greater, for the variation increases going east; second, $9^{\circ} 57' 19''$ is contradicted by all the other observations at Sydney, whereas $9^{\circ} 27' 19''$ agrees very well with the best.

In Sydney the greatest diurnal range of the magnet occurs in February, and amounts to $18'$, the magnet pointing $6'$ west of its mean reading at 9 a.m., and $7'$ degrees east at 2 p.m.

List of Determinations of the Magnetic Variation in New South Wales, 1770 to 1874.

	Variation.	Month.	Year.
Cook	$11^{\circ} 3' 0''$	April 29th.....	1770
Lieut. Shutland.....	8 6 0	July	1788
Brewster.....	8 46 0	March	1793
Finders.....	8 51 0	"	1803
Brewster.....	8 51 34	February and March ...	1813
P. P. King.....	8 42 0	October.....	1817
Oxley.....	9 0 0	April	1818
Eoe.....	9 6 0	"	1822
Brewster.....	8 47 48	October.....	1822
Rumker.....	8 51 41	April	1823
Sir T. Brisbane.....	8 45 0	"	1823
Brewster.....	8 56 0 (Noon)	January and February...	1824
Dunlop.....	9 3 48 "	April	1825
Do.....	9 21 7	September.....	1832
Sir J. C. Ross.....	9 57 19*	July	1841
Blackwood.....	9 25 0	February	1844
Admiral King.....	9 42 52	April	1851
Do.....	9 47 56	"	1852
Denham.....	10 0 0	September.....	1857
Do.....	10 0 0	"	1858
" Novara" (ship).....	9 59 54	December.....	1859
Smalley.....	9 49 4	"	1864
Do.....	9 42 54	"	1866
Do.....	9 40 40	"	1867
Russell.....	9 36 36	"	1870
Do.....	9 35 0	"	1871
Do.....	9 34 2	"	1872
Do.....	9 32 22	"	1873
Do.....	9 32 45	"	1874

* Probable misprint here—57' for 27'.



THE following paper on *Periodicity* was read before the Royal Society of Sydney, on 11th October, 1876. By permission of the Society it is inserted here. I was the more anxious to reproduce it as it forms an epitome of the preceding pages, combined with some theoretical and other matter that belonged rather to such a paper than to the pages of a work on "Climate," but which nevertheless are interesting in their connection.

To the certainty of one cycle and its undoubted cause we have all been accustomed to give our adherence, but the very familiarity with it often makes us fail to see that the cause which rules in the cycle of greatest changes, viz., from summer to winter, must surely be sufficient by its probable variation to produce the minor changes which distinguish one year from another. We know that a slight change in the sun's position in the sky is sufficient to make the difference between winter and summer; and yet, when one year differs from another, we seldom suspect the grand cause of any variation. We call in theories of heated plains, unusual rains, or winds, to our aid in explaining the phenomena, while, if questioned at another time as to the cause of the heated plains, or the action of interior continents, we should, without question, attribute them to the solar influence.

Passing, then, from the annual cycle, about which all are agreed, let us consider some of the "Periods" which have been put forward as the results of observation and investigation.

The shortest is that which for many years pleased meteorological observers in Tasmania, viz., two years—a wet and a dry one alternately. Such a period does not take long for its discovery, and is exceedingly convenient in many ways, but after some twenty or five-and-twenty years of regular recurrence, during which observers naturally thought it was fully proved and established, a change came, and two wet years appeared together—1848 and 1849—and these were followed by two dry ones. 1849, as we shall see, was a memorable year in the climate of New South Wales and the other Colonies, but here it was memorable as the driest year on record. There it was the turning point in the *two years'* period; and Tasmania, like the other Colonies, has since had an uncertain rainfall.

The next "period" is one of three years, suggested here by my friend, Mr. Tebbutt, in the *Herald*, 27th February, 1874, and by him traced through all his observations at Windsor for a period of fourteen years. For these observations, and also for those of Sydney between 1863 and 1875, it agrees remarkably well with the results; but, in attempting to trace it back through the Sydney and South Head observations, it fails to represent the rainfall results; very much, however, may be said in its favour, and it has been remarked also in the climate of Ceylon.

Mr. Tytler, writing in Ceylon on January 30, 1873, says:—"In the Tropics, at least here in Ceylon, where we enjoy the regular changes of the monsoons, the basic period runs five or six years dry and five or six years wet. These make eleven, and they form the medium cycle of *three years*, the grand cycle of thirty or thirty-three years being three periods of the eleven years cycle." It is evident, therefore, that in Ceylon some traces of a three-year period may be found.

Mr. Ranken, in his work on the Dominion of Australia, speaks of years of dry weather in Central Australia, followed by years of drought. Making "years of a season, and not seasons of a year," he thinks that the immense area of flat and heated plain has a cumulative effect upon the weather, making season after season dry, until the tension becomes too great, and a great inrush of polar wind takes place, bringing abundance of rain, which spreads all over the burnt-up plains. Once there, the

water takes several years to get away. It rises, and is again precipitated, and flood after flood follows. He thinks that these changes over the vast extent of flat country in a large degree modifies the climate of its coast margins.

Of this view it may be said that two well-known facts appear to be overlooked. In the first place, the evaporation on those interior plains during the summer months must at least amount to 12 inches per month; and overhead is steadily blowing the return wind of the trades, which, as the moisture rises, sweeps it away to the south-east, to be precipitated far from the interior of Australia.

As we have already seen, a period of five or six years has been recognised in Ceylon; and although I am unable to trace it in our annual results, the monthly rain tables show some signs of it. For instance, in April, 1845, there was a very heavy fall of rain; again in 1850 and 1855, 1861, and 1867. Another series may be found in June, 1846; heavy rain in 1852, 1858, and 1864; but I do not think any weight can be attached to these. They are selected cases, and by no means represent the general character of the seasons.

A period, however, of between six and seven years may be traced in our dry years a long way back; thus: 1872, 1865, 1858, 1852, 1845, 1838, 1832, 1826, 1820, 1814, 1808; and it is, perhaps, worth remarking, the comet of Biela has a period of six and two-thirds years, and, whether connected with the cause of our seasons or not, has passed the earth in every one of these years except the three last, which should be 1819, 1813, and 1807, to agree with the comet's seven visits.

There are some who believe in a period of nine years, and no doubt facts might be brought forward if the period could only find a champion. Of the next period in our list a great deal has been said, and for many years amongst observers of this climate this period of ten years has been considered, if not an established fact, at least one on behalf of which very much could be said, and a large amount of experience brought in as evidence.

For instance, the series following may be taken:—

	1789 } Dry years.
	1799 }
	1809 This year was certainly wet during the winter, but very dry during a part of it.
	1819 Wet year in the winter, but dry spring and beginning.
	1829 } Very dry years.
	1839 }
	1849 }
	1859 Moderate year.
	1869 Latter half dry.
So	1808 } Very dry years.
	1818 }
	1828 }
	1838 }
	1848 Wet, but dry spring.
	1858 Moderate.
	1868 Moderate.

And so of other series which might be taken, the ten years seem to bring round the same weather; and it will be observed that in the early days of the Colony it was far more marked than it has been during the last thirty years. It is not, therefore, surprising that those who had bitter experience of 1808, 1818, 1828, 1838, 1829, 1839, and 1849, should be convinced that a ten years' period was beyond question; yet, I think, a careful examination of all the evidence reveals so many exceptions that it cannot be looked upon as satisfactory, and it will presently be seen that these years are better represented by the nineteen years' period than by any other.

Mr. Symonds, in the Report of the British Association for 1865, and *Nature*, 1872, page 143, says:—"In a table I prepared for fifty years' rainfall in Great Britain, (1) the wettest years are 1836, 1841, 1848, 1852, and 1860; (2) that these, all but two, form a twelve-year period, viz., 1836, 1848, 1860, to which we may now add 1872; (3) that the dry years were 1826, 1834, 1844, 1854, 1855, 1858, and 1864; that of these, all but three form a ten-year period, viz., 1834, 1844, 1854, 1864. All this looked very satisfactory; but to make assurance doubly sure, I determined to make up a longer period; this I accordingly did for 140 years, and I was so disappointed at the total disappearance of both ten and twelve-year periods that I cannot say that I have closely scrutinized the values herein given." Mr. Symonds is also inclined to adopt Mr. Meldrum's theory of wettest years with greatest sun spots.

But no period has found such general favour as that known as the sun-spots, or eleven-years period. Its advocates assert that meteorological phenomena vary as the area of spots on the sun's surface; that when they are at a maximum we have the maximum of hurricanes, violent storms, and rainfall. To Mr. Meldrum, of the Mauritius, belongs the honor of first pointing out the coincidence of these phenomena, not only for the Mauritius, but also for a large number of stations, so far as maximum rainfall is concerned; and it appears that out of the stations examined sixty-seven have the maximum rainfall between 1859 and 1862. Amongst these are included two of the Australian stations, Brisbane and Adelaide, which, to a certain extent, agree with this theory, while the other three Australian stations, where a long series of observations have been made, are left out. It is not stated whether the sixty-seven stations were selected, but the three Australian stations omitted do not agree with it, while the two that are taken, to a certain extent do agree. Speaking of these rainfall investigations, Mr. Lockyer grows warm, for he says:—"A most important cycle has been discovered, analogous in most respects to the saros discovered by the astronomers of old. Indeed, in more respects than one may the eleven-yearly period be called the saros of meteorology; and as the astronomers of old were profoundly ignorant of the true cause of the saros, so meteorologists of the present day are profoundly ignorant of the true nature of the connection between the sun and the earth." No doubt this theory has for a time met the growing feeling amongst students of this subject, viz., that we must look outside the earth for the true explanation of its irregular as well as its regular meteorological changes; but I do not think that we find in it the final answer. In the first place, the sun-spots period is not an eleven years period; it is generally called such, but if we examine records of the maxima and minima

we find a very different result, for the period between maxima actually varies from seven to fifteen years, nay, it is itself subject to variations in intensity as well as in time; and there is much that indicates an unknown cycle in this phenomenon also.*

In the next place, in the tropical limits of hurricanes, where the cycle is said to be most conspicuous, the truth of the theory has been denied by other observers, and I do not think that we can be satisfied with such an uncertain cause or coincident phenomena as the solution of our difficulty. It is true that the increase of sun-spots can be seen year by year, and to a certain extent the approach of a maximum can be detected in this way; but the sun-spot curve is a most irregular one—sometimes remaining almost stationary, and then, with a great outburst, running rapidly upwards. Besides, the great charm of a period is gone, if it may be seven or fifteen years long, as the case may be. For convenience I will here give the recorded dates of maxima and minima of sun-spots from "Loomis' Meteorology:"—

SUN-SPOT PERIODS.

Relative Intensity.	Period.	Date of maximum.	Remarks.	Date of minimum.	Period.	Remarks.
93	...	Year. 1778	Slight rise in curve year 1781	Year. 1784	...	Rose nearly to max. by 1787.
111	11	1789	Rapid fall to 1791, then gradual	1798	14	Gradual rise.
73	15	1804	Quick fall to 1806, then gradual	1810	12	Slow rise.
44	12	1810	Gradual fall to 1820, then slow	1823	13	Steady rise until 1823, then slight fall, and again a rise.
58	14	1830	Quick fall	1833	10	Very rapid rise.
111	7	1837	Very quick fall to 1838, then quick fall.	1845	12	Rapid rise.
101	11	1848	Rapid fall to 1850, then a stop, and again a quick fall.	1856	11	Very rapid rise.
98	12	1860	Quick fall to 1863, then rise, and again quick fall.	1867	11	Very rapid rise.
140	10	1870	Rapid fall .....	.....	..	—

The duration of this period has been variously stated as 11, 11½, and 11¾ years, with how much regard to observations we have already seen. Taking the rainfall at Sydney, 1860 had the greatest recorded rainfall here; but another year given as one of the limits of maximum, 1862, was, with one exception, the driest on record, while the nearest approach in rainfall here to 1860 was 1841, which was not a year of maximum or minimum sun-spots, but is exactly nineteen years from 1860.

Using our rainfall observations, as has been done in Mr. Meldrum's discussion of the results at other places—that is, taking three years together, one on each side of the maxima and minima, we get the following results:—

Minimum period	1843-44-45	...	195 inches of rain.
Maximum	" 1847-48-49	...	115 "
Minimum	" 1855-56-57	...	147 "
Maximum	" 1859-60-61	...	183 "
Minimum	" 1866-67-68	...	140 "
Maximum	" 1869-70-71	...	165 "

* Proctor has shown, page 188, "Science By-ways," that the sun-spot period cannot be traced in the earth's temperature, and the connection, if any, between it and rainfall and wind cannot, up to the present time, be considered proven, if indeed the evidence does not tend the other way.

A period of twelve years has by some been thought to exist and be connected with Jupiter's revolution about the sun. No doubt this planet has a great influence on the solar system, and controls some of its meteor streams; but although I am fully prepared to admit the possibility of this action directly affecting our climate—and some confirmation appears to be found in such series as

1866	}	dry	or—	1865
1854			1853	
1842			1829	

(the intermediate year 1841 was very wet)—yet it fails altogether when extended to other series, and rainfall measurements show no trace of it. We are therefore compelled to feel, like Mr. Symonds, disappointment that it cannot be traced.

A period of thirteen years is said to be recognised by the majority of observers in Ceylon, and that the intensity of the monsoons, rainfall, and cloudy weather, vary in this cycle.

In America there are some indications of a period of seventeen years, and it is said that one of the marked features is the regular return of a plague of locusts.

In the British Association Report for 1842, page 24, Luke Howard, F.R.S., attempted to prove a period of eighteen years in the climate of England, from his own observations at Ackworth, in Yorkshire; but when he afterwards (1845) attempted to predict the weather on this theory, he stated that his lunar period was modified by the facts then taking place, and I am not aware that this period has been advocated by any one else.

The next period, "nineteen years," we will pass over for the present, to mention an opinion expressed by Mr. Jevons, whose valuable investigation into the climate of Australia gave him every facility for forming a correct estimate of our climate. He says (at page 81 of his work):—

"I think it will appear pretty plain from the table of floods and droughts that the history of the Australian Colonies comprehends only two complete and two incomplete climatic periods, thus):—

Period.	Commencing.	Terminating.	Characterised by
1. ...	—	1798 ...	Drought
2. ...	1799 ...	1821 ...	Flood
3. ...	1822 ...	1841 ...	Drought
4. ...	1842 ...	Not terminated in 1858	Flood.

There can be no doubt that, taken as a whole, the second period, 1799 to 1821, was one of great floods; but 1808, 1810, 1813-14-15-16 will ever be remembered as years of severe drought. Again, 1822 to 1841, 1825, 1830, 1832, 1836 were wet years

Mr. Tytler, in Ceylon, lays great stress on the cycle which has been observed there for thirty years, and he points out that visitations of the horrible leeches of Ceylon and most of the great landslips occur at this interval, and that the Singalese, with their traditions going back some 2,000 years, believe in an Edorvora Kala and a Weyokala of thirty years or so.

Of longer periods we have not much to say, though an attempt has been made to establish a period of fifty-six years in England (5 times 11½), and I shall have occasion further on to bring forward some facts which seem to point clearly to a long period of upwards of fifty years in this Colony.

In England Mr. Symonds's most valuable researches on the rainfall have revealed some very interesting facts upon which a paper could well be written, but I will here only mention one or two. In the middle of last century a very severe drought began in 1737, and between 1740 and 1750 the rainfall was nearly 30 per cent. below the average; after that it gradually rose to 1775, when five wet years, 1772 to 1776, came together, and such a wet period has not been experienced since; after this the rain curve sinks rapidly again to 1785, then a slight rise to 1795, then a fall to 1805, then a gradual rise to 1824, since which time there have been some very wet years, but the average keeps the rain curve nearly even. The *very* dry years were 1788, 1806, 1826, 1734, 1737-38, 1744, 1854, and 1864. These facts I have taken from Mr. Symonds's work, as they are valuable for comparison with some of our history and traditions derived from the aborigines, especially the *great drought*, of which more presently. (*See diagram at end of this paper.*)

Coming now to the period of nineteen years, which I think was first suggested in my "Notes on the Climate of New South Wales, 1870"; but as the history of cycle-hunting has not yet been written, it is impossible to say that it has never been observed or published before. It is, however, certain that it was then first detected in our rainfall observations; and, so far as the information was then available, it was traced back for two periods. The rainfall diagram from this point of view was then published, including the results from 1840 to 1869. The following year (1871), Professor Smith, in his opening address to the Royal Society of N.S.W., took up the subject, and added considerably to the information I had published. The information about many years in the list then available was very meagre; yet the evidence again seemed in its favour, as may be judged from the following numerical statement:—eighty-seven years were examined; of these fifty-two fell into the nineteen-year period, twenty-five years were *not determined* from want of information, and ten appeared to be exceptions—that is, of the determined years only one in six was as an exception.

Since then I have been able, by a diligent search for information, to add largely to our knowledge of the meteorology of past years; and, whatever may become in after years of the nineteen-years period, it has more in its favour now than ever before. Experience, however, can alone decide this question, and I have never put the theory forward as the *solution* of our difficulty. The evidence has convinced me that it represents our climatic changes, but nothing will please me better than a succession of fine seasons from now onwards, in direct opposition to what the present investigation leads me to expect; for such seasons would be of infinitely more value than the confirmation of the theory could possibly be. And I think I shall be able to show you that there is an amount of probability in its favour that will justify at least a careful examination; for if it should prove true, there is warning of seasons to come which may, if rightly used, be of the greatest value to the grazier and the agriculturist. A page of figures is not generally enticing to the reader, and I have, therefore, put into the form of curves the rainfall at each place from year to year, and for convenience they have been arranged, as Sydney curve is, in the nineteen-years period. It is, however, impossible to convey in this way an exact idea of the character

of each year, for the curve is in some cases wholly distorted by rain-storms, as for instance, in 1844, where the curve is raised twenty inches by the rain-storm of one day; and again in 1868, a very dry year and counterpart of 1849, we have a rain-storm in February in which ten inches fell. So again of 1870, it was the excessive rain in March that masked the drought of six months of the year; but a very good general idea is obtained, and it seems, in my opinion, to illustrate the theory that we have every nineteen years a recurrence of similar weather. We have already seen that much may be said in favour of a nine or ten years period, that is about half the period indicated, and there is doubtless this sub-period which for three or four turns seems to fall in with the facts; but if we attempt to carry it through all the years it wholly fails. While tracing the nineteen years period through past history, we find no less than eleven well-marked lines in the series, and in many of them special characteristics will be found reproduced step after step in the series.

The second set of curves represents the rainfall at other places in Australia, and one station (Greenwich) from the northern hemisphere, which is put in for comparison; and although the theory does not at first sight seem borne out by the Greenwich curve, yet there are remarkable coincidences in the character of the curves, if they are viewed in the light of remarks to be made presently.

It will be seen that the Brisbane rain curve follows Sydney very well; it is below the average in 1859, above it for the two years 1860-61, very low in 1862, high again in 1863-4, very low in our memorable 1865, and so on, running to maxima in 1870 and 1873, like the rain curve at Sydney. Melbourne is sometimes with Sydney, as in 1862, 1865, 1868, and 1870, when droughts or heavy rains involved the whole eastern coasts; but it often accords with the Adelaide curve, to which I wish to draw your particular attention, as it bears strongly on the opinions expressed in this paper. (*Diagram 1*).

The Adelaide curve, if *inverted*, agrees very closely with that for Sydney, or, in other words, their rain seasons are the opposite of ours; and when the dry seasons prevail here, the rain precipitation, as I have before stated, is pushed southward, and recorded in Adelaide, and often in Melbourne. From 1840 to 1859 this fact is most striking, and, excepting 1854, 1864, and 1869, when, as before stated, droughts seemed to envelope the whole of Australia, we have a very marked agreement. For the first nineteen years, seventeen are the reverse of Sydney, two agree with it; for the second period, eight out of fourteen are the reverse of Sydney, and the others indifferent; so that, twenty-five years out of thirty-three, the rain curve at Adelaide is the reverse of Sydney. At Melbourne these phenomena are not so marked; but in many cases the same may be observed, notably of our driest year, 1849; it was at Melbourne the wettest on record.

The remarks just made form a very good illustration of what I have to state presently, viz., that the same cause, even a distant one, will not produce the same effects on different portions of the earth's surface. The force that brings us a drought usually carries rain in abundance to South Australia.

Let us now take the years in series, as they are arranged in the diagrams, only remarking that the year 1783 to 1787 are with us pre-historic:—

1802. A medium year, but there is little information.
 1821. Moderate rain in July; heavy rain and floods in September.
 1840. Moderate rains; heavy in July and September.
 1859. Heavy rain in January and February; rain in July; very heavy and flood in September.
-

1808. Early part, very dry; latter part, wet and favourable.
 1822. Early part, very dry; abundant rain in February; latter part, wet.
 1841. February, dry; terrific rain in April 29; abundant rains latter part.
 1860. Early part, wet; very heavy rain, April 28 and 29; abundant rains latter part.
-

1804. Heavy rain, April and October; moderate year.
 1823. Heavy rain, March and October; moderate year.
 1842. Moderate year; heavy rain, February; June, October, and November, dry months.
 1861. Heavy rain, April and August; September to end of year, dry.
-

1805. Wet; floods in Hawkesbury and South Creek, March, October, and November.
 1824. Wet; heavy rains, July, September, and October; Murrumbidgee in high flood, 20th, 21st, and 22nd October.
 1843. Wet; very heavy rains, February, March, April, and August.
 1862. Dry; heavy rain, February; rest of year very dry.
-

1787. Wet (?); when the colonists landed they saw recent flood-marks.
 1806. Wet; very high flood in March; flood in October.
 1825. Wet; abundant rains in March; floods in August.
 1844. Wet; flood rains in June, and heavier in October.
 1863. Wet; January, February, and March, very heavy rain also August, and for sixteen days in October.
-

1788. Wet; heavy rain, February and August; October, November, dry.
 1807. Wet; heavy rain and flood, January; wet in June; (no information end).
 1826. Wet; heavy rain and flood, January; floods in August; September, October, November, dry.
 1845. Wet; heavy rain, January and February; flood rains in April; August, September, and October, dry.
 1864. Wet; heavy rain, February and March; high flood in June; September and November, dry.

1789. Dry ; " the colonists suffered a parching thirst for several months."
1808. Dry ; year very dry, but flood in November.
1827. Dry ; dry year ; heavy rain in April ; little information to be had.
1846. Dry ; dry year ; heavy rain in November.
1865. Dry ; dry year ; heavy rain in November.
1790. Dry ; February and March, heavy rain ; *no rain* June to November.
1809. Dry ; February and March, heavy rain ; floods, May and July ; rest of year very dry.
1828. Dry ; April and June, heavy rain ; end of year hot and dry.
1847. Dry ; January, April, and May, heavy rain ; latter part of year very dry.
1866. Dry ; January, February, heavy rain ; floods in June and July ; August to end, dry.
-
1791. Early part severe drought ; (end no information).
1810. Early part severe drought ; tanks dry in February ; flood in July.
1829. Early part drought ; heavy rain, May and August ; flood in November.
1848. Early part wet ; February, April, May, dry ; flood rains, July and October ; end dry.
1867. January, February, dry ; March, April, very wet ; June, highest flood on record ; end dry.
-
1792. Dry ; heavy rain, April and September.
1811. Dry ; early part dry ; Sydney tanks dry for weeks in February ; flood in March.
1830. Rain in January ; floods, March and April ; floods in October and November.
1849. Dry ; early part very dry ; heavy rain, May and July ; end very dry.
1868. Dry ; January and February, wet ; March and April, very dry ; May and July, heavy rain ; end dry.
-
1793. Early part dry ; rain in April and May.
1812. Early part dry ; heavy rain in March ; floods in November.
1831. Early part dry ; floods in April and May ; rain in November.
1850. Early part dry ; heavy rain, March and April ; flood rains, July and October.
1869. Early part dry ; February and March, heavy rain ; flood in May ; heavy rain in November.
-
1794. Moderate year ; very wet August.
1813. Dry weather ; heavy rains in October.
1832. Early part dry ; heavy rains in March and April ; May, June, July, very dry ; rain in August.
1851. Early part dry ; heavy rain, February and April ; May to September ; dry ; rain, October.
1870. Early part dry ; March and May, heavy rain ; June to September, very dry ; rain, October and November.

1795. Dry; floods in January; March, wet; very heavy rain in August.
 1814. Dry; rains early in April; early spring drought; rain in October.
 1883. Dry; rains, February and March; spring drought; rain in September.
 1852. Dry; March, rains; June, heavy rain; July, October, and December, dry; rain in August and November.
 1871. Dry; March, May, and June, wet; July, October, December, dry; rain in August.
-

1796. Early part, no information; floods in August; wet in December.
 1815. Very dry; rain in August and December.
 1834. Early part dry (water scarce in Sydney); rain in August.
 1853. February and April, very dry; heavy rain, July and August; September, October, and December, dry.
 1872. February and April, dry; dry winter; rain in August and December.
-

1797. January, very hot; March and April, wet; May, June, July, very dry.
 1816. No information; February, wet; high floods, May 30 and June 20; dry spring.
 1835. January, very hot; March, wet; very dry winter; July, rain; dry spring.
 1854. January, hot; rain, March, April, and June; very dry all the rest of year.
 1873. January, hot; February, great flood; floods on the 5th and 18th June; August, September, October, dry.
-

1798. January and March, heavy rain; May, wet; very dry spring.
 1817. January and March, heavy rains; May, wet; (no information).
 1836. February and March, heavy rain; May, wet; snow in Sydney, June; cold, dry spring.
 1855. February, March, April, wet; winter, very cold; dry, cold spring.
 1874. February to July, very wet; winter, very cold; August, September, dry.
-

1799. Dry; January and February, hot and dry; floods in March.
 1818. Dry; no information; floods in March; dry spring; rain, September.
 1837. Dry; February, hot and dry; heavy rains, March; September to end of year, dry.
 1856. Dry; March, April, May, heavy rains; very dry spring.
 1875. Dry; floods in March; wet in April, May, and June; July to end, very dry.

1800. Early part dry; March, heavy rain and flood; seems to have had dry spring.
1819. Early part dry; February, March, and June, floods; dry spring; summer very dry.
1838. Early part dry; March and April, rain; dry spring; storm and rain, 10th and 13th October; 2nd November, day of humiliation on account of drought.
1857. Early part dry; February, March, and April, wet; September, November, December, dry; storm and rain, 6th and 7th October.
1876. Early part dry; April and May, wet; storm and rain, 7th and 8th October. For the remainder of this year we have yet to write the history.*
1801. A very high flood in March is the only information yet found.
1820. Summer very dry; Sydney water all gone, except in wells; floods in June and July; August, September, October, and November, very dry; heavy rain in December.
1839. Summer very dry; heavy rain in April; dry spring; rain in October.
1858. Summer very dry; heavy rain, April and May; very dry, July, August, September, November, and December; rain in October.
1877. The character of this year we have yet to learn, but the series in which it stands has been very dry from the beginning.

Bearing in mind that in this period it is supposed that the general character of the weather returns, and that it is only in some of the series that well-marked characters develop themselves, it is interesting to look back and see how the question of probability stands numerically, ninety years are under consideration; of these there are only three, 1830-48-62, that are decided exceptions. I do not mean to say that there will be the same wet or the same amount of dry weather in every year of a series, but that the general character of the years in each series will be the same; in one year, for instance, 1870, there may be an excessive fall of rain for two or three months, but take the year through, and it will be found very dry at the beginning; a wet autumn, a dry spring, and then rain in the early summer, like other years in the series.

The droughts also show themselves very remarkably—1865-6, 1846-7, 1827-8, 1808-1809, 1789-1790.

So, of the well-known three years drought, it appears first in 1799, 1800, 1801; in 1818, 1819, 1820; in 1837, 38, 39; in 1856, 57, 58; and lastly in 1875, 1876; of 1877 we have yet to learn the character. In 1819 there were some very severe floods, and so in 1876 have we had similar heavy floods in some parts of the country, and so the great floods of 1809 find their representatives in 1866, fifty-seven years afterwards.†

* Moderate rain fell in October 1876 along the Mountain and Coast district, but it was still very dry in far west. In November moderate rain fell generally over the Colony, but the weather was very hot. In December no rain, 1st to 12th.

† Droughts are a much more marked feature of climate than floods, for floods are often the product of a great storm, and some of the greatest have come in notably dry years. Even in the fearfully dry year 1862 there was very heavy rain in February, and in 1865, a memorable year of drought, 9·877 in. fell in November, and of this 4 inches fell in one day. So in June, 1866, 3 inches fell on the 15th; so of 1849, 5·610 in. fell in May, and of this 2·640 in. fell in one day.

Heavy floods are not always an indication of a wet year, very often they come in droughts, and naturally follow the great disturbances which then take place between the polar and equatorial currents; moreover, our rivers are so situated with respect to the mountains, that a heavy thunderstorm may make a flood, and in proof of this it may be stated that the first flood that ever alarmed the Hawkesbury settlers in 1799 came down on them without even an appearance of rain preceding it.

In looking at these droughts which are recorded, it is worth while to notice one or two of the traditions of the blacks. When Singleton was first settled, in 1821, the aborigines told the settlers that long before, there was a fearful drought, in which all the lower part of the Hunter River dried up, and the only place they could obtain water was at the head of the river, amongst the mountain springs; that here all the tribes—even those who bore each other the greatest enmity—collected, and for sake of dear life lived peaceably for the time. Still the drought dragged on. All the great gum-trees died, and vast numbers of the blacks, who were buried by their friends in a great field. In proof of these statements, the graves and dead trees still standing in 1822 were shown to the whites.* We may here recall the fearful drought extending over many years, in the middle of the 18th century (1740 to 1750), as shown in Mr. Symonds's work; and we may mention that the drought of 1789 has its counterpart in England in 1788; that of 1814-15 here, in 1813-14 there; that of 1827 here, in 1826 there; that of 1837-38 here, in 1837-38 there; that of 1846-47 here, in 1844-45 there. Many other instances might be given, but these are enough. (*See diagram*)

In Africa, Livingstone records the drought of 1846-7 as follows: ("South Africa," pages 17 and 18.)

"During the first year of our residence at Chonuane (1845) we were visited by one of those droughts which occur from time to time in even the most favoured districts of Africa.

"In the second year (1846) scarce any rain fell; the third was marked by the same extraordinary drought, and during these two years the whole rainfall did not amount to 10 inches. The Kolobeng ran dry, and so many fish died that the hyenas from the country collected to the feast and were unable to clear away the putrid mass. A large old alligator was left high and dry in the mud among the victims. The fourth year, 1848, was equally unpropitious, the rain being insufficient to bring the grain to maturity; needles lying out of doors for months did not rust; and a mixture of sulphuric acid and water, used in a galvanic battery, parted with all its moisture to the air, instead of imbibing more from the atmosphere, as it would have done in England. I put the bulb of a thermometer three inches under the soil in the sun at mid-day, and found that the temperature was from 132° to 134°. Rain would not fall, and dew there was none."

* In confirmation of the tradition of the blacks, it may be mentioned that a keen observer, who was sent by Captain King from Sydney to Melbourne along the coast, in 1802, says—"All the great gum trees were dead in every place I visited, and especially on Elephant Island, here I saw enormous dead trees, 5 to 6 feet in diameter, surrounded by a dense forest of young trees from 6 to 18 inches in diameter, these were only two or three feet apart, while of the old big trees there were only about twenty to the acre." The young trees were just such a growth as might be expected in that rich soil in the forty or fifty years which had probably elapsed since the great drought.

Again, in India we have 1837 standing out as their most dreadful year of drought and famine.*

Surely we have here enough to justify a strong suspicion, to say no more, that we have waves of drought passing over the earth, that we have an outside cause for the phenomena that has puzzled us so long—a phenomenon which we have every reason to believe is subject to laws as definite as those which hold the planets in their places, and the knowledge of which is fairly within our reach, if we have but patience to take the uphill way that leads to it. Nor must we at once assume that, if a period is proven at one place, we shall find the same at another. There is, I think, unmistakeable evidence of several involved periods; out of the combination of these with local circumstances come the results there observed; like the vibrations in musical notes, they will “beat” just in accordance with the conditions existing. For instance, with one of the waves of drought we may have the conditions which shift the trade winds and send a comparatively plentiful rainfall; or we may have a number of forces at work which shall make the nineteen years cycle of one place the thirty years period of another.

As bearing upon this question, the history of Lake George is instructive, situated as it is in the mountains, with a well-defined catchment area, and no outlet. It forms a sort of natural rain-gauge, and should afford valuable information. I have been at some trouble to learn its history. In the latter part of 1820 it was discovered, and was then a magnificent sheet of water; but, fine as it appeared, the blacks declared they had seen it dry, and even covered by a forest—tales that looked, at the time, very improbable. The heavy rains of 1821 and 1822 filled it up considerably above what had been its level for many years, for it killed a great number of gum-trees round its margin, many of which were two feet in diameter. In 1824 it was twenty miles long, and about eight miles wide; from 1826 the water gradually dried up, and during the drought of 1827, 1828, 1829, its size got rapidly less; in 1828 it was fifteen miles long. In 1832 it was possible to ride over it, and it appears to have been dry, or nearly dry, from Kenny's Point to George's Gap. In 1836 it was visited by Sir Thomas Mitchell, and by him described as a grassy meadow like Breadalbane Plains, with dead timber on it. From this time it became a cattle and sheep run, at times having some water in it, which soon dried up. In 1842 and 1843, water accumulated; but in 1846 and 1847 it got quite dry again, and it was not until the floods of 1852 that any large quantity of water stayed in it. In the drought of 1866 and 1868 the water nearly all disappeared; but from 1870 it steadily increased, and by August, 1874, it was higher than ever before known, and again killed a number of trees around its margin. The water is now gradually decreasing (1876). It is therefore evident that from 1825 the lake decreased in size, and though sometimes of moderate extent after heavy rains, it soon dried up, and it was not until 1870 that the lake showed such decided signs of increase, rising to its maximum in 1874. It is difficult, nay impossible, to say in what years the lake filled up before, but judging

* In 1872 rain almost deserted Bengal, and fell in great quantity in Northern India, while the rainfall of 1873 was the lowest on record, with the single exception of 1837; and 1862, the very dry year in Sydney, was also a year of drought in Central Russia.

from the seasons, it is very probable that it began to fill in 1816 and 1817, finding its maximum about 1822. Looking back at the droughts which came before these rains, it is most likely the lake was more or less dry from 1790 to 1800, and at that time afforded the experience related by the blacks in 1820; but taking only these points which are historical, we have the lake at its maximum in 1824 and in 1874, a period of fifty years.

On the Hunter River, about West Maitland, in the early days of the settlement, there were evidences of comparatively recent encroachments on the south or town side, and on the opposite side a considerable portion of land had been left by the river, the current setting strongly on the town side; but the water in an ana-branch still surrounding the portion that had been left, flood after flood came great and small, and deposited mud, till the ana-branch was filled up, but no decided change came in the river's course, even in the greatest floods of 1857 and others, until 1870, when all at once, as it were, the river began to cut in on the town, and took away whole houses, even a terrace of small ones, and seemed disposed to cut off a large bend in the river, and many acres of the town, at the same time it made another large addition to the opposite side at that point, entirely changing its course. Judging from the great floods in the Hawkesbury in 1816 to 1819, it is probable that the Hunter was similarly visited; indeed, there was debris in the trees at the first settlement which left no doubt of the fact, and we are left to form an opinion of the date from the recent character of the debris, and the banks of the river where changes had taken place; and I do not think we can, from the known character of the seasons, place them at any other date than about 1817; or, in other words, we have evidence here of a similar period to that observed in Lake George; and it is interesting, in connection with the general evidence from Lake George and the Hunter of a long period during which the seasons seem to run to a climax, to note some of the facts in connection with the nineteen-year period, which seem to me to prove beyond doubt that there is a tendency here also to run at every third period to a maximum. To take the whole of the evidence on this subject which may be derived from the tabular statements would take much too long for our present purpose, and a few instances will be sufficient to show that this tendency exists, which is all I wish to do at present:—

1790. There was heavy rain in February and March, and it is said, "no rain fell from June to November," which was a very severe drought.

1847. There were heavy rains in the early part of the year, but from May to the end of the year was a very severe drought.

Again, 1809, one of the intermediate years, while generally a dry year, and specially so at the end, had very heavy rains in May and July, and in the latter month a very heavy flood.

While 1866, a similar year, and, like 1809, very dry at the end, had heavy floods in June and July.

The other year of this series, 1828, there was heavy rain in April and June, and a very hot and dry spring. We have yet to learn if that fearful drought, so well known of old, will reappear in 1885.

Or, taking another line of the nineteen years series :—

1797. January was very hot, March and April wet, and from May to the end of the year very dry.

1854. January, hot ; March, April, and June wet ; all the rest of the year very dry. Of the intermediate year, 1816, though there was, like these, a dry spring, there were very high floods, May 30 and June 20, and heavy rain in November.

While 1873, the fifty-seventh year from 1816, there were floods on the 5th and 18th June, almost returning to the day, and there was a dry spring.

It is needless to multiply instances—pages might be filled had we the time ; those which have been given are sufficient to establish a very strong probability in favour of this law. To others, who have not investigated the facts, it may come with less force than it does to me ; but those who are interested will shortly have before them more complete information about the meteorology of New South Wales for past years than it is possible to give in this paper.

Of the probable cause or causes which produce the effects we have been considering, volumes might be written ; but space requires me to condense into a few pages my views on this subject ; and, at the risk of leaving out some points of importance, I will try to be as brief as possible.

And first, allow me to say, that I still hold the opinion (which was expressed in my "Notes on the Climate of New South Wales" in 1870), viz., that it is wet or dry with us, just as the trade winds are weaker or stronger. In other words, that when from *some cause* the trade winds and N.W. monsoon set to the southward with more force than usual, we have a preponderance of northerly and north-westerly winds, and, of course, dry weather, because the region of rain precipitation is on the margin of the trades ; and if this is pushed to the south of us, we have dry winds here, and an extra rainfall on the south coast ; and if the trade wind is weaker we are in the rain region and have abundance of it ; and I have by no means given up the opinion expressed at the same time, that the moon has a great influence upon our weather. Every year only adds to the facts which, to me at least, prove lunar influence on the weather ; and had I time I should be glad to introduce here many of them from my own observation which go to prove the moon's influence in *forming* and in *dissipating* clouds, besides many collateral facts proving her influence on the atmosphere, volcanoes, &c., but these must be left for another opportunity.

Since 1870 many facts bearing upon the interdependence of the parts of the solar system have been brought to light, more especially by the study of meteoric astronomy, which seem to throw light on many historical statements, and phenomena that have been observed in more recent times—phenomena which I think a little consideration will convince us could not take place without producing very decided effects upon the earth's atmosphere.

It has been proved that the number of meteor streams is almost inconceivable ; that they revolve about the sun at all degrees of inclination to the ecliptic, and in all sorts of periods ;

months of February and May, and the celebrated M. Erman considered that "this is caused by the interposition of meteoric rings between us and the sun, and that the increase in temperature in August and November is caused by their preventing radiation from our globe, and possibly by radiation towards us of a part of the heat which they themselves receive;" and a "French physicist, M. Deville, who has examined in the most crucial manner the temperatures of the months of August and November since 1808, has detected the fact that in both months there is an increase of temperature about the period of the star showers, and a decrease in February and May, which he does not hesitate to ascribe to the influence of meteoric rings." (Guilemin, Ast.)

It may be mentioned that the 10th of August meteor stream, if disposed in the form of a flat ring, would encounter the ecliptic between the 5th and 11th of February, and would partially eclipse the sun's light.

As the data upon which these views were founded were for the northern hemisphere, it is interesting to inquire if any similar phenomena have presented themselves here; and, comparatively short as the time of our observations has been, we get several marked instances, and in every year examined there is a depression in the temperature curve between the 5th and 11th of February, and in nearly all cases it is on the 8th, 9th, or 10th.

In 1869 there is a marked fall in the annual temperature curve in February, although during February there was less cloud and cool south wind than in March and January. In the temperature curve for that month there is a great depression on the 10th, and on the nights of the 10th and 11th there were terrific cyclonic storms, with thunder and lightning, in Sydney.

In 1868 also there was a great fall in the temperature in February, and the average for the month was only equal to that of March.

In 1860, February temperature is again below January and March, and there was less south wind in February than in either of the other months. On the 9th, 10th, and 11th there were storms of thunder, lightning, and heavy rain.

Other remarkable depressions in the temperature of other months might be given of the same kind, but these will suffice of particular instances.

No one can, I think, look at the temperature curve plotted for a number of years without being struck by its strange anomalies. One year the temperature runs up suddenly to its maximum, and one month, or part of it, constitutes the summer; while in another year it rises to the same temperature and retains it for two or three months, the temperature of each being quite as high as the year of short summer. It is the same in winter. The curve is pointed, or rounded, in direct accordance with the circumstances which modify the sun's heating power. That these are between us and the sun does not, I conceive, admit of a doubt. Year after year the sun rolls on, and the spots which we see on his surface do not seem to affect his heating power, or if they do, almost inappreciably; while month after month, or season after season, strange irregular changes take place in the temperature, which can only be accounted for on the supposition that space between the sun and earth is not empty. To what extent these cosmical causes may interfere may be judged from historical statements.

Humboldt remarks with regard to the occasional darkening of the sun, that "a phenomenon of this kind, which cannot be explained by fogs or volcanic ashes, occurred in the year 1547 (24th to 28th August), and lasted three days. The sun was reddish, and so dark that several stars were visible at noonday." Similar darkenings of the sun's surface occurred in 1090 and 1208, but lasted for a shorter time—the former for three hours and the latter for six hours. Messier states that on the 17th June, 1777, about noon, he perceived an immense number of black globules pass over the sun's disc. Two other obscurations of the sun, that of the beginning of February, 1106, and that of 12th of May, 1706, during which, about 10 o'clock in the morning, it became so dark that bats commenced flying, and persons were obliged to light candles, do not appear to admit of any other explanation.

One other case from Roman history may be mentioned:—"At certain times the sun appears to be not of his wonted brightness, as it happened to be for a whole year when Cæsar was murdered, when it was so darkened that it could not ripen the fruits of the earth."—*Virgil*, *Geor.*, Liber 1, &c.

Dr. Weiss of Vienna, says:—"Cosmical clouds undoubtedly appear in the universe, but only of such density that in most cases they possess sufficient coherence to withstand the destructive operation of the sun's attraction, not only up to the boundaries of our system, but even within it."

He considers that comets from these clouds, when the earth meets them, give ocular demonstration of the fact in a shower of meteors; and on the 27th of November, 1872, when the earth passed over the orbit of Biela's comet, such a shower actually took place, and a magnificent display of meteors was seen. At Turin, 33,400 were observed in 6½ hours; and in other places similar displays were seen; and if to these recorded meteors we add the far greater number that were not seen, we get some idea of the density of this stream representing only a faint comet, and how potent a cause for effects on terrestrial temperature may exist between the earth and the sun, all unheeded by us.

I confess that the account given of the darkening and red colour of the sun during a whole year does not seem to me so incredible as many have esteemed it; for we have in modern times two accounts of a similar phenomenon, lasting for weeks, viz., the *dry fogs* of 1783 and 1831. Many have attributed these to the action of volcanoes, and it is well known that in 1783 the fearful earthquakes in Calabria took place in February, and began a long list of volcanic eruption in the world; but in estimating the part played by volcanoes in these and similar phenomena, it is to be borne in mind that there must be a cause for the volcanic outbreak, and probably a cosmical one. Modern research has shown that they are subject to tidal effects like the ocean, or to distant attractive forces, and that eruptions are not caused by contraction of the earth's surface *only*, but by this and some other forces combined.

Besides, if great volcanic eruptions produced these dry fogs, we should have had many recorded in the world's history, and the peculiar and disagreeable smell would have been recognised; probably, also, rain would have thrown them down.

On the other hand, dust has been collected on the high snow-covered mountains, and when examined it proved to be meteoric dust.

Of the dry fog which came on suddenly in June, 1873, it is recorded that it extended from the northern coasts of Africa, over France, to Sweden, and over great part of North America, and lasted more than a month. Travellers found it on the summits of the Alps. Abundant rains in June and July, and most violent winds did not dissipate it; and, in some places, it was so dense that the sun could not be seen until it had attained an altitude of twelve degrees, and throughout the daytime it was red and so dull that it might be looked at with the naked eye. The fog diffused a disagreeable odour, and the humidity ranged from 57 to 68, while in an ordinary fog it is 100. It had a phosphorescent appearance, and the light at midnight was compared to that of the full moon. The second instance:—

The extraordinary fog of 1831 excited public attention in the four quarters of the world. It appeared on the

Coast of Africa	August 3.
At Odessa.....	August 9.
In South France	August 10.
Paris	August 10.
New York.....	August 15.
Canton (China)	End of August.

This fog was so thick that it was possible to observe the sun all day with the naked eye, and without a dark glass, and in some places the sun could not be seen till it was 15° or 20° high. At Algiers, United States, and Canton, the sun's disc appeared of an azure blue or of a greenish colour. Where the fog was dense, the smallest print could be read even at midnight.

M. Arago, the great French astronomer, was at some trouble to prove that these fogs could not be comets, and gave as his principal reason that it would be impossible for the head of the comet to rise and set with the sun for more than a month, which is quite true; but it is nevertheless possible that the comet left part of his tail with the earth, while the head was too insignificant to be seen.

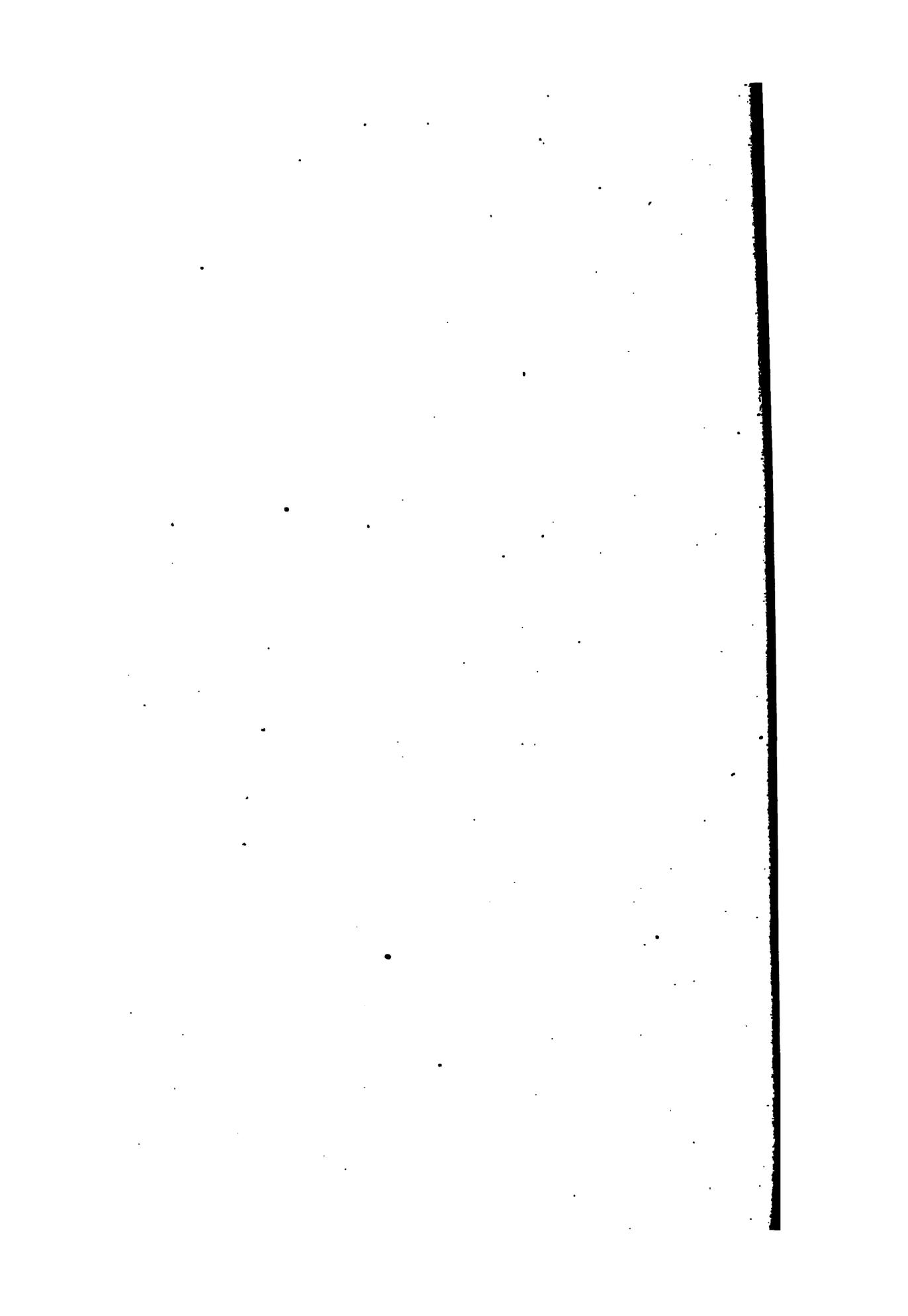
I will not stay to point out the bearing of these facts on the opinions previously expressed, for this paper is already too long. A wide field for speculation is opened up when we look at some of the facts which have been brought forward to-night; and I think enough has been said to convince us that, in discussing the meteorology of the past or the future, we must ever bear in mind that the solar system is not stationary—it is rolling on into the unknown regions of space. What changes in the cosmical ether, what clouds of meteoric matter, what strange forces we shall encounter in common with other members of the solar system, is yet to be learned. But *space* is no longer empty: day by day, as science advances, we have to acknowledge new-found denizens of its infinite expanse, and recognise new relations between the earth and the manifold occupants of celestial space which surround us.

Albeit, we know but little yet about those with the presence of which we have been so long familiar. We have yet to learn the functions of electricity in regard to climate; we have yet to measure how much of it is produced by the friction of millions of meteors rushing through our atmosphere, not to mention numberless other phenomena comparatively within our reach, but which, so far, are by no means within our knowledge. The

celebrated M. Arago, after a profound investigation of this subject, uses words that are well worthy of study, and with them I will close:—

“Thus the various phenomena of the celestial vault and of meteorology, even while they appear by their irregularity to defeat the sagacity of the human mind, are ultimately found by profound investigation to be connected by sublime relationship.”

[Three diagrams.]

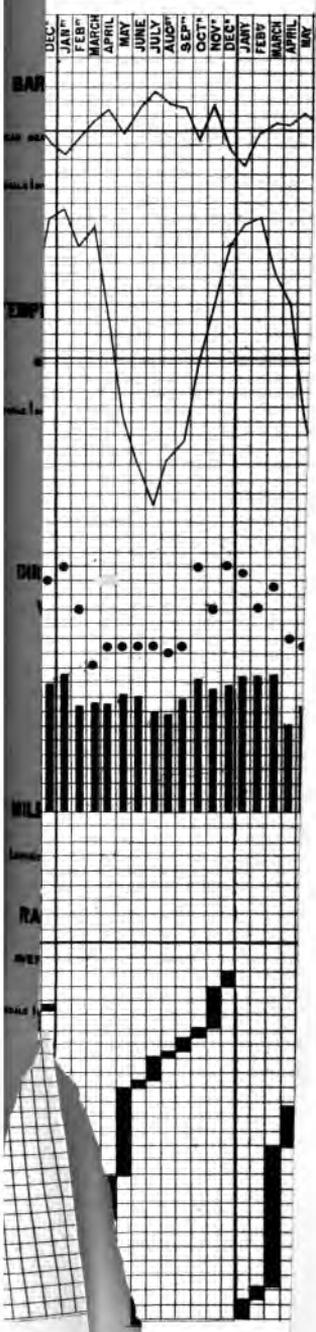






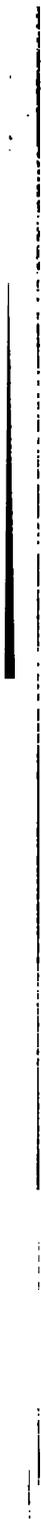
DIAGRAM

1869 18



1777





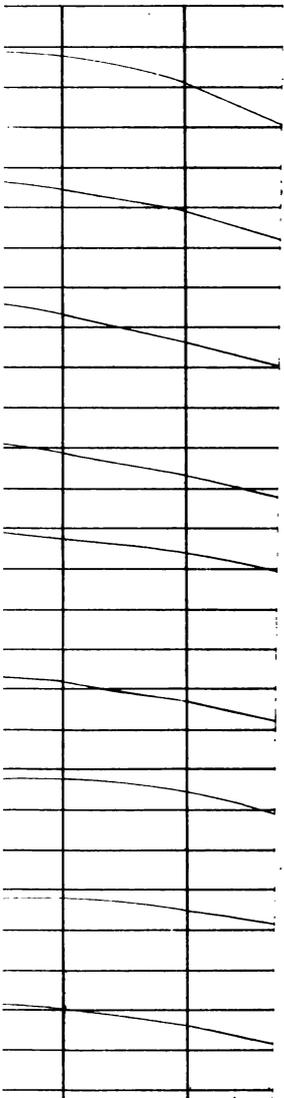
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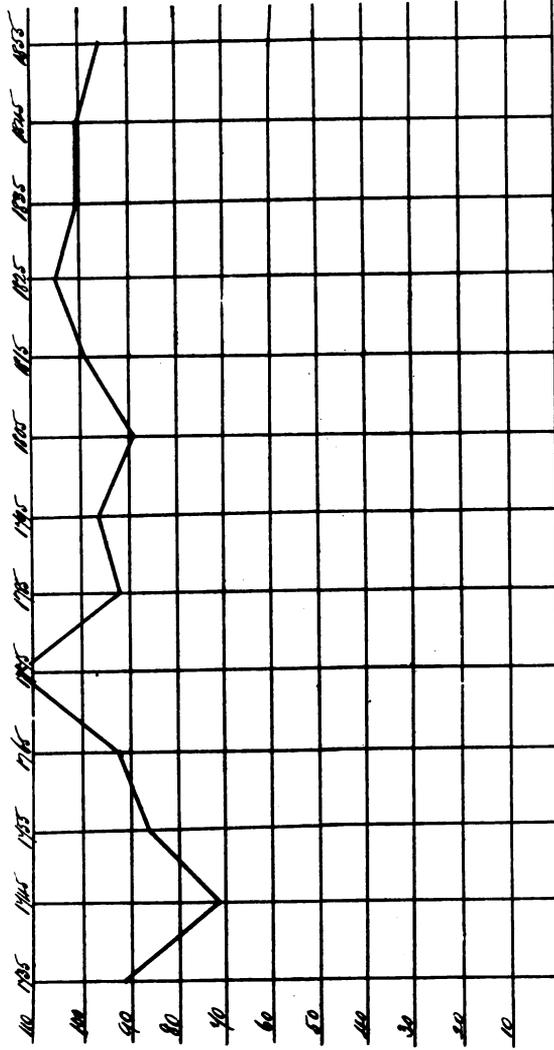


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Pl. 2.

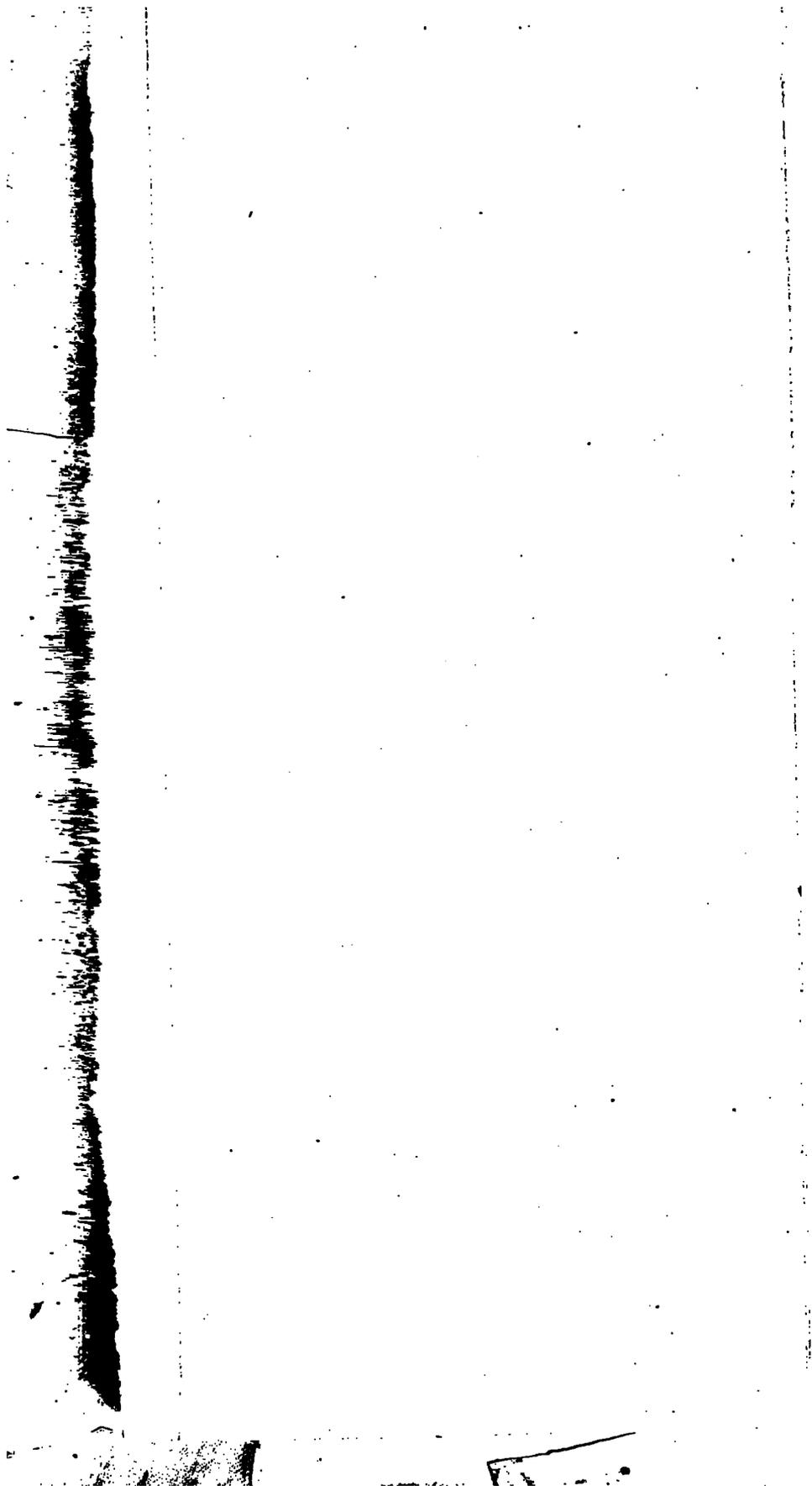
CURVE SHOWING THE RAINFALL IN THE MIDLAND COUNTIES OF ENGLAND FROM 1730 TO 1860.

Each horizontal line is equal to 10 per cent. of the average rainfall, and each point in the curve is the mean of 10 years, thus 1745 is from 1730 to 1740.



PREPARED BY THE METEOROLOGICAL OFFICE.

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APPENDIX.

GENERAL ABSTRACT
OF ALL THE
METEOROLOGICAL OBSERVATIONS
IN
NEW SOUTH WALES,
UP TO THE END OF
1875.



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NEW SOUTH WALES.

TABLE I.
METEOROLOGICAL STATIONS and their approximate positions in latitude, longitude, height above mean sea level, and distance from the East Coast in miles.

Position.	Thargomindah.	Casino.	Tenterfield.	Grafton.	Inverell.	Bourke.	Karrabri.	Armidale.	Covera.	Goonoo Goonoo.	Port Macquarie.	Kurrumbidgee.	Casella.	Boome.
Latitude	28° 0'	28° 08'	29° 56'	29° 43'	29° 56'	30° 06'	30° 05'	31° 08'	31° 01'	32° 01'	32° 01'	32° 46'	32° 25'	32° 4'
Height	450 ft.	139	88	40	122	393	191	927 ft.	66	155 ft.	53	545 ft.	.....	89
Distance	0 ft.	36	88	22	122	393	191	927 ft.	66	110	1	94	120	78
Longitude	147° 36'	155° 00'	155° 15'	155° 51'	151° 01'	149° 58'	149° 09'	151° 08'	147° 12'	150° 51'	155° 54'	150° 51'	150° 51'	150° 53'

Position.	Muswellbrook.	Dubbo.	Mudgee.	Dalwood.	West Maitland.	Lambton.	Newcastle Tel. Station.	Newcastle Big Station.	Orange.	Bathurst.	Forbes.	Kurrumbidgee.	Windoor.	Mount Victoria.
Latitude	32° 17'	32° 18'	32° 35'	32° 42'	32° 47'	32° 53'	32° 55'	32° 55'	33° 18'	33° 24'	33° 27'	33° 33'	33° 36'	33° 36'
Height	475	.....	1,500	.....	98	.....	18	112	2,691	2,000	1,120	1,670	3,490	58
Distance	68	182	121	27	18	7	1	1	124	96	176	36	61	30
Longitude	150° 53'	148° 35'	146° 35'	151° 20'	151° 35'	151° 44'	151° 50'	151° 51'	149° 5'	149° 37'	148° 5'	150° 45'	150° 15'	150° 50'

METEOROLOGY.

TABLE I—continued.

Position.	Woodford.	Paramatta.	South Heel.	South Head.	Sydney.	Botany.	Liverpool.	Wentworth.	Wilton.	Cordaux River.	Young.	Wollongong.	Moss Vale.	Goulburn.
Latitude	33° 44'	33° 48'	33° 49'	33° 55'	33° 51'	33° 56'	33° 53'	33° 56'	33° 51'	33° 56'	33° 56'	33° 56'	33° 56'	33° 56'
Height	2192	.....	09	254	155	.....	.....	.....	12	.....	.....	.....	.....	2129
Distance	50	16	.....	0	5	4	15	476	.....	6	.....	.....	0	54
Longitude	150° 24'	151° 59'	151° 18'	151° 16'	151° 11'	151° 22'	150° 57'	147° 1	147° 1	147° 1	147° 12'	147° 12'	147° 12'	147° 4'

Position.	Terara.	Wagga Wagga.	Cape St. George.	Gunyahleen.	Lake George.	Queanbeyan.	Urana.	Deniliquin.	Kandra.	Moruya.	Bodalla.	Albury.	Cooma.	Men.
Latitude	34° 52'	35° 8'	35° 12'	35° 12'	35° 17'	35° 20'	35° 20'	35° 33'	35° 52'	35° 53'	36° 4'	36° 08'	36° 12'	36° 0'
Height .....	.....	.....	175	.....	2067	.....	400	410	496	.....	124	572	2437	107
Distance	4	161	0	70	19	09	218	287	88	0	5	275	52	0
Longitude	150° 42'	147° 24'	150° 45'	146° 8'	146° 24'	146° 15'	146° 20'	145° 32'	148° 32'	148° 32'	146° 55'	147° 0'	146° 0'	146° 59'

TABLE II.
 BAROMETRIC Readings corrected to 32° Fahrenheit and Mean Sea Level.

Year.	Port Moresby (New Guinea).	Thargomindah (Queensland).	Castino.	Grafton. *	Cowra.	Armidale.	Goonoo Goonoo.	Port Macquarie.	Maitland.	Newcastle.		Bathurst.	Forbes.
										Telegraph Station.	Signal Station.		
1858	30'003	.....	.....	30'156	.....	.....	30'041	.....	.....	29'884	.....
1859	034	.....	.....	003	.....	.....	'052	.....	.....	'947	.....
1860	'007	.....	.....	29'825	.....	.....	'048	.....	.....	30'032	.....
1861	29'989	.....	.....	825	.....	.....	'063	.....	.....	'079	.....
1862	30'065	.....	.....	770	.....	.....	.....	30'019	.....	'069	.....
1863	'817	.....	.....	.....	'011	.....	'052	.....
1864	870	.....	.....	.....	'067	.....	29'972	.....
1865	'075	.....	30'062	.....
1866	30'390	.....	.....	.....	.....	.....	'070	.....
1867	470	.....	.....	.....	.....	.....	'069	.....
1868	30'022	.....	600	.....	.....	.....	.....	.....	'111	.....
1869	670	.....	.....	.....	.....	.....	'111	.....
1870	30'291	.....
1871	29'814	.....	.....	.....	.....	.....	'040	.....
1872	30'113	.....	.....	.....	.....	.....	'040	.....
1873	'169	.....	.....	.....	.....	.....	'018	.....
1874	'034	.....
1875	'033	.....
	30'056	056	.....	.....	.....	30'029	.....	.....	.....	.....	.....	'980	.....
Means ...	30'056	30'004	30'020	30'022	* 30'530	29'948	30'065	30'010	30'051	30'043	30'022	30'049	30'165

* Aneroid, no altitude correction applied.

METEOROLOGY.

TABLE II—continued.
BAROMETER Readings corrected to 32° Fahrenheit and Mean Sea Level.

Year.	Mount Victoria.	Windsor.	Woodford.	Parramatta.	South Reef.	Sydney.	Liverpool.	Goulburn.	Cape St. George.	Denillingquin.	Kiandra.	Albury.	Cooma.	Eden.
1858	.....	.....	.....	30'016	.....	30'046	.....	30'047	.....	30'077	.....	.....	30'011	.....
1859	.....	.....	.....	'029	.....	'039	.....	'053	.....	'109	.....	30'070	'024	.....
1860	.....	.....	.....	'029	.....	'009	.....	'065	.....	'115	.....	29'935	'018	.....
1861	.....	.....	.....	.....	.....	'007	.....	'035	.....	'122	.....	'920	29'987	.....
1862	.....	.....	.....	.....	.....	'007	.....	'033	.....	.....	.....	'959	'981	.....
1863	.....	.....	.....	.....	.....	'003	.....	'010	.....	'060	.....	30'023	'963	.....
1864	.....	.....	.....	.....	.....	'013	.....	'020	.....	'071	.....	'047	'989	.....
1865	.....	.....	.....	.....	.....	'023	.....	'047	.....	'128	.....	'048	.....	.....
1866	.....	.....	.....	.....	.....	'049	.....	.....	.....	.....	.....	.....	.....	.....
1867	.....	.....	.....	.....	29'960	'038	.....	.....	29'955	'112	29'982	.....	.....	.....
1868	.....	.....	.....	.....	30'087	'099	.....	.....	30'100	'125	30'028	.....	.....	.....
1869	.....	.....	.....	.....	.....	'063	.....	.....	29'984	'176	'057	.....	.....	30'065
1870	.....	.....	.....	.....	.....	'004	.....	29'937	'958	'118	'180	.....	.....	29'944
1871	.....	.....	.....	.....	.....	'067	.....	30'069	'973	'127	'101	.....	.....	'920
1872	30'013	'024	30'086	.....	.....	'069	30'032	'069	'984	'133	'032	.....	.....	'987
1873	'019	'050	29'953	.....	.....	'078	'039	'075	30'020	'132	'041	30'044	.....	30'021
1874	'040	'031	'925	.....	.....	'041	'018	'072	'004	'085	.....	'053	.....	'016
1875	'005	'005	.....	.....	.....	'012	29'993	'044	29'973	'030	.....	'023	.....	29'973
Means ...	30'019	30'043	29'968	30'025	30'024	30'039	30'021	30'041	29'995	30'108	30'060	30'012	29'996	29'989

† The mean Barometer for all the years previous to 1871, was taken from the three daily readings at 9 a.m., 3 p.m., and 9 p.m.; and for all subsequent years the mean is the result of the 9 a.m. reading only. The mean of the hourly measures of the Barograph are published monthly. It is found that the true mean of the Barometer, taken from the hourly readings, is 0.032 less than the reading at 9 a.m.

TABLE III.
TABLE showing the Average Monthly Reading of the Barometer at Sydney, at 32° Fahrenheit and Mean Sea Level.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1858.....	28'941	30'085	30'136	30'180	30'095	30'188	30'083	29'930	29'911	30'132	30'016	29'806
1859.....	'981	29'921	'017	'099	'054	'137	'181	30'137	30'041	29'995	29'997	'969
1860.....	'848	'996	'005	'041	'110	29'989	'198	'271	'107	30'017	'936	'949
1861.....	'931	'864	'052	'080	'062	30'022	29'967	'157	'118	29'967	30'028	'852
1862.....	'929	'936	'028	'036	'023	'087	'979	'118	29'949	30'127	29'971	'892
1863.....	'926	'880	'045	'175	'096	'137	30'064	'031	30'134	29'809	'844	'894
1864.....	'903	'967	'133	'062	'225	'076	29'984	29'983	'004	'968	'974	'919
1865.....	'948	'950	'010	'128	'060	'209	30'083	30'167	29'946	30'023	'968	'789
1866.....	'939	30'000	'164	'167	'123	'185	'078	'165	'978	29'898	'911	'984
1867.....	'956	29'942	'099	'051	'141	'174	'094	'180	'864	'824	'967	'810
1868.....	'928	30'004	'005	'192	'341	'066	'173	'067	30'091	30'017	30'037	'898
1869.....	'827	29'971	'082	'144	29'990	'166	'254	'174	'168	29'918	'183	'856
1870.....	'763	'086	'056	'039	30'107	'031	'139	'094	'105	30'093	29'937	'938
1871.....	'934	'860	29'972	'031	29'921	29'917	'025	'065	'073	'165	'668	'944
1872.....	'997	30'009	'955	'008	30'049	'908	29'952	'036	'168	'070	'992	'869
1873.....	30'004	29'948	30'022	29'993	'097	30'079	30'121	'036	29'047	29'978	'929	'902
1874.....	29'932	'908	'019	30'073	29'974	'055	'095	29'954	29'845	30'089	'900	'867
1875.....	'852	'941	'004	'010	29'977	'964	'161	'986	30'059	29'881	'781	'769
Means	29'919	29'954	30'048	30'084	30'080	30'078	30'091	30'086	30'033	29'998	29'963	29'889

METEOROLOGY.

TABLE IV.
MAX of Temperature in Shade.

Year.	Thargomindah.	Casino.	Tenrfield.	Gratton.	Inverell.	Narrabri.	Armidale.	Goonoo Goonoo.	Covga.	Port Macquarie.	Murrumbidgee.	Casalis.	Seone.	Muswellbrook.	Dubbo.	Mudgee.	West Maitland.	Lambton.	Newcastle Telegraph Station.	Newcastle Signal Station.	Orange.	Bathurst.	Forbes.	
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857	...	65.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1858	...	65.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1859	...	66.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1860	...	66.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1861	...	68.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1862	...	67.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1863
1864
1865
1866
1867
1868
1869
1870
1871
1872
1873
1874
1875
Means...	70.6	67.1	67.5	68.3	69.5	68.0	69.9	61.3	70.9	63.7	60.2	61.0	62.2	61.5	60.6	59.8	62.5	60.0	64.0	63.9	55.2	57.2	60.8	

* Omitted, returns being for portion of year only.

† Corrected for one or two months missing.

TABLE IV—continued.
MEAN of Temperature in Shade.

Year.	Kurralong.	Windsor.	Mount Victoria.	Woodford.	Parramatta.	South Head.	Sydney.	Liverpool.	Wentworth.	Young.	Wollongong.	Moss Vale.	Goulburn.	Wagga Wagga.	Cape St. George.	Take George.	Queenbeyan.	Urana.	Deniliquin.	Kandra.	Albury.	Cooma.	Iden.
1841	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1842	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1843	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1844	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1845	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1846	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1847	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1848	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1849	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1850	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1851	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1852	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1853	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1854	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1855	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1856	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1857	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1858	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1859	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1860	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1861	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1862	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1863	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1864	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1865	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1866	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1867	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1868	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1869	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1870	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1871	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1872	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1873	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1874	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
1875	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3
Means	55.0	53.8	54.2	57.6	62.2	61.7	62.5	59.9	64.4	59.1	62.1	55.3	55.6	60.2	61.9	56.3	53.0	62.1	59.9	45.1	59.8	55.2	60.3

* Omitted, returns being for portion of year only.

† Corrected for one or two months missing.

TABLE V.
MEAN Temperature of each Month in the Year.
AT SYDNEY.

Year.	January	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Means.
1856	69.0	69.6	68.6	64.7	56.1	49.2	46.9	52.6	55.8	62.2	62.9	65.7	60.3
1857	70.2	71.2	68.0	64.1	54.5	53.0	52.2	51.9	55.1	59.7	64.7	68.6	61.1
1858	73.0	69.6	67.6	62.4	57.1	52.2	48.9	50.7	57.0	60.8	66.3	68.6	61.2
1859	70.6	69.8	68.2	63.8	58.5	52.5	50.6	55.3	57.3	65.3	66.4	69.5	62.3
1860	70.6	68.7	70.6	64.8	57.4	53.4	51.8	54.7	57.5	61.3	63.8	67.2	61.8
1861	69.7	71.6	71.5	64.7	56.6	54.6	51.1	52.4	57.6	64.3	64.5	69.0	62.3
1862	70.6	71.7	70.4	62.4	57.7	54.4	52.5	52.3	59.9	62.0	68.1	69.9	62.7
1863	71.9	72.1	69.4	63.8	59.0	55.0	52.6	53.9	57.0	62.3	66.4	67.8	62.6
1864	72.1	69.3	67.7	64.6	58.2	54.1	53.3	54.9	59.2	60.4	64.9	67.0	62.6
1865	69.5	71.1	69.2	66.4	56.5	52.9	51.0	55.0	61.1	64.1	67.7	70.5	62.9
1866	71.4	71.2	68.2	66.8	60.5	56.8	52.9	54.8	59.5	62.8	66.6	68.1	63.3
1867	71.1	70.8	68.5	66.4	61.0	56.2	54.3	54.7	59.3	68.5	69.4	70.9	64.3
1868	70.7	69.5	69.5	64.4	58.6	55.8	53.0	54.0	59.7	66.5	65.5	72.0	63.3
1869	72.9	70.1	71.6	65.1	58.3	55.2	52.3	55.4	56.7	62.0	66.3	70.1	63.0
1870	71.5	72.0	68.1	66.0	58.5	54.0	52.4	53.5	57.0	64.3	67.0	68.5	62.8
1871	69.5	70.7	65.7	63.9	59.5	53.8	53.1	55.7	58.8	60.6	65.7	71.6	62.4
1872	73.2	71.9	68.0	62.1	56.5	52.0	53.1	52.0	58.0	63.1	67.3	70.3	62.6
1873	69.7	70.5	67.9	63.6	60.2	57.8	51.4	56.5	60.1	63.0	62.9	71.3	63.0
1874	71.6	70.2	69.7	66.2	58.9	53.2	51.2	53.5	57.7	65.8	67.5	70.9	63.0
1875	72.7	69.7	69.6	65.0	57.0	55.6	52.5	57.3	57.4	64.5	68.1	70.7	63.3
Means	71.1	70.6	68.9	64.6	58.0	54.3	51.9	54.0	58.1	63.2	66.1	69.4	62.5

TABLE VI.
TABLE showing average Readings of Maximum Thermometer at Sydney, for each Month for the Years 1859 to 1875 inclusive.

Months.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	Means.
January.....	78.2	78.4	76.8	78.7	78.1	80.8	76.8	79.5	77.5	76.9	80.0	78.4	75.7	79.5	75.7	76.9	80.0	78.1
February.....	77.7	74.5	79.3	78.1	78.8	75.4	78.5	78.1	77.3	74.9	76.6	77.9	76.4	77.8	76.8	75.9	75.0	77.0
March.....	75.3	77.0	78.1	78.4	76.0	73.7	76.4	74.9	74.9	76.1	78.0	72.3	72.4	73.9	74.2	75.4	74.7	75.4
April.....	73.6	71.3	70.4	70.9	70.8	71.4	73.4	73.8	70.7	72.7	70.4	71.2	70.6	68.9	69.7	71.6	70.5	71.3
May.....	67.0	65.4	63.7	65.4	65.8	65.2	64.1	67.5	65.9	66.0	64.4	63.7	65.2	63.3	67.2	64.6	63.5	65.2
June.....	60.2	59.8	61.9	61.1	60.0	59.9	60.5	61.9	62.1	62.4	61.8	61.3	60.7	62.0	62.9	59.5	61.7	61.2
July.....	58.4	58.4	57.0	60.6	59.6	59.8	58.6	59.2	61.9	59.7	59.6	59.4	60.9	59.9	58.2	57.7	59.1	59.3
August.....	63.8	60.8	59.2	60.9	61.1	62.1	63.5	63.0	62.5	61.6	63.4	60.7	65.3	59.5	64.1	61.5	65.9	62.3
September.....	64.9	64.2	66.0	68.4	65.1	67.6	71.4	67.9	66.1	67.5	63.8	65.0	66.5	66.1	68.3	65.7	66.2	66.5
October.....	74.9	68.0	72.9	70.6	69.9	67.4	73.7	70.6	77.7	75.1	69.2	70.6	68.0	70.2	71.2	74.7	72.2	71.6
November.....	74.4	70.9	73.0	76.2	76.3	72.7	76.0	73.6	78.9	71.9	73.4	73.9	72.7	73.1	69.0	76.1	77.3	74.1
December.....	77.7	73.4	77.4	77.0	76.2	74.0	76.4	74.8	78.8	79.8	76.9	75.4	79.3	76.5	78.5	78.9	79.6	77.1
Means.....	70.5	68.5	69.6	70.5	69.8	69.2	70.8	70.4	71.2	70.4	69.8	69.2	69.5	69.2	69.7	69.9	70.5	69.9

TABLE VII.
TABLE showing average readings of Minimum Thermometer at Sydney, for each Month for the Years 1859 to 1875 inclusive.

Months.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	Means.
January	62.9	62.7	62.6	62.4	65.6	63.9	62.5	64.3	64.7	64.4	65.8	64.5	63.3	66.7	63.6	66.3	65.5	64.2
February	61.8	62.8	63.9	65.2	65.4	62.5	63.4	64.2	64.3	64.3	63.6	65.9	65.1	65.9	64.1	64.5	64.3	64.2
March	61.0	64.1	64.9	62.3	62.8	61.4	61.1	62.0	62.0	62.9	65.1	63.9	59.0	62.1	61.6	63.9	63.9	62.6
April	53.9	58.3	59.0	53.9	56.8	57.7	58.3	59.5	62.0	56.3	59.4	60.4	57.2	55.3	57.5	60.8	59.5	58.0
May	50.0	49.4	49.5	49.9	52.2	51.1	49.0	53.9	56.1	51.2	52.2	53.3	53.7	49.6	53.0	53.1	50.4	52.2
June	44.7	47.0	47.2	47.6	49.9	48.1	46.2	57.7	50.3	49.0	48.5	48.1	46.8	49.0	52.6	46.8	49.4	48.8
July	42.8	45.2	45.2	44.4	45.5	45.2	43.3	45.5	46.8	46.2	45.3	45.4	45.2	46.3	44.6	44.6	45.8	45.1
August	46.7	48.5	45.5	43.6	46.6	50.8	46.2	46.9	46.9	46.5	47.3	46.3	46.0	44.3	48.8	45.5	48.5	46.8
September	49.6	50.7	49.2	51.4	48.9	50.8	51.2	50.9	52.4	51.8	49.7	50.7	51.1	49.9	51.7	49.6	48.5	50.5
October	55.6	54.5	55.6	53.4	54.6	53.4	54.4	55.0	59.1	57.8	54.9	58.0	53.2	56.0	56.6	57.0	56.7	55.5
November	58.4	56.6	55.9	59.9	56.5	57.0	59.6	58.9	59.9	59.2	59.6	60.1	58.7	61.4	56.8	58.7	59.0	58.6
December	61.3	60.9	60.5	62.8	59.4	60.0	59.3	61.5	63.7	64.0	63.2	61.5	64.0	64.1	64.0	62.8	61.8	62.2
Means	54.1	55.1	54.9	54.7	55.3	55.2	54.5	56.7	57.4	56.1	56.2	56.5	55.3	55.9	56.2	56.1	56.1	55.7

TABLE VIII.
MEAN Maximum Temperature in the Shade during the hottest month.

Year.	Thargomindah.	Casino.	Tenterfield.	Grafton.	Inverell.	Bourke.	Narrabri.	Armidale.	Cowga.	Goonoo Goonoo.	Port Macquarie.	Murrumbidgee.	Castles.	Scene.	Muswellbrook.	Dubbo.	Mudgee.	West Maitland.	Lambton.	Newcastle Telegraph Station.	Newcastle Signal Station.	Orange.	Bathurst.	Torres.	Kurrung.	
1858	...	93.4	...	...	...	...	...	87.9	...	...	...	...	...	...	...	...	...	91.6	...	...	...	...	...	...	...	...
1859	...	95.4	...	...	...	...	...	83.1	...	...	...	...	...	...	...	...	...	87.4	...	...	...	...	...	...	...	...
1860	...	98.9	...	...	...	...	...	87.0	...	...	...	...	...	...	...	...	...	89.1	...	...	...	...	...	...	...	...
1861	...	93.6	...	...	...	...	...	89.3	...	...	...	...	...	...	...	...	...	85.8	...	...	...	...	...	...	...	...
1862	...	...	...	...	...	...	...	89.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1863	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1864	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1865	...	...	...	...	...	...	...	...	97.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1866	...	...	...	...	...	...	...	...	100.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1867	...	...	...	...	...	...	...	...	101.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1868	...	...	...	...	...	...	...	...	106.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1869	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1870	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1871	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1872	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1873	...	90.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1874	...	66.2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1875	...	99.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Means	98.5	95.3	81.0	93.3	85.2	92.2	97.5	83.3	100.3	89.4	79.2	85.8	91.0	91.6	92.2	90.6	87.7	87.0	80.5	84.0	80.1	80.8	88.9	87.9	74.9	

* For portion of year only ; not included in Mean.

TABLE VIII—continued.
 Mean Maximum Temperature in the Shade during the hottest month.

Year.	Windsor.	Mount Victoria.	Woodford.	Parramatta.	South Head.	Sydney.	Liverpool.	Wentworth.	Cordeaux River.	Young.	Wollongong.	Moss Vale.	Goulburn.	Wagga Wagga.	Cape St. George.	Lake George.	Queanbeyan.	Urana.	Deniliquin.	Kandra.	Moruya.	Bodalla.	Albury.	Cooma.	Eden.	
1858	91.1	...	...	...	...	...	...	...	...	89.1	...	...	...	...	...	85.8	...	...	...	...	...	...
1859	85.0	...	78.2	...	...	...	...	...	...	80.4	...	...	...	...	...	92.4	...	...	...	...	77.3	...	
1860	86.1	...	78.4	...	...	...	...	...	...	81.2	...	...	...	...	...	93.7	...	...	...	...	79.2	...	
1861	79.3	...	...	...	...	...	...	79.7	...	...	...	...	...	91.3	...	...	...	...	95.4	...	
1862	78.7	...	...	...	...	...	...	86.6	...	...	...	...	...	96.0	...	...	...	...	90.1	...	
1863	78.8	...	...	...	...	...	...	84.9	...	...	...	...	...	94.6	...	...	...	...	93.9	...	
1864	80.8	...	...	...	...	...	...	86.1	...	...	...	...	...	90.5	...	...	...	...	94.7	...	
1865	79.4	...	...	...	...	...	...	86.5	...	...	...	...	...	...	...	...	...	...	83.2	...	
1866	78.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1867	78.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1868	81.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1869	83.2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1870	79.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1871	78.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1872	79.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1873	79.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1874	79.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1875	78.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Means	90.1	82.6	75.0	86.4	82.5	79.1	82.4	94.1	...	90.8	80.1	78.7	85.1	87.6	81.7	85.0	80.2	91.9	94.5	75.9	94.3	80.9	77.3

† Observations for portion of year only.

TABLE IX.
MEAN Minimum Temperature in the Shade during the coldest month.

Year.	Thargomindah.	Casino.	Temperfield.	Grafton.	Inverell.	Bourke.	Narrabri.	Armidale.	Cowga.	Goonoo Goonoo.	Port Macquarie.	Murrumbidgee.	Castella.	Beone.	Muswellbrook.	Dubbo.	Mudgee.	West Maitland.	Lambton.	Newcastle Station.	Newcastle Signal Station.	Orange.	Bathurst.	Forbes.
1858	37.4	...	...	...	...	...	...	29.2	...	...	...	...	...	...	...	...	...	38.4	...	...	...	...	48.0	...
1859	37.1	...	...	...	...	...	...	23.9	...	...	...	...	...	...	...	...	...	40.7	...	...	...	...	43.9	...
1860	40.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43.3	...	...	...	...	29.5	...
1861	42.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	31.7	...
1862	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	29.4	...
1863	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	37.0	...
1864	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	30.5	...
1865	...	...	...	...	...	...	...	...	42.0	...	...	...	...	...	...	...	...	...	...	...	...	...	34.5	...
1866	...	...	...	...	...	...	...	...	40.0	...	...	...	...	...	...	...	...	...	...	...	...	...	37.0	...
1867	...	...	...	...	...	...	...	...	37.0	...	...	...	...	...	...	...	...	...	...	...	...	...	45.8	...
1868	...	...	...	...	...	...	...	...	35.0	...	...	...	...	...	...	...	...	...	...	...	...	...	46.8	...
1869	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	40.3	...
1870	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	32.8	...
1871	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	31.9	...
1872	...	...	...	...	...	...	...	...	69.6	...	...	...	...	...	...	...	...	...	...	...	...	...	30.9	...
1873	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	30.9	...
1874	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	29.2	...
1875	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	37.6	...
Means	41.0	39.3	34.4	39.1	33.4	41.3	38.7	33.9	44.7	32.2	46.8	40.6	36.4	44.1	39.2	35.3	35.7	42.5	40.3	44.6	45.4	34.0	29.6	35.4

TABLE IX—continued.
 MEAN Minimum Temperature in the Shade during the coldest month.

Year.	Kurrajong.	Windsor.	Mount Victoria.	Woodford.	Parramatta.	South Head.	Sydney.	Liverpool.	Wentworth.	Young.	Wollongong.	Moss Vale.	Goulburn.	Wagga Wagga.	Cape St. George.	Lake George.	Queanbeyan.	Urana.	Deniliquin.	Kingdra.	Moruya.	Podalla.	Albury.	Cooma.	Eden.	
1858	
1859	42.8	...	...	...	...	...	31.2	...	...	...	...	...	22.4	...	...	...	...	28.9	...	
1860	43.2	...	...	...	...	29.7	...	...	...	...	...	...	29.9	...	...	...	...	27.3	...	
1861	43.2	...	...	...	...	32.7	...	...	...	...	...	...	28.3	...	...	...	...	34.1	28.6	
1862	43.6	...	...	...	...	33.7	...	...	...	...	...	...	...	...	...	...	...	36.8	27.7	
1863	43.5	...	...	...	...	31.2	...	...	...	...	...	...	...	...	...	...	...	27.6	...	
1864	46.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	35.6	27.9	
1865	43.3	...	...	...	...	...	36.2	...	...	...	...	...	...	...	...	...	...	28.5	...	
1866	43.9	...	...	...	...	...	31.0	...	...	...	...	...	...	...	...	...	...	36.7	31.2	
1867	45.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1868	46.4	...	...	...	...	...	...	...	48.8	...	...	...	41.4	23.9	...	...	...	...	...
1869	46.2	...	...	...	...	...	...	...	50.0	...	...	...	...	...	...	...	...	...	...
1870	45.4	...	...	...	...	...	...	...	48.6	29.6	...	...	...	...	...	...	...	...	...
1871	45.4	...	...	...	...	...	...	...	45.8	...	...	...	...	...	...	...	...	...	...
1872	43.2	...	...	...	...	...	...	...	44.8	...	...	...	...	...	...	...	...	...	...
1873	44.3	...	...	...	...	...	...	...	44.1	...	...	...	...	...	...	...	...	...	...
1874	44.6	...	...	...	...	...	...	...	43.1	...	...	...	...	...	...	...	...	...	...
1875	44.6	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1876	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1877	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1878	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1879	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1880	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1881	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1882	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1883	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1884	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1885	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1886	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1887	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1888	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1889	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1890	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1891	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1892	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1893	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1894	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1895	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1896	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1897	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1898	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1899	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
1900	43.8	...	...	...	...	...	...	...	44.4	...	...	...	...	...	...	...	...	...	...
Means	37.7	37.5	32.2	41.3	38.4	46.6	45.1	36.7	40.8	35.3	45.0	35.3	32.3	35.8	46.0	36.1	33.6	39.6	35.3	30.2	33.4	27.8	43.7

* Observations for portion of year only.

TABLE X.
Mean Diurnal Range of Temperature in the Shade.

Year.	Thargomindah.	Casino.	Tenterfield.	Grafton.	Inverell.	Bourke.	Narrabri.	Armidale.	Cowga.	Goonoo Goonoo.	Fort Macquarie.	Murrumbidgee.	Casils.	Scone.	Muswellbrook.	Dubbo.	Mudgee.	West Maitland.	Lambton.	Newcastle Telegraph Station.	Newcastle Signal Station.	Orange.	Bathurst.	Forbes.
1858	...	27.0	...	...	...	...	...	27.9	...	...	...	...	...	...	...	...	...	24.9	...	...	...	...	26.5	...
1859	...	32.3	...	...	...	...	...	23.1	...	...	...	...	...	...	...	...	...	24.4	...	...	...	...	31.4	...
1860	...	28.2	...	...	...	...	...	41.4	...	...	...	...	...	...	...	...	...	21.7	...	...	...	...	26.2	...
1861	...	26.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	19.8	...	...	...	...	27.6	...
1862	31.2	...
1863	29.1	...
1864	29.9	...
1865	35.9	...
1866
1867
1868
1869
1870
1871
1872
1873
1874
1875
Means	21.0	26.6	22.3	27.8	23.9	20.9	26.3	24.8	31.7	26.1	15.7	19.8	25.6	21.1	26.4	23.1	19.4	21.5	20.6	17.9	15.1	16.9	30.3	21.0

TABLE X—continued.
MEAN Diurnal Range of Temperature in the Shade.

Year.	Kurrajong.	Windsor.	Mount Victoria.	Woodford.	Parramatta.	Sydney.	Liverpool.	Wentworth.	Young.	Wollongong.	Moss Vale.	Goulburn.	Wagga Wagga.	Cape St. George.	Lake George.	Queanbeyan.	Urana.	Deniliquin.	Kiandra.	Moruya.	Bodalla.	Albury.	Cooma.	Eden.
1858	27.6	8.7	...	...	...	...	25.4	...	...	...	...	...	...	5.3	...	...	...	7.32	...	...
1859	29.6	9.1	...	...	...	...	21.5	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1860	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1861	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1862	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1863	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1864	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1865	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1866	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1867	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1868	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1869	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1870	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1871	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1872	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1873	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1874	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
1875	25.0	8.3	...	...	...	...	21.2	...	...	...	...	...	...	8.3	...	...	...	...	5.32	...
Means	22.1	14.3	...	23.3	27.4	14.9	15.9	25.8	19.7	13.3	...	16.7	20.0	30.6	...	...	...	30.1	30.6	13.9

* Observations for portion of year only.

TABLE XI.
MEAN Humidity of Air at 9 A.M. Scale 0 to 100.

Year.	Thargomindah.	Casino.	Gratton.	Inverell.	Armidale.	Goonoo Goonoo.	Newcastle Telegraph Station.	Newcastle Signal Station.	Bathurst.	Windoor.	Mount Victoria.	Sydney.	Goulburn.	Cape St. George.	Lake George.	Deniliquin.	Kandra.	Albury.	Cooma.	Eden.
1859	...	76.0	...	...	...	...	...	...	...	...	...	70.7	80.0	...	...	...	...	...	74.0	...
1860	...	78.0	...	...	74.0	...	...	...	...	...	...	74.2	76.0	...	...	...	...	...	70.0	...
1861	69.0	...	...	...	...	67.0	...	71.7	74.0	...	...	...	...	...	71.0	...
1862	77.0	...	...	...	...	77.0	...	71.6	73.0	...	...	...	...	...	71.0	...
1863	80.0	...	...	...	...	76.0	...	71.4	73.0	...	...	...	...	...	75.0	...
1864	77.0	...	73.0	73.0	...	...	...	...	...	75.0	...
1865	72.0	...	73.0	73.0	...	...	...	...	...	75.0	...
1866	68.0	...	...	72.0	...	69.6	67.0	...	...	...	...	68.0	...	...
1867	76.0	...	72.1	...	...	...	...	...	...	...	...
1868	74.0	...	70.6	...	...	...	...	...	...	...	...
1869	72.3	72.3	...	76.0	...	72.9	...	...	...	...	...	...	...	...
1870	72.3	72.3	...	76.0	...	72.9	...	...	...	...	...	...	...	...
1871	75.1	...	80.0	...	71.3	...	...	...	...	...	...	...	...
1872	76.3	75.4	80.0	...	71.3	...	...	...	...	...	...	...	...
1873	79.3	...	...	77.5	76.7	...	...	71.9	...	...	...	...	...	...	...	...
1874	79.1	...	...	78.2	77.0	...	...	75.9	...	...	...	...	...	...	...	...
1875	79.0	...	...	75.6	76.8	...	...	75.9	...	...	...	...	...	...	...	...
Means	54.7	77.0	67.6	76.5	78.2	69.9	72.3	75.0	75.8	74.4	79.6	73.1	76.1	81.9	73.9	70.2	74.6	72.9	73.0	76.0

* Observations for portion of year only.

TABLE XII.
 Extent of Cloudy Sky. Scale 0 clear to 10 overcast.

Year.	Thargomindah.	Casino.	Tenterfield.	Grafton.	Inverell.	Bourke.	Narrabri.	Armidale.	Cowga.	Goonoo Goonoo.	Port Macquarie.	Murrumbidgee.	Casells.	Scene.	Muswellbrook.	Dubbo.	West Maitland.	Newcastle Telegraph Station.	Newcastle Signal Station.	Orange.	Bathurst.	Forbes.	
1859	...	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	54	...	...	...	...	...	...
1860	...	54	54	...	...	...	...	54	...	...	...	...	...	...	...	...	...	50	...	...	40	...	...
1861	...	47	43	...	...	...	...	43	...	...	...	...	...	...	...	...	...	51	...	...	39	...	...
1862	64	...	...	...	...	64	...	...	...	...	...	...	...	...	...	49	...	...	37	...	...
1863	53	...	...	...	...	53	...	...	...	...	...	...	...	...	...	46	...	...	52	...	...
1864	37	...	...	...	...	37	...	...	...	...	...	...	...	...	...	46	...	...	54	...	...
1865	36	...	...
1866
1867
1868
1869
1870
1871	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1872	46	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1873	44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1874	44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1875	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Means	47	51	47	43	31	19	21	48	23	29	31	36	11	37	40	26	49	49	42	48	48	48	28

TABLE XII—continued.
Extent of Cloudy Sky. Scale 0 clear to 10 overcast.

Year.	Kurruljong.	Windsor.	Mount Victoria.	Paramatta.	South Reef.	South Head.	Sydney.	Liverpool.	Wentworth.	Young.	Goulburn.	Cape St. George.	Lake George.	Queanbeyan.	Urana.	Deniliquin.	Kindra.	Moruya.	Bodalla.	Albury.	Cooma.	Eden.
1859	6.0	...	...	4.2	...	...	...	5.8	...	...	...	...	3.5	...	...	...	4.8	5.8	...
1860	5.1	...	...	...	5.8	...	...	...	...	3.3	...	...	...	5.1	5.6	...
1861	4.9	...	...	...	5.2	...	...	...	...	2.7	...	...	...	4.0	5.3	...
1862	...	4.3	...	...	...	...	4.2	...	...	...	4.6	...	...	...	...	4.2	...	...	...	5.1	5.6	...
1863	...	6.1	...	...	...	...	5.0	...	...	...	4.6	...	...	...	...	4.2	...	...	...	5.1	5.6	...
1864	...	6.3	...	...	...	...	5.6	...	...	...	5.4	...	...	...	...	2.1	...	...	...	5.5	6.1	...
1865	...	5.4	...	...	...	...	4.6	...	...	...	4.5	...	...	...	...	2.1	...	...	...	4.3	3.6	...
1866	...	6.0	...	...	...	...	5.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1867	...	6.0	...	...	...	5.6	5.0	...	...	...	...	5.9	...	...	...	3.3	6.6	...	...	...	...	...
1868	...	5.8	...	...	...	5.2	5.0	...	...	...	...	5.6	...	...	...	3.0	5.8	...	...	...	...	...
1869	...	6.1	...	...	...	...	6.2	...	...	...	...	5.9	5.5	...	...	3.4	6.2	...	...	...	...	4.9
1870	...	6.6	...	...	...	...	6.2	...	...	...	6.0	6.3	...	...	...	4.0	6.6	...	...	...	...	5.9
1871	6.6	...	...	...	...	5.2	...	...	...	3.0	5.4	...	...	...	6.3	5.3
1872	5.7	5.2	...	...	6.3	4.4	3.5	...	5.2	5.2	...	...	4.1	2.8	5.1	...	...	...	6.2	5.4
1873	...	6.1	5.6	...	...	...	6.0	4.5	4.1	...	4.2	5.7	...	5.3	3.4	2.9	6.0	...	...	4.3	6.7	5.4
1874	4.9	6.3	6.6	2.9	5.6	...	6.0	4.9	4.0	3.9	6.1	6.0	...	5.0	3.4	2.7	...	...	...	4.3	6.1	5.6
1875	4.7	6.0	5.5	0.8	6.2	...	5.9	4.6	4.1	3.5	5.8	6.0	...	4.7	4.1	3.2	...	6.3	5.0	4.6	6.0	5.7
Means	4.8	6.0	5.9	3.7	5.9	5.4	5.3	4.6	3.7	3.8	5.3	5.8	5.5	5.0	3.8	3.2	5.9	6.2	5.0	4.7	5.8	5.5

* Observations for portion of year only.

TABLE XIII.
TABLE showing Average Monthly Extent of Cloudy Sky at Sydney.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	Septem-ber.	October.	November.	December.	Annual Mean.
1859	5.8	4.4	4.2	2.4	2.1	4.5	3.4	4.0	4.8	3.6	5.7	5.7	4.2
1860	3.6	7.1	6.1	4.4	2.5	5.2	4.7	5.7	4.9	5.1	5.6	6.2	5.1
1861	5.4	5.5	5.5	6.1	3.8	3.5	5.3	5.0	3.5	4.0	5.1	5.5	4.9
1862	5.0	4.6	4.7	3.0	3.8	5.4	1.7	2.6	4.4	3.8	4.9	6.0	4.2
1863	6.6	6.6	6.3	4.4	2.1	7.5	4.0	3.6	3.7	6.1	4.1	5.9	5.0
1864	6.0	8.0	7.1	6.2	5.1	5.7	3.8	3.8	4.3	5.6	5.0	6.2	5.6
1865	8.9	5.9	5.6	4.6	3.5	6.0	3.4	3.3	3.3	3.7	4.6	3.9	4.6
1866	6.9	6.5	6.6	6.0	4.5	6.0	5.0	3.0	2.9	3.8	5.2	4.7	5.1
1867	4.8	6.4	5.7	8.1	6.1	5.5	3.1	3.2	4.8	4.3	3.6	4.5	5.0
1868	6.2	7.4	4.5	4.6	3.9	4.2	4.4	2.6	4.6	5.5	7.0	4.9	5.0
1869	4.9	5.5	6.2	6.3	5.5	4.4	2.9	2.7	4.2	7.0	6.3	7.3	5.3
1870	5.7	6.0	9.1	6.7	7.4	4.6	5.3	4.2	5.9	6.8	6.5	7.0	6.3
1871	7.0	7.3	6.1	5.0	6.4	5.6	2.9	3.5	4.5	6.1	6.7	6.5	5.6
1872	7.1	7.9	6.7	4.9	5.5	5.6	4.8	5.7	5.4	6.3	7.3	7.1	6.2
1873	6.6	7.1	5.9	5.4	6.4	7.0	4.2	5.1	3.9	6.0	7.3	6.9	6.0
1874	7.5	7.3	8.1	7.2	4.9	4.1	6.5	4.5	5.1	5.5	6.3	5.3	6.0
1875	6.0	7.9	6.5	7.6	4.3	6.6	4.8	4.9	4.4	6.3	5.9	5.8	5.9
Means ...	6.1	6.5	6.2	5.5	4.6	5.3	4.2	4.0	4.4	5.3	5.7	5.8	5.3

TABLE XIV—continued.
PREVAILING direction of the Wind.

Year.	Parramatta.	South Reef.	South Head.	Sydney.	Liverpool.	Wentworth.	Cordeaux River.	Young.	Wollongong.	Moss Vale.	Goulburn.	Terrara.	Wagga Wagga.	Cape St. George.	Lake George.	Queanbeyan.	Urana.	Denbighuin.	Kiandra.	Moruya.	Bodalla.	Albury.	Cooma.	Eden.
1859	W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1860	N.E.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1861	N.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1862	W & N.E.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1863	W & N.W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1864	S.S.W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1865	W.N.W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1866	W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1867	W.N.W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1868	W.N.W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1869	W.N.W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1870	W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1871	W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1872	W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1873	W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1874	W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1875	W.N.W.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Means	S.W.	...	S.W.	W.	W.S.W.	W.	...	...	S.W.	W.	W.	...	...	S.	N.W.	N.W.	...	S.W.	N.W.	...	...	N.E.	...	S.W.

TABLE XV.
RAINFALL in New South Wales.

Year.	Thargomindah.		Casino.		Teeterfield.		Grafton.		Inverell.		Bourke.		Narrabri.		Armidale.		Cowga.	
	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858	37'071	150	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...
1859	32'170	84	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	32'850	108
1860	50'080	128	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...
1861	55'410	138	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...
1862	40'250	57	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...
1863
1864
1865
1866
1867	44'990	133	.....	...	.....	...	.....	...	.....	...
1868
1869
1870	b 12'775	58	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...
1871	32'595	120	*10'500	49	.....	...	d 6'698	32	23'705	68	e 16'740	44	.....	...
1872	37'140	101	35'258	92	.....	...	24'000	52	24'880	63	33'620	77	.....	15
1873	16'510	25	.....	...	35'573	72	42'911	76	.....	...	11'900	39	32'340	65	28'710	98	.....	...
1874	16'020	43	.....	...	25'910	68	31'002	76	21'130	55	12'347	44	28'020	56	16'606	76	.....	...
1875	a 7'220	18	.....	...	22'780	65	36'509	74	e 21'690	63	12'850	23	20'380	66	37'540	86	.....	...
Means ...	16'265	34	42'996	111	30'800	85	38'132	88	21'130	55	17'950	46	23'238	57	35'761	96	5'570	15

* For last 6 months only not included in mean. † 1874, October, November, December, no observations.
 ‡ Observations only for first and last 3 months. § 2 months only, January and February.
 || 1875, June to December, inclusive, none (January to May inclusive.)
 a First 5 months only not included in mean. | d Jan., Feb., and March missing not included in mean.
 b Last 4 months only " " | e Last 7 months only " "
 c No return for December " " |

TABLE XV—continued.
RAINFALL &c.—continued.

Year.	Goomoo Goomoo.		Port Macquarie.		Murrurundi.		Cassilis.		Scone.		Muswellbrook.		Dubbo.		Mudgee.		Dalwood.	
	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.
1840	47'550	77	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..
1841	48'730	91	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..
1842	72'850	98	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..
1843	68'390	135	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..
1844	64'630	145	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..
1845	44'570	137	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859
1860
1861
1862
1863
1864
1865
1866
1867
1868
1869
1870	<i>b</i> 21'940	38	<i>e</i> 14'040	40	<i>e</i> 17'550	45	.....	..	<i>e</i> 15'080	23	<i>e</i> 12'840	34	<i>g</i> 16'325	55	.....	..
1871	57'616	120	28'796	81	23'650	80	.....	..	14'818	31	15'500	57	21'100	77	33'060	53
1872	47'243	139	23'670	62	23'150	56	.....	..	28'503	46	24'750	75	32'800	66	25'650	66
1873	<i>d</i> 13'450	21	96'903	149	44'100	44	28'090	60	.....	..	.....	..	17'840	41	23'638	49	41'780	101
1874	31'540	44	45'075	139	<i>d</i> 22'245	29	28'240	76	26'020	65	.....	..	* 10'050	28	34'490	79	.....	..
1875	21'570	48	69'735	149	1'850	42	25'040	60	22'780	47	<i>f</i> 12'690	66	20'700	59	.....	..	.....	..
Means ...	26'555	46	63'314	139	27'854	58	25'634	66	24'400	56	21'661	39	19'698	58	28'012	68	32'569	83

* 6 months only—May, June, July, August, September, and November not included in mean.

<i>a</i> Last 6 months only not included in mean.	<i>e</i> Last 4 months only not included in mean.
<i>b</i> " 3 " " "	<i>f</i> " 9 " " "
<i>c</i> " 3 " " "	<i>g</i> " 5 " " "
<i>d</i> " 9 " " "	

TABLE XV—continued.
RAINFALL, &c.—continued.

Year.	Woodford.		Farramatta.		South Reef.		South Head.		Botany.		Sydney.		Liverpool.		Wentworth. †		Wilton.			
	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.		
1840	144'250	108	.....	...	.....	...	.....	...	.....	...	.....	...
1841	76'310	142	.....	...	.....	...	.....	...	.....	...	.....	...
1842	48'320	137	.....	...	.....	...	.....	...	.....	...	.....	...
1843	62'780	168	.....	...	.....	...	.....	...	.....	...	.....	...
1844	70'670	157	.....	...	.....	...	.....	...	.....	...	.....	...
1845	62'025	132	.....	...	.....	...	.....	...	.....	...	.....	...
1846	43'833	139	.....	...	.....	...	.....	...	.....	...	.....	...
1847	42'799	142	.....	...	.....	...	.....	...	.....	...	.....	...
1848	59'170	137	.....	...	.....	...	.....	...	.....	...	.....	...
1849	31'480	140	.....	...	.....	...	.....	...	.....	...	.....	...
1850	44'875	157	.....	...	.....	...	.....	...	.....	...	.....	...
1851	35'135	142	.....	...	.....	...	.....	...	.....	...	.....	...
1852	43'775	145	.....	...	.....	...	.....	...	.....	...	.....	...
1853	46'105	130	.....	...	.....	...	.....	...	.....	...	.....	...
1854	29'275	136	.....	...	.....	...	.....	...	.....	...	.....	...
1855	52'850	138	.....	...	.....	...	.....	...	.....	...	.....	...
1856	43'370	116	.....	...	.....	...	.....	...
1857	50'090	135	.....	...	.....	...	.....	...
1858	30'595	139	.....	...	.....	...	.....	...
1859	34'634	123	.....	...	.....	...	.....	...	42'044	128	.....	...	.....	...	.....	...
1860	72'938	172	.....	...	.....	...	.....	...	82'801	182	.....	...	.....	...	.....	...
1861	29'380	77	.....	...	.....	...	.....	...	58'360	157	.....	...	.....	...	.....	...
1862	20'835	99	.....	...	.....	...	.....	...	23'980	111	.....	...	.....	...	.....	...
1863	38'315	146	.....	...	.....	...	.....	...	47'080	152	.....	...	.....	...	.....	...
1864	66'334	162	.....	...	.....	...	.....	...	69'120	187	.....	...	.....	...	.....	...
1865	36'278	128	.....	...	.....	...	.....	...
1866	36'800	149	.....	...	.....	...	.....	...
1867	52'370	...	.....	...	59'680	126	.....	...	.....	...	.....	...
1868	41'180	...	.....	...	43'060	127	.....	...	.....	...	.....	...
1869	48'190	134	.....	...	.....	...	.....	...
1870	63'370	151	64'215	178	58'972	169	*1'240	7	c 16'750	65
1871	a 12'265	54	b 40'780	94	52'274	194	41'852	135	15'243	66	d 28'250	64
1872	40'920	140	28'270	104	37'122	224	27'013	158	15'770	77	31'540	70
1873	64'300	151	73'404	251	50'991	153	12'930	80	48'240	93
1874	55'470	160	39'280	46	75'100	148	63'370	...	63'600	216	41'927	151	10'980	72	33'640	85
1875	23'790	74	42'643	87	47'190	...	46'251	176	35'705	143	12'780	70	34'750	98
Means ...	53'563	150	39'308	111	58'872	118	48'286	133	50'906	161	42'743	152	13'541	73	37'043	87

* Not included in mean. † January, February, March, no observations; if the average fall on these months be added to the amount measured in 1840, the amount becomes 58,520, and the average for all years, 49,979.
‡ Rain-gauge 7 feet above ground.

a Last 6 months only, not included in mean. | c Last 5 months only, not included in mean.
b January missing " " " | d Jan. and Feb. missing " " "

NEW SOUTH WALES.

TABLE XV—continued.
RAINFALL, &c.—continued.

Year.	Cordeaux River.		Young.		Wollongong.		Moss Vale.		Goulburn.		Terrara.		Wagga Wagga.		Cape St. George.		Gungahleen.	
	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859	24'060	111	...	...	...	...	...	...	...	...
1860	40'520	131	...	...	...	...	...	...	...	...
1861	23'520	104	...	...	...	...	...	...	...	...
1862	16'350	65	...	...	...	...	...	...	...	...
1863	26'740	78	...	...	...	...	...	...	...	...
1864	26'420	116	...	...	...	...	...	...	...	...
1865	11'720	65	...	...	...	...	...	...	8'280	21
1866	24'380	50
1867	75'476	125	32'240	51	...
1868	37'070	128	22'310	40	...
1869	49'420	133	29'800	42	...
1870	96'110	185	49'710	69	...
1871	*18'740	55	18'360	24	43'340	75	39'640	99	32'450	111	†11'190	44	20'650	60	61'932	150	28'420	46
1872	43'150	109	37'530	70	28'310	48	45'510	109	29'980	99	36'530	112	30'240	88	37'134	138	33'290	48
1873	83'910	134	27'490	81	649'330	66	59'130	93	31'370	92	72'320	114	20'830	62	64'130	130	29'600	38
1874	60'280	127	27'510	80	...	...	46'880	97	26'850	90	...	...	28'350	73	38'260	119	25'100	34
1875	60'860	120	26'410	54	†29'450	36	44'800	93	25'570	88	...	...	24'544	70	46'690	96	24'910	45
Means	62'050	123	30'843	77	38'325	62	49'080	98	26'296	96	54'450	113	25'991	73	56'247	134	28'004	44

* Only 7 months, not included in mean. † Only 4 months, not included in mean. ‡ Only 6 months, not included in mean. § Only 10 months, not included in mean. ¶ No observations taken.
a August missing, not included in mean. *d* June, July, & Nov. missing, not included in mean.
b Last 5 months only, not included in mean. *e* Last 5 months only " " "
c May and September missing, not included in mean. *f* January missing " " "
g Last 4 months only " " "

TABLE XV—continued.
RAINFALL, &c.—continued.

Year.	Lake George.		Queanbeyan.		Urana.		Deniliquin.		Kiaandra.		Bodalla.		Albury.		Cooma.		Eden.	
	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.	Rainfall.	Days.
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859	13'042	63	...	...	...	...	...	...	18'595	108	...	...
1860	18'828	64	...	...	...	...	35'470	92	25'085	123	...	...
1861	15'100	72	...	...	...	...	16'170	75	15'400	116	...	...
1862	†	19'500	75	14'410	98	...	...
1863	25'380	66	...	...	...	...	38'750	96	20'050	115	...	...
1864	13'020	56	...	...	...	...	31'270	76	21'450	114	...	...
1865	†	27'622	47	...	...	...	...
1866	3'500	81	46'600	55	...	...	30'300	56	...	...	...	...
1867	6'560	67	72'640	124	...	...	...	...	...	...	...	...
1868	12'690	47	55'610	110	...	...	...	...	...	...	...	...
1869	27'190	129	...	...	...	...	11'450	39	67'510	130	...	...	...	...	...	...	26'570	125
1870	a 14'160	41	47'345	20	24'045	71	61'480	88	...	...	e 16'410	36	...	...	67'570	154
1871	27'820	100	21'080	28	20'770	67	74'100	138	...	...	30'859	98	24'290	80	53'740	131
1872	29'020	80	28'780	50	17'390	74	55'980	114	...	...	28'450	72	16'810	60	54'630	107
1873	26'040	65	18'300	58	22'540	78	55'900	117	...	...	27'110	95	22'470	76	53'780	120
1874	18'700	61	17'560	65	18'270	57	...	...	...	...	27'780	81	14'230	61	45'490	158
1875	17'140	67	24'570	77	24'140	65	...	...	b 23'155	37	34'300	96	9'800	72	43'610	128
Means	23'744	75	22'058	56	16'448	64	61'228	110	...	...	28'965	80	18'417	94	45'056	132

* Portion of year only, omitted in mean. † Only 6 months rain measured, 5,530 inches. ‡ Rain gauge out of order. § No observations taken.

a Last 4 months only, not included in mean.

b " 6 " " " "

c " 4 " " " "

TABLE showing the amount of Rain, and number of Rainy Day

Year.	Name of Station.	January.		February.		March.		April.		May.		Ye
		Rain in Inches.	No. of Days.	Rain in Inches.	No. of Days.	Rain in Inches.	No. of Days.	Rain in Inches.	No. of Days.	Rain in Inches.	No. of Days.	
1840	South Head .....	..	..	..	..	..	..	2.61	13	*1.60	16	184
1841	"	5.63	17	0.53	6	3.83	18	*25.43	13	6.73	12	184
1842	"	5.82	12	*11.06	14	3.07	14	7.84	9	5.51	9	184
1843	"	1.58	14	12.33	17	5.36	20	7.86	13	6.67	17	184
1844	"	9.88	17	1.88	16	2.28	5	1.31	14	1.95	10	184
1845	"	4.86	11	4.67	14	3.46	10	*16.40	15	9.64	15	184
1846	"	1.00	6	5.91	9	2.69	15	1.26	9	1.43	8	184
1847	"	*10.68	17	6.12	12	2.49	16	7.35	14	6.18	13	184
1848	"	8.03	18	2.55	14	*13.85	10	2.78	14	0.85	10	184
1849	"	0.57	11	0.81	15	1.18	4	1.13	10	*5.61	13	184
1850	"	1.37	12	1.73	17	4.80	12	4.27	12	1.22	11	184
1851	"	1.74	8	*6.17	12	1.79	12	5.60	17	2.27	14	184
1852	"	3.39	12	0.87	8	5.17	17	1.25	7	5.41	13	184
1853	"	4.45	16	10.16	9	3.09	13	1.85	10	3.90	9	184
1854	"	3.09	14	10.11	10	4.67	16	3.40	12	0.89	9	184
1855	"	2.53	12	4.34	10	7.58	15	*10.24	17	7.10	7	184
1856	Petersham	3.52	13	2.31	13	3.91	12	4.67	11	3.73	9	184
1857	Double Bay	3.02	10	*6.69	12	4.39	13	6.04	16	5.74	15	184
1858	Near Sydney	1.16	6	1.31	8	3.74	12	3.02	13	*11.85	12	184
1859	Sydney	6.99	18	7.22	10	1.02	12	10.44	4	0.97	6	184
1860	"	6.57	8	10.87	17	5.23	17	*20.02	14	10.18	6	184
1861	"	3.59	15	3.27	16	4.40	19	*24.49	17	1.57	10	184
1862	"	3.72	13	*4.74	9	1.90	13	1.39	13	1.47	7	184
1863	"	*0.45	14	6.31	14	5.64	16	6.30	14	10.40	10	184
1864	"	1.10	11	7.19	16	11.68	23	7.46	19	4.03	20	184
1865	"	5.07	14	3.94	9	0.95	11	2.40	11	1.05	14	184
1866	"	4.10	17	3.95	17	2.70	15	1.02	7	3.26	14	184
1867	"	1.73	10	3.69	13	12.05	14	1.02	23	3.83	15	184
1868	"	4.52	16	*15.30	16	0.85	9	10.06	4	5.03	11	184
1869	"	1.03	10	7.21	14	5.18	9	3.99	15	*12.42	10	184
1870	"	2.76	11	1.50	9	*18.70	26	5.53	15	10.47	22	184
1871	"	5.62	13	4.55	18	7.38	12	*12.84	19	10.11	27	184
1872	"	5.05	18	1.65	22	*6.27	23	2.08	21	1.91	20	184
1873	"	5.52	18	*18.56	22	2.42	24	3.90	26	1.03	23	184
1874	"	3.86	24	*10.49	23	4.38	28	9.11	26	8.62	16	184
1875	"	1.15	10	5.59	19	6.73	23	4.78	19	*12.55	18	184
Sums	.....	141.15	466	185.58	480	174.83	528	241.32	506	181.88	471	..
Means	.....	4.03	13	5.30	14	4.94	15	6.70	14	5.052	13	..

* Maximum for the year. † Less than half an inch. ‡ Number of days on which measure quantities of dew has fallen is added to rain days since 1869.

XVI.

each Month, from 1840 to December 31st, 1875, inclusive.

Year.	June.		July.		August.		September.		October.		November.		December.		Total for Year.	Total for Year.	Year.
	Rain in Inches.	No. of Days.	Rain in Inches.	No. of Days.	Rain in Inches.	No. of Days.	Rain in Inches.	No. of Days.	Rain in Inches.	No. of Days.	Rain in Inches.	No. of Days.	Rain in Inches.	No. of Days.			
1840	3.93	15	7.01	13	0.89	6	4.87	14	1.75	13	1.95	7	4.94	11	44.25	168	1840
1841	1.73	11	1.11	14	1.47	7	4.20	10	4.20	10	7.05	19	4.35	14	76.31	142	1841
1842	6.60	18	4.18	9	3.80	15	1.10	14	1.10	11	1.10	8	3.04	15	48.32	137	1842
1843	3.01	18	4.18	13	2.77	16	3.63	11	1.10	11	0.75	10	3.54	10	62.78	168	1843
1844	10.04	12	2.89	14	2.94	17	3.72	8	1.89	15	0.80	15	4.57	9	70.66	157	1844
1845	3.41	9	4.91	12	0.90	10	3.62	8	1.89	15	0.80	4	7.74	14	62.01	132	1845
1846	5.61	13	2.31	10	5.48	14	5.94	18	2.75	16	3.07	10	5.43	13	43.83	139	1846
1847	2.84	13	0.79	10	0.84	11	1.19	13	1.30	10	1.54	10	1.54	6	42.81	142	1847
1848	5.47	11	3.45	15	1.89	15	3.37	7	5.35	17	1.56	10	2.92	17	59.17	155	1848
1849	1.80	11	1.11	11	1.66	11	1.33	15	5.35	17	1.56	10	1.54	11	21.49	140	1849
1850	3.18	15	2.02	22	1.44	10	4.50	14	8.66	17	1.69	9	1.52	6	44.88	157	1850
1851	1.55	12	2.02	15	2.99	16	0.58	12	4.32	11	2.50	15	3.61	10	35.14	142	1851
1852	10.30	11	0.59	10	5.05	16	3.17	12	4.32	13	4.80	14	1.51	10	43.79	143	1852
1853	14.25	13	2.33	11	7.00	10	1.12	7	2.71	9	4.48	14	1.78	10	46.12	130	1853
1854	8.46	19	1.64	6	1.52	11	2.50	10	1.08	8	1.54	13	2.92	10	29.29	136	1854
1855	2.17	6	2.96	13	0.59	4	5.35	12	2.38	13	2.35	12	5.27	19	52.86	138	1855
1856	10.46	16	3.44	8	0.65	5	0.79	8	3.35	9	1.53	8	4.77	8	43.31	116	1856
1857	5.39	14	5.55	11	4.56	12	1.54	7	3.26	14	1.51	8	1.26	15	50.95	135	1857
1858	5.94	14	10.06	11	0.79	6	1.54	7	3.72	16	2.48	14	2.10	15	39.59	139	1858
1859	4.33	13	4.69	10	0.29	10	2.54	10	10.30	6	1.31	11	3.62	15	42.06	128	1859
1860	2.81	11	11.95	10	9.48	10	1.77	6	4.08	19	7.29	17	7.75	19	82.81	182	1860
1861	1.84	11	4.77	12	1.95	9	0.73	7	2.72	10	1.03	9	2.99	10	58.36	157	1861
1862	3.32	10	10.12	4	6.39	14	3.27	10	0.78	16	0.68	6	0.91	7	23.98	111	1862
1863	5.85	19	1.41	8	1.95	9	0.73	7	3.48	16	1.25	8	3.42	11	47.09	152	1863
1864	5.38	14	8.02	10	3.03	15	1.44	12	5.41	17	1.25	8	3.42	12	69.11	187	1864
1865	5.30	11	1.89	12	2.99	10	1.13	8	0.92	7	9.88	12	0.77	9	36.29	128	1865
1866	8.80	17	4.42	14	1.07	11	1.14	5	1.39	9	1.61	13	2.26	10	36.81	119	1866
1867	12.64	12	2.62	14	0.98	11	1.14	5	10.14	4	10.20	2	0.85	7	59.63	119	1867
1868	3.88	9	4.81	7	2.60	9	3.35	14	10.21	4	2.42	14	0.92	7	43.06	127	1868
1869	1.42	10	3.28	9	0.67	3	11.63	9	1.46	6	2.42	14	0.92	7	43.06	127	1869
1870	1.50	8	2.40	11	2.82	9	1.05	11	1.76	17	5.57	15	2.03	13	48.19	134	1870
1871	4.58	16	10.30	13	10.47	12	0.57	12	4.19	21	2.49	18	7.80	17	64.22	178	1871
1872	1.36	16	0.98	12	2.97	22	2.28	10	3.47	23	2.13	13	0.57	12	52.27	194	1872
1873	10.52	25	10.88	17	2.98	19	1.59	16	5.77	19	3.29	17	3.52	16	37.12	224	1873
1874	9.27	18	6.26	19	1.36	15	2.10	14	2.14	19	3.33	8	4.43	16	73.40	224	1874
1875	7.82	15	1.61	19	0.52	9	1.70	13	1.06	12	0.88	10	1.87	9	63.60	216	1875
Sums	190.07	457	154.04	438	105.20	413	92.15	411	123.71	478	112.01	414	99.91	407	1801.81	5469	...
Means	5.280	13	4.279	12	2.922	11	2.560	11	3.436	13	3.111	12	2.775	11	50.050	152	...

† rainy day is understood to be a day upon which any measurable quantity of rain falls.
 ‡ There are 22 months rainfall less than $\frac{1}{2}$ inch.
 § If the average fall, 14.27 be allowed for the missing months, the 36 years average becomes 50.447.

TABLE
SHEWING the Daily

DAY.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.
January.									
1	.....	.....	.....	.....	0'038	.....	.....	.....	.....
2	.....	.....	.....	.....	0'013	0'063	.....	.....	0'001
3	0'160	0'005	.....	0'020	.....	.....	.....	.....	0'013
4	.....	.....	1'090	.....	.....	.....	0'037	.....	0'008
5	.....	0'040	.....	0'063	.....	.....	0'210	0'347	.....
6	.....	0'339	0'002	0'025	.....	0'045	0'128	0'037	.....
7	.....	.....	3'130	0'125	0'010	.....	0'057	.....	.....
8	.....	0'009	0'256	0'013	0'060	.....	.....	.....	.....
9	.....	1'388	0'380	.....	.....	.....	.....	0'829	0'026
10	.....	0'577	0'001	.....	.....	.....	0'014	0'001	0'160
11	0'330	0'060	.....	.....	.....	.....	0'180	.....	.....
12	0'190	0'275	.....	.....	0'160	0'010	0'020	0'655	0'077
13	0'040	.....	.....	0'010	.....	0'190	.....	0'313	0'037
14	.....	.....	.....	.....	.....	0'953	.....	0'645	.....
15	.....	0'018	.....	0'128	.....	.....	0'175	0'150	.....
16	.....	0'012	.....	0'370	.....	0'037	.....	0'070	.....
17	0'010	.....	.....	9'017	0'112	.....	.....	.....	.....
18	.....	.....	.....	0'087	0'480	.....	.....	.....	.....
19	.....	0'285	0'613	0'126	1'090	.....	0'004	.....	1'025
20	.....	0'020	.....	.....	0'031	.....	0'070	.....	0'002
21	.....	0'695	.....	0'890	0'032	0'050	.....	0'050	0'052
22	.....	0'005	.....	0'036	0'933	3'750	.....	.....	0'040
23	.....	.....	.....	.....	0'310	0'253	.....	0'001	0'012
24	.....	.....	.....	0'287	0'223	.....	.....	0'028	0'012
25	.....	.....	.....	.....	0'233	0'055	.....	.....	.....
26	.....	.....	1'100	.....	.....	0'553	.....	.....	.....
27	.....	0'001	.....	.....	.....	0'153	.....	.....	0'125
28	.....	0'022	.....	.....	.....	.....	.....	0'040	0'233
29	.....	.....	.....	.....	.....	0'326	.....	0'044	1'913
30	.....	0'040	.....	0'363	.....	.....	.....	1'290	0'360
31	.....	3'195	.....	1'030	.....	0'003	.....	0'572	.....
Sum	1'160	6'986	6'572	3'590	3'725	6'447	0'895	5'072	4'096
February.									
1	.....	1'550	.....	0'023	.....	.....	.....	0'052	0'004
2	0'120	1'365	0'083	.....	.....	.....	.....	.....	0'054
3	0'260	0'580	0'100	.....	.....	.....	.....	.....	0'156
4	.....	0'002	.....	0'250	.....	0'212	0'630	.....	0'339
5	.....	.....	.....	0'014	0'242	0'252	.....	.....	0'106
6	.....	.....	0'024	.....	.....	.....	0'170	.....	0'048
7	.....	.....	.....	0'170	0'270	.....	1'376	0'110	.....
8	0'040	.....	0'052	0'461	1'161	0'140	.....	.....	0'172
9	.....	.....	2'976	1'059	1'555	0'145	0'726	.....	.....
10	.....	.....	1'160	0'380	0'590	.....	2'118	.....	.....
11	.....	.....	2'389	.....	0'008	.....	0'342	0'144	0'010
12	.....	.....	0'872	0'130	.....	.....	0'033	0'383	.....
13	.....	.....	1'661	0'015	0'010	.....	.....	1'801	.....
14	.....	.....	0'412	.....	0'060	.....	0'337	1'205	0'023
15	.....	.....	.....	.....	.....	1'043	0'364	0'010	1'039
16	.....	0'035	.....	0'310	.....	0'373	0'009	0'131	1'600
17	0'060	0'785	.....	0'004	.....	1'314	0'001	0'001	0'010
18	.....	1'545	.....	.....	.....	0'098	.....	.....	.....
19	.....	0'645	0'117	0'006	.....	.....	.....	.....	.....
20	0'100	.....	.....	.....	.....	.....	.....	0'100	0'068
21	.....	.....	.....	.....	0'848	.....	.....	.....	0'130
22	.....	.....	0'089	.....	.....	0'550	1'031	.....	.....
23	0'220	0'050	0'242	.....	.....	0'002	1'130	.....	0'115
24	0'170	0'123	0'003	0'320	.....	0'062	.....	.....	0'056
25	.....	.....	0'138	.....	.....	.....	.....	.....	0'015
26	.....	.....	0'076	0'012	.....	1'174	0'224	.....	.....
27	.....	0'001	0'041	0'060	.....	0'439	.....	.....	.....
28	0'340	0'535	0'430	0'055	.....	0'503	0'290	.....	.....
29	.....	.....	.....	.....	.....	.....	2'398	.....	.....
Sum	1'310	7'216	10'863	3'274	4'744	6'307	9'589	3'937	3'945

XVII.

Rainfall at Sydney.

DAY.	1867.	1868.	1869	1870.	1871.	1872.	1873.	1874.	1875.
January.									
1	.....	.....	.....	.....	0'253	0'518	.....	0'001	.....
2	.....	.....	0'180	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	0'082	.....	0'001	.....
4	.....	.....	.....	0'330	.....	.....	0'044	.....	.....
5	.....	.....	.....	0'020	.....	.....	.....	.....	.....
6	.....	0'010	.....	.....	.....	.....	0'001	0'030	.....
7	.....	.....	.....	.....	0'005	0'040	.....	0'036	.....
8	.....	0'010	.....	.....	0'211	.....	1'404	0'001	0'245
9	.....	0'300	.....	.....	.....	.....	0'023	0'121	0'292
10	0'040	0'470	.....	0'020	0'980	0'216	0'651	0'140	0'006
11	.....	.....	0'060	.....	.....	0'020	0'449	0'415	0'001
12	.....	.....	.....	.....	.....	0'023	2'512	0'050	.....
13	.....	0'020	.....	.....	0'205	2'800	0'051	.....	.....
14	.....	.....	.....	.....	0'396	0'168	0'164	0'258	.....
15	0'007	.....	.....	1'490	.....	0'001	0'001	0'065	.....
16	0'001	.....	0'040	0'020	.....	0'003	0'001	.....	.....
17	0'030	.....	0'020	0'010	.....	.....	.....	.....	0'215
18	.....	1'280	0'230	.....	.....	.....	0'007	0'116	.....
19	.....	0'120	0'150	.....	.....	0'384	.....	0'001	.....
20	0'160	0'030	.....	0'270	.....	0'015	0'002	0'457	.....
21	0'970	0'090	0'010	0'020	.....	0'001	.....	0'011	.....
22	.....	0'520	0'220	.....	0'115	0'001	0'180	0'001	.....
23	.....	0'210	.....	.....	0'665	0'265	.....	0'058	.....
24	0'009	.....	.....	.....	1'837	0'109	.....	0'027	.....
25	.....	.....	.....	.....	0'470	0'010	0'008	0'352	0'177
26	.....	.....	.....	.....	.....	.....	0'009	1'607	0'015
27	.....	0'020	.....	0'310	.....	0'390	0'001	.....	0'030
28	.....	0'790	.....	0'240	0'476	.....	.....	0'012	0'029
29	0'001	0'280	.....	.....	.....	.....	.....	0'076	.....
30	0'142	0'160	0'010	.....	0'002	.....	.....	0'024	0'135
31	0'372	0'010	0'110	0'030	0'002	.....	0'013	0'003	.....
Sum ...	1'732	4'520	0'030	2'760	5'617	5'046	5'521	3'862	1'145
February.									
1	0'957	.....	.....	0'230	0'957	.....	0'020	0'016	.....
2	0'830	3'300	.....	.....	0'685	0'005	0'006	.....	0'022
3	.....	0'020	.....	.....	0'177	0'452	.....	0'240	.....
4	0'042	.....	.....	.....	0'203	0'086	0'103	0'003	.....
5	.....	.....	0'530	.....	.....	0'045	0'018	.....	2'357
6	0'015	.....	.....	.....	0'270	0'438	0'003	.....	0'216
7	.....	0'210	0'080	.....	0'003	0'002	0'001	0'051	0'760
8	0'001	0'170	0'150	0'140	0'115	.....	.....	0'001	0'330
9	0'045	.....	0'600	0'010	.....	0'023	.....	0'146	.....
10	.....	0'090	0'010	.....	0'090	0'005	0'006	0'025	.....
11	.....	0'090	2'720	.....	.....	0'106	0'363	0'166	.....
12	.....	0'030	2'240	.....	.....	0'002	0'902	0'364	0'665
13	0'001	.....	0'190	.....	.....	.....	0'004	0'252	0'040
14	.....	0'290	0'400	.....	.....	0'033	0'001	1'054	0'079
15	0'001	0'150	0'120	.....	.....	0'001	0'001	.....	0'032
16	0'001	2'940	0'040	.....	0'168	0'020	.....	0'001	0'032
17	.....	6'180	0'090	.....	0'020	0'119	.....	0'795	0'285
18	.....	1'200	0'010	.....	0'416	0'045	0'001	0'980	.....
19	.....	0'030	.....	.....	.....	.....	0'001	0'057	0'175
20	1'580	.....	.....	.....	.....	0'030	.....	.....	0'109
21	0'022	.....	.....	.....	0'075	0'002	0'037	0'001	0'140
22	.....	0'290	.....	.....	0'111	0'071	0'430	0'204	0'016
23	.....	.....	.....	0'010	0'905	0'024	0'642	3'990	.....
24	.....	0'110	.....	0'090	0'124	.....	2'175	0'485	0'100
25	.....	0'100	.....	0'170	0'003	0'135	8'900	0'712	.....
26	0'095	0'130	.....	0'130	0'190	0'003	4'930	0'410	0'010
27	0'130	.....	.....	0'270	0'038	.....	0'011	0'533	0'106
28	.....	.....	.....	0'450	.....	.....	0'001	0'001	0'119
29	.....	.....	.....	.....	.....	0'001	.....	.....	.....
Sum ...	3'690	15'300	7'210	1'500	4'552	1'648	18'556	10'487	5'593

TABLE
SHOWING the daily

DAY.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.
March.									
1.....	0'540	0'240	.....	.....	0'012	1'378	0'589	.....	.....
2.....	.....	.....	.....	.....	.....	.....	0'010	0'381	0'097
3.....	1'220	0'393	.....	0'838	.....	.....	0'232	0'043	.....
4.....	0'060	.....	0'225	.....	.....	0'729	.....	.....	.....
5.....	.....	.....	0'541	.....	.....	.....	0'005	.....	.....
6.....	.....	.....	.....	0'025	.....	0'190	0'340	0'188	.....
7.....	.....	.....	.....	.....	.....	0'792	0'061	0'001	1'126
8.....	.....	.....	.....	0'022	.....	.....	.....	.....	.....
9.....	.....	.....	0'273	0'090	.....	.....	0'529	0'007	0'001
10.....	0'030	.....	0'155	.....	.....	.....	0'493	.....	0'147
11.....	0'030	0'010	0'400	.....	.....	.....	.....	.....	.....
12.....	0'120	.....	.....	0'024	0'054	0'250	.....	.....	.....
13.....	.....	0'002	1'385	.....	.....	0'122	.....	.....	0'001
14.....	.....	0'058	0'616	.....	.....	.....	.....	0'020	.....
15.....	0'020	0'142	0'423	.....	.....	.....	0'778	.....	0'187
16.....	.....	0'103	0'055	.....	.....	0'095	0'085	.....	0'116
17.....	.....	0'001	0'001	0'001	0'016	0'101	0'044	.....	0'110
18.....	.....	0'010	.....	.....	0'004	0'984	0'428	.....	.....
19.....	.....	.....	0'012	0'116	0'040	.....	0'720	.....	.....
20.....	.....	0'059	0'023	.....	0'210	.....	0'273	.....	0'008
21.....	.....	.....	.....	.....	.....	0'328	0'035	0'263	0'067
22.....	0'030	.....	.....	.....	0'133	0'150	0'302	0'001	0'001
23.....	0'160	.....	.....	.....	0'410	.....	.....	0'001	.....
24.....	0'370	0'002	0'512	.....	0'955	.....	.....	0'001	.....
25.....	0'260	.....	.....	0'360	0'001	0'001	0'001	.....	.....
26.....	.....	.....	.....	2'347	0'060	0'003	0'502	.....	.....
27.....	0'900	0'001	.....	0'083	.....	.....	0'991	.....	.....
28.....	.....	.....	0'081	0'032	0'004	0'100	2'045	0'040	0'451
29.....	.....	.....	0'040	0'070	0'007	0'324	0'640	.....	0'623
30.....	.....	.....	.....	0'390	.....	0'116	0'184	.....	0'037
31.....	.....	.....	0'483	.....	.....	.....	0'260	.....	0'731
Sum ...	3'740	1'021	5'225	4'398	1'900	5'643	9'547	0'946	2'703
April.									
1.....	.....	.....	0'800	.....	.....	0'005	0'055	.....	0'450
2.....	.....	.....	0'336	.....	0'015	0'112	.....	.....	.....
3.....	.....	.....	.....	6'616	0'001	.....	0'005	.....	.....
4.....	.....	.....	.....	5'827	0'007	.....	.....	.....	.....
5.....	0'210	.....	.....	0'190	0'293	.....	.....	0'001	0'002
6.....	0'090	0'010	.....	.....	.....	0'073	.....	.....	0'101
7.....	.....	.....	.....	.....	.....	0'010	0'700	0'001	0'008
8.....	.....	0'046	.....	0'245	0'020	.....	1'630	.....	.....
9.....	.....	0'193	.....	1'412	.....	.....	.....	0'005	.....
10.....	0'090	.....	.....	0'053	.....	.....	1'650	0'040	.....
11.....	.....	.....	0'004	.....	.....	.....	.....	0'230	.....
12.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13.....	0'960	.....	.....	0'202	0'295	.....	.....	0'138	.....
14.....	0'380	.....	.....	.....	0'295	.....	0'119	.....	0'001
15.....	0'360	.....	.....	.....	.....	.....	0'310	.....	.....
16.....	.....	.....	0'210	.....	0'001	0'004	0'220	.....	.....
17.....	.....	.....	.....	.....	0'110	0'004	0'166	0'002	0'057
18.....	0'880	.....	1'058	.....	.....	0'176	0'020	0'994	0'208
19.....	0'030	.....	0'694	.....	.....	1'067	0'134	0'186	0'027
20.....	0'490	.....	0'010	0'204	.....	0'541	0'001	0'739	.....
21.....	0'590	.....	.....	0'030	.....	0'016	0'004	0'001	.....
22.....	.....	0'086	.....	2'630	0'198	0'009	0'046	.....	.....
23.....	.....	.....	.....	0'023	.....	2'025	.....	.....	0'002
24.....	0'030	.....	.....	1'109	.....	2'218	.....	.....	0'008
25.....	.....	0'008	0'071	0'213	.....	0'040	.....	.....	.....
26.....	.....	0'009	1'702	1'125	.....	.....	.....	.....	0'153
27.....	.....	.....	2'440	0'461	.....	.....	0'001	0'116	.....
28.....	.....	0'045	5'151	0'065	.....	.....	0'933	.....	.....
29.....	0'030	0'033	7'522	2'473	0'160	.....	1'979	0'089	.....
30.....	0'880	0'009	0'025	1'614	.....	.....	2'280	0'092	0'002
Sum....	5'020	0'439	20'023	24'492	1'395	6'300	9'483	2'404	1'019

XVII—continued.
Rainfall at Sydney.

DAY.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.
March.									
1	0'462	.....	.....	0'350	.....	0'002	0'388	0'017	0'911
2	0'013	.....	0'130	0'600	.....	.....	0'025	0'121	1'953
3	.....	.....	.....	1'360	.....	0'143	0'070	0'001	0'001
4	.....	.....	.....	0'200	.....	.....	0'024	0'001	.....
5	.....	.....	.....	0'080	.....	0'028	0'004	0'304	0'003
6	.....	.....	0'010	0'840	0'043	0'105	0'001	0'139	0'995
7	.....	.....	.....	.....	.....	0'074	.....	0'003	0'462
8	.....	.....	.....	0'330	.....	0'001	0'001	.....	.....
9	0'046	.....	.....	0'280	.....	0'002	.....	0'801	0'030
10	.....	.....	.....	3'390	.....	0'820	0'001	0'193	0'004
11	0'005	0'190	.....	0'010	0'333	0'127	0'055	0'004	0'379
12	.....	.....	.....	0'050	0'027	0'540	0'082	0'003	0'192
13	.....	.....	.....	0'620	0'018	0'484	0'026	0'020	0'121
14	.....	0'020	.....	0'090	.....	0'102	0'001	0'099	0'881
15	.....	0'010	.....	0'010	0'011	0'043	0'060	0'010	0'214
16	0'450	0'030	.....	0'010	0'485	0'001	0'723	0'001	0'005
17	.....	.....	0'350	0'400	1'694	0'002	0'007	0'040	.....
18	.....	0'020	0'050	1'130	3'236	0'004	0'023	.....	0'330
19	0'342	.....	4'450	0'700	0'970	0'090	0'002	0'001	0'001
20	2'262	.....	.....	0'160	.....	0'450	0'001	0'355	.....
21	.....	.....	0'010	1'320	.....	.....	.....	.....	.....
22	.....	0'040	0'050	0'840	0'400	.....	.....	0'001	0'001
23	.....	0'280	.....	.....	0'158	0'002	.....	0'001	.....
24	4'026	.....	.....	.....	.....	.....	.....	0'374	.....
25	2'650	0'060	.....	.....	.....	0'040	1'303	.....	0'047
26	0'380	.....	0'090	0'330	.....	0'520	0'001	0'400	0'131
27	.....	.....	.....	.....	.....	.....	0'541	0'105	0'009
28	0'245	0'200	.....	0'400	.....	.....	0'274	0'011	0'004
29	0'235	.....	0'040	0'860	.....	0'185	0'170	0'003	0'026
30	0'055	.....	.....	3'380	.....	2'539	.....	0'001	0'031
31	0'876	.....	.....	0'960	0'003	0'006	0'003	0'068	.....
Sum.....	12'047	0'850	5'180	18'700	7'378	6'270	2'424	4'380	6'731
April.									
1	2'095	.....	0'270	0'150	0'075	.....	0'003	0'180	.....
2	0'830	.....	0'580	0'280	.....	0'001	0'001	.....	0'002
3	0'080	.....	.....	0'010	.....	.....	0'097	0'072	0'002
4	.....	0'010	0'640	.....	0'248	0'001	0'001	0'026	0'001
5	.....	.....	0'330	0'400	0'012	0'001	0'002	.....	.....
6	0'652	.....	.....	0'190	.....	0'001	0'004	.....	.....
7	.....	.....	1'550	0'010	.....	0'001	0'002	0'001	0'070
8	1'430	0'020	0'310	.....	.....	.....	0'002	2'045	0'034
9	0'513	.....	0'020	.....	.....	0'003	0'002	0'990	0'835
10	0'090	.....	0'610	.....	.....	0'001	0'004	0'013	0'021
11	0'100	.....	0'170	.....	.....	0'208	0'115	0'025	.....
12	5'645	.....	.....	.....	1'884	0'003	0'864	0'055	0'022
13	0'583	.....	0'010	.....	0'015	0'003	0'099	0'001	.....
14	0'016	.....	0'610	.....	.....	.....	0'089	0'980	0'125
15	0'132	0'020	0'180	0'580	0'098	0'004	1'070	0'302	0'950
16	.....	.....	0'340	.....	.....	.....	0'014	0'008	.....
17	.....	.....	.....	.....	0'003	.....	.....	0'008	0'370
18	.....	.....	.....	.....	0'003	0'008	0'024	0'004	0'058
19	.....	.....	.....	.....	0'002	0'001	0'235	.....	0'001
20	0'200	0'010	.....	.....	.....	0'002	0'398	0'001	0'042
21	0'107	.....	.....	.....	0'102	0'001	0'402	0'001	0'003
22	0'500	.....	0'060	1'030	0'021	.....	0'003	0'410	0'895
23	0'040	.....	.....	0'250	0'002	.....	0'141	0'640	.....
24	0'435	.....	.....	1'040	0'001	0'001	.....	0'003	.....
25	0'820	.....	.....	0'450	0'001	0'014	.....	0'001	0'204
26	0'780	.....	.....	0'020	0'005	0'110	.....	0'475	.....
27	0'065	.....	0'310	0'930	2'347	0'645	0'003	1'340	0'025
28	0'613	.....	.....	0'180	1'860	1'014	0'001	1'488	0'001
29	0'700	.....	.....	.....	2'964	0'058	.....	0'022	.....
30	0'195	.....	.....	0'010	2'956	.....	0'324	0'014	1'122
Sum...	17'481	0'060	5'990	5'530	12'539	2'081	3'901	9'114	4'781

TABLE
SHEWING the daily

DAY.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.
May.									
1.....	0'080	.....	.....	0'005	.....	0'152	0'093	0'287	0'001
2.....	.....	.....	.....	.....	.....	0'062	0'131	0'035	0'155
3.....	.....	.....	.....	.....	.....	.....	0'004	0'289	0'002
4.....	1'140	.....	.....	0'002	.....	.....	0'003	0'003	0'002
5.....	0'060	.....	.....	.....	.....	.....	0'008	.....	.....
6.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7.....	0'010	.....	.....	0'053	0'880	.....	0'290	.....	.....
8.....	0'870	0'105	.....	.....	0'490	0'026	0'001	0'001	.....
9.....	.....	0'005	0'010	0'008	.....	.....	0'001	.....	.....
10.....	2'980	.....	0'010	.....	.....	.....	0'008	.....	0'050
11.....	0'030	0'470	.....	0'010	.....	.....	.....	.....	0'008
12.....	.....	0'002	.....	0'045	.....	.....	.....	.....	0'210
13.....	.....	0'067	.....	0'377	0'053	.....	.....	.....	0'035
14.....	.....	.....	.....	.....	.....	.....	.....	.....	0'080
15.....	.....	.....	.....	0'066	.....	.....	.....	0'014	0'513
16.....	.....	0'030	.....	0'704	.....	0'002	.....	.....	2'080
17.....	.....	.....	.....	0'071	0'006	.....	.....	.....	.....
18.....	0'060	.....	0'027	.....	.....	0'010	.....	0'057	.....
19.....	.....	.....	.....	0'060	.....	0'040	0'280	0'013	.....
20.....	.....	.....	.....	.....	.....	0'010	0'047	.....	.....
21.....	0'160	0'116	.....	0'170	0'043	0'046	0'375	.....	.....
22.....	.....	.....	.....	.....	.....	.....	0'193	0'008	.....
23.....	.....	.....	0'010	0'001	.....	.....	0'215	0'208	.....
24.....	0'120	.....	0'034	.....	.....	0'054	0'013	0'110	.....
25.....	0'240	.....	.....	.....	.....	.....	0'009	0'013	.....
26.....	6'100	0'004	0'042	.....	.....	.....	.....	0'010	.....
27.....	.....	.....	0'023	.....	.....	.....	.....	0'003	0'053
28.....	.....	0'166	0'020	.....	.....	.....	0'030	.....	.....
29.....	.....	.....	.....	.....	.....	0'001	0'040	.....	0'047
30.....	.....	0'003	.....	.....	.....	.....	0'009	.....	.....
31.....	.....	.....	.....	.....	.....	.....	.....	.....	0'021
Sum...	11'850	0'968	0'176	1'572	1'472	0'403	1'750	1'051	3'257
June.									
1.....	.....	.....	1'427	.....	.....	.....	.....	.....	.....
2.....	.....	.....	0'050	.....	.....	.....	3'720	.....	0'001
3.....	.....	.....	.....	.....	.....	.....	1'060	.....	.....
4.....	.....	1'495	0'006	.....	.....	1'321	0'030	.....	.....
5.....	0'080	0'081	0'003	0'388	0'002	0'241	.....	.....	.....
6.....	0'030	0'343	0'287	0'078	.....	0'011	.....	.....	.....
7.....	.....	.....	0'525	0'013	.....	0'473	.....	.....	.....
8.....	.....	0'030	0'292	0'137	.....	0'749	.....	0'614	.....
9.....	.....	.....	.....	0'012	.....	0'030	0'400	1'168	.....
10.....	.....	0'010	.....	0'010	.....	0'707	2'510	0'777	0'325
11.....	.....	.....	.....	.....	.....	0'590	3'930	0'070	0'848
12.....	.....	.....	.....	.....	.....	0'107	0'405	0'458	0'014
13.....	0'380	.....	0'010	.....	.....	0'420	0'080	1'353	0'465
14.....	0'100	.....	0'004	.....	0'008	.....	0'237	0'619	0'427
15.....	0'930	.....	0'160	.....	0'398	0'014	1'170	0'131	3'010
16.....	0'480	.....	0'031	.....	0'231	.....	0'268	0'093	0'005
17.....	0'640	0'140	.....	0'004	0'785	.....	0'273	.....	0'183
18.....	0'080	0'733	.....	.....	0'045	0'008	.....	0'002	.....
19.....	.....	0'466	0'005	0'163	.....	0'173	.....	0'002	1'338
20.....	0'080	0'050	.....	.....	.....	0'276	0'590	.....	1'000
21.....	.....	0'014	.....	0'105	.....	0'250	0'710	0'007	0'245
22.....	0'170	0'140	.....	.....	.....	.....	.....	.....	0'120
23.....	0'220	.....	.....	.....	1'292	.....	.....	0'005	0'439
24.....	.....	.....	.....	.....	0'370	0'002	.....	.....	0'080
25.....	.....	.....	.....	0'007	0'075	.....	.....	.....	0'242
26.....	.....	.....	.....	0'009	.....	0'066	.....	.....	0'152
27.....	.....	0'825	.....	.....	0'096	.....	.....	.....	.....
28.....	0'240	.....	.....	.....	.....	0'210	.....	.....	.....
29.....	1'250	.....	0'005	.....	.....	0'200	.....	.....	.....
30.....	1'260	.....	.....	0'010	0'020	.....	0'643	.....	.....
Sum...	5'940	4'327	2'805	1'836	3'322	5'848	16'020	5'299	8'894

XVII—continued.
Rainfall at Sydney.

DAY.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.
May.									
1	0'670	.....	0'110	.....	1'380	0'001	.....	0'026	1'040
2	0'230	0'540	.....	0'010	0'105	0'001	0'002	0'188	0'130
3	0'010	.....	.....	0'020	.....	0'175	0'001	1'348	3'140
4	.....	0'100	0'060	0'050	0'004	0'368	0'001	3'920	1'439
5	0'001	.....	0'160	0'230	0'001	.....	.....	.....	.....
6	0'913	.....	0'820	0'450	0'004	0'001	.....	.....	.....
7	0'395	.....	2'240	0'030	0'003	0'139	.....	0'121	0'060
8	0'045	.....	4'370	.....	0'053	0'017	.....	.....	.....
9	.....	0'001	1'890	0'080	0'700	.....	.....	0'001	0'040
10	.....	.....	0'830	0'500	0'656	0'003	0'003	0'012	.....
11	0'095	.....	.....	0'140	0'012	0'155	0'002	0'180	.....
12	0'070	.....	.....	1'430	.....	0'008	0'002	0'180	.....
13	.....	0'010	.....	4'030	.....	.....	0'001	.....	0'065
14	.....	0'440	.....	.....	0'002	.....	0'003	.....	.....
15	0'020	0'530	.....	.....	0'002	0'002	0'001	.....	.....
16	.....	.....	.....	.....	0'081	.....	0'002	.....	.....
17	0'080	.....	.....	0'010	0'030	0'078	.....	.....	.....
18	0'020	0'010	1'550	.....	0'002	0'079	0'001	.....	.....
19	.....	.....	0'210	0'090	0'942	.....	0'001	0'001	0'000
20	.....	0'020	.....	0'500	0'401	.....	0'046	0'305	0'001
21	.....	.....	.....	0'180	0'260	.....	0'077	.....	0'120
22	0'305	.....	.....	0'050	1'706	.....	0'003	.....	0'002
23	0'360	.....	.....	0'020	0'010	0'001	0'080	.....	0'001
24	0'001	.....	.....	.....	0'043	.....	0'001	.....	.....
25	.....	.....	.....	2'440	1'377	0'744	0'003	0'274	.....
26	.....	0'780	.....	.....	1'250	0'017	0'084	1'336	0'002
27	.....	.....	.....	.....	0'395	0'003	0'022	0'471	0'347
28	.....	.....	.....	0'040	0'602	0'104	0'535	0'339	1'300
29	.....	.....	.....	0'050	.....	.....	0'088	0'093	3'895
30	0'190	1'610	.....	0'080	0'002	0'007	0'002	.....	0'950
31	0'410	0'980	.....	.....	0'010	0'006	0'066	0'008	0'068
Sum ...	3'815	5'030	12'420	10'470	10'113	1'909	1'025	8'623	12'549
June.									
1	0'030	0'030	0'030	0'010	.....	0'006	0'011	0'968	0'004
2	0'010	.....	0'040	0'160	0'002	0'004	0'002	.....	0'001
3	.....	.....	.....	0'770	0'005	0'001	0'004	0'009	0'181
4	0'020	.....	.....	.....	0'006	0'075	0'001	0'005	0'005
5	.....	.....	.....	.....	0'002	.....	3'934	0'010	0'446
6	.....	1'090	.....	.....	0'866	.....	1'003	0'007	2'395
7	0'010	.....	.....	.....	0'340	.....	0'042	0'002	1'765
8	.....	.....	.....	.....	0'030	0'893	0'001	.....	.....
9	0'180	.....	.....	.....	.....	0'004	0'001	.....	.....
10	.....	.....	0'180	.....	.....	0'031	0'360	1'510	.....
11	.....	.....	.....	.....	.....	0'258	0'145	1'995	.....
12	0'240	0'010	.....	.....	.....	0'005	0'972	1'132	.....
13	.....	.....	0'360	.....	0'004	0'002	0'120	0'085	.....
14	.....	0'040	0'280	.....	.....	.....	0'001	.....	.....
15	.....	0'030	.....	.....	.....	0'001	.....	.....	.....
16	.....	0'900	0'070	0'200	0'002	.....	1'650	.....	.....
17	.....	0'560	0'070	0'140	0'003	.....	0'339	.....	0'011
18	0'140	0'370	0'100	0'100	0'806	0'007	0'021	0'001	0'056
19	1'040	0'050	0'070	0'110	0'001	0'020	0'021	0'001	.....
20	4'120	.....	0'220	.....	0'001	.....	0'080	0'011	.....
21	2'180	.....	.....	.....	0'002	.....	.....	0'005	.....
22	3'330	.....	.....	.....	0'990	.....	.....	.....	0'001
23	1'340	.....	.....	0'100	1'187	.....	0'001	.....	0'001
24	.....	.....	.....	.....	0'326	.....	.....	.....	.....
25	.....	.....	.....	0'010	0'001	0'023	0'001	0'290	0'005
26	.....	.....	.....	.....	.....	.....	.....	0'725	.....
27	.....	.....	.....	.....	.....	.....	1'040	2'005	0'971
28	.....	.....	.....	.....	.....	0'024	0'238	0'505	1'903
29	.....	.....	.....	.....	0'001	.....	.....	.....	0'073
30	.....	.....	.....	.....	.....	0'001	0'010	.....	.....
Sum ...	12'640	3'080	1'420	1'500	4'575	1'355	10'518	9'266	7'818

TABLE
SHEWING the daily

DAY.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.
July.									
1.....			0'012				0'752		0'070
2.....			0'011	0'017			1'260		0'010
3.....		0'049					0'015		
4.....			0'368				0'009		0'001
5.....								0'001	
6.....					0'028			0'199	
7.....			0'025			0'019		0'080	
8.....			0'233	0'030				0'008	0'080
9.....			0'003	0'036	0'026		0'005	0'009	0'040
10.....				0'026				0'158	0'027
11.....			0'048				0'272	0'232	3'005
12.....							1'228	0'015	0'290
13.....					0'055		1'921		0'258
14.....						0'146	1'910		0'025
15.....									0'017
16.....									
17.....									
18.....						0'068			0'045
19.....			0'066	0'043		0'278		0'085	0'553
20.....		0'237	0'047	0'054		0'135			
21.....		3'703	0'755			0'006		0'485	
22.....	0'001	0'629	2'660					0'600	
23.....			2'690			0'717			
24.....			1'313	0'337	0'010				0'002
25.....			1'311	1'177		0'037			
26.....			0'883	2'477					
27.....	0'045		1'010	0'102				0'019	
28.....			0'446	0'470				0'001	
29.....	0'006		0'188	0'005					
30.....	0'009	0'015	0'070						
31.....		0'061	0'003				0'010		
Sum...	0'061	4'694	11'952	4'774	0'119	1'406	7'382	1'891	4'423
August.									
1.....			0'888			0'002	0'022		
2.....		0'022	5'325		0'110				
3.....		0'009	0'105		0'683			1'001	
4.....			0'047		0'840			1'006	
5.....	0'430		0'495	0'052			0'016	0'140	
6.....	0'051	0'010	0'700	0'060	0'011		0'265	0'175	0'080
7.....	0'083	0'007	0'300	3'246	0'012		0'160	0'036	0'130
8.....		0'027	0'004	1'594			0'683	0'718	
9.....			0'500	1'277			0'146	0'146	
10.....	0'064	0'066	0'192	1'001		0'290	0'762	0'728	
11.....	0'093	0'087	0'157	0'004		1'339	0'465	0'037	
12.....		0'004	0'115	0'012	0'015	1'687	0'004	0'001	
13.....			0'083			1'396	0'060		
14.....		0'015				0'891	0'156		
15.....	0'066			0'507	0'163	0'480			
16.....				0'008		0'001	0'060		0'056
17.....					0'010	0'280			
18.....				0'310		0'010			0'170
19.....				0'018					0'394
20.....							0'200		0'001
21.....				0'082					0'001
22.....									
23.....			0'082	0'040		0'007	0'023		
24.....		0'040	0'160	0'157	0'004				
25.....	0'001			0'080		0'001			
26.....						0'001			
27.....				0'109					
28.....				0'072				0'001	0'001
29.....			0'320	0'088					0'015
30.....			0'011			0'001			0'048
31.....									0'170
Sum...	0'788	0'287	9'484	7'717	1'948	6'386	3'022	2'989	1'066

XVII—continued.

Rainfall at Sydney.

DAY.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.
July.									
1		0'010							0'015
2								0'004	0'909
3							0'003		0'193
4		0'020					0'003	1'304	0'021
5					0'002	0'001	0'002	1'502	
6		0'010				0'129	0'005		
7						0'062		0'027	
8	0'020				0'001	0'006		0'001	
9			0'400		0'001	0'006			0'115
10					0'003	0'008			0'001
11		0'160			0'003	0'030	0'003		
12	0'050	0'140			0'001				
13		0'020		0'020	0'005			0'002	
14					0'001			0'683	0'001
15				0'240				0'225	0'025
16				0'410			0'015		
17			0'030	0'430		0'115		0'003	0'001
18		0'160	0'010	0'020					
19		0'450	1'290			0'002	0'049	0'002	0'001
20		0'410	0'890			0'088	1'570	0'072	
21		2'390	0'280				1'873	0'515	0'040
22			0'030	0'220	0'002	0'488	0'420	0'040	0'048
23				0'650	0'054		1'317	0'001	0'006
24	0'010			0'070	0'219	0'001	1'085	0'004	0'015
25		0'400	0'100	0'280			2'267		0'001
26		0'200		0'050			2'111	0'010	0'030
27		0'030					0'056		0'070
28	0'027			0'010				0'069	0'105
29	1'770		0'160						0'014
30	0'670	0'170			0'003		0'090	0'016	
31	0'080	0'140			0'003		0'010	1'775	
Sum...	2'620	4'810	3'280	2'400	0'298	0'976	10'879	6'255	1'611
August.									
1					0'001		0'002	0'435	0'001
2		0'080		0'130	0'003	0'045		0'002	
3			0'130	1'370	0'001	0'001	0'105		0'001
4	0'110				0'001		0'001		0'112
5				0'020		0'001	0'002	0'015	
6		0'060				0'001	0'001		
7					0'007		0'520	0'003	
8	0'030				0'013			0'460	0'110
9	0'270				0'360	0'022		0'169	0'211
10		0'050				0'092	0'340	0'001	
11						0'075	0'001	0'036	
12	0'010	0'010			0'002	0'549		0'057	
13							0'019		
14						0'001	0'001		
15						0'001	0'001	0'002	
16						0'031			
17		0'310			0'003	0'927	0'214		
18	0'020				0'070	0'002		0'030	
19		0'810				0'003	0'001		0'001
20		0'950				0'523			
21	0'520						0'100	0'001	
22				0'020		0'248	0'003	0'001	
23	0'020		0'350		0'003	0'009	1'020		
24				0'020			0'604	0'123	
25				0'020		0'001			
26									0'081
27		0'080	0'190	0'500			0'004		
28				0'110		0'188			0'002
29					0'003	0'023		0'020	0'001
30				0'630		0'034			
31		0'250				0'195	0'040		
Sum...	0'980	2'600	0'670	2'820	0'467	2'972	2'979	1'355	0'520

TABLE
SHewing the Daily

DAY.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.
September.									
1							0'154		0'058
2		0'049	0'056				0'103		0'002
3		2'050	0'420				0'820		
4	0'968	3'620	0'495	0'009	0'002	0'011	0'002		
5		1'796	0'108	0'032					
6	0'264	0'532			0'060	1'440			
7	0'082	0'030	0'020		0'199	0'702			
8					0'002		0'083		
9		0'006	0'035	0'001		0'030		0'109	
10							0'110	0'022	
11	0'003	0'200	0'290	0'122			0'027	0'526	
12		0'465	0'537	0'036		0'089		0'001	
13		1'057		0'012	0'240				
14		0'045					0'195		
15		0'042							
16		0'055							
17			0'045						
18			0'001				0'006	0'020	
19		0'001						0'322	
20					0'004			0'122	
21			0'040						
22		0'036	0'070				0'025		
23			0'012			0'087			0'020
24	0'103		0'107	1'505				0'003	
25			0'030	0'056					0'050
26			0'242				0'068		
27		0'011	0'034		0'120	0'067			
28						0'017			
29		0'010					0'006		
30	0'003						2'020		0'010
Sum ...	1'423	12'896	2'548	1'773	0'627	3'266	3 160	1'125	0'140
October.									
1			0'030				0'057		
2			0'020		0'055	0'034	0'330		
3	0'325				0'120	0'124	0'056	0'415	
4	0'665		0'300		0'225	0'104	0'014		
5	0'734		0'447			0'040			0'155
6	0'514		0'140						0'195
7	0'070	0'080		0'165					0'150
8	0'001	0'017				0'224			
9			0'010			0'346			0'007
10	0'070				0'003				
11	0'348						0'004	0'311	
12	0'276					0'044		0'013	
13	0'014			1'595		0'363		0'094	
14	0'005			0'090		0'002			0'203
15	0'001						0'313		
16			0'043			0'378	0'003		
17		0'148				0'002			
18				0'010	0'018	0'983			
19		0'013	1'065		0'001			0'020	
20	0'248		0'131		0'211		0'027	0'020	0'111
21			0'595		0'003		0'201		0'342
22	0'187	0'012	0'001				0'386		
23				0'013		0'126	0'284		0'094
24			0'070	0'753		0'252	0'465		
25			0'084						
26				0'001		0'050	0'036		
27			0'001			0'410	0'389		0'135
28	0'080	0'027			0'025				
29	0'093		0'813	0'078			0'845	0'042	
30			0'080				0'136		
31	0'090		0'245	0'006					
Sum ...	3'721	0'297	4'075	2'711	0'718	3'482	3'489	0'915	1'390

XVII—continued.
Rainfall at Sydney.

DAY.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.
September.									
1	.....	.....	.....	0'110	.....	0'004	0'190	.....	0'109
2	.....	.....	.....	0'040	.....	.....	.....	.....	.....
3	0'090	.....	.....	.....	.....	0'002	0'027	.....	.....
4	0'010	0'020	.....	.....	.....	0'003	0'465	.....	0'010
5	0'020	0'010	.....	.....	.....	.....	.....	0'010	.....
6	.....	.....	0'050	.....	0'002	.....	0'075	0'106	.....
7	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	0'850	0'090	.....	0'070	.....	0'001	0'001	.....	0'001
9	0'050	.....	0'180	0'020	.....	0'004	0'002	.....	.....
10	0'060	.....	0'190	.....	.....	0'002	0'778	0'189	.....
11	0'040	.....	0'120	0'010	.....	.....	0'003	0'969	.....
12	.....	.....	0'120	.....	0'003	.....	0'001	0'309	0'005
13	0'040	0'030	.....	.....	.....	0'069	0'032	0'001	0'002
14	.....	0'910	0'010	.....	.....	0'540	.....	0'060	0'724
15	.....	0'310	.....	.....	0'004	0'001	.....	0'155	0'547
16	.....	.....	.....	.....	.....	.....	.....	.....	0'010
17	.....	.....	0'900	0'010	0'056	.....	.....	0'020	.....
18	.....	0'160	.....	0'040	0'004	0'003	.....	0'044	.....
19	.....	0'160	.....	.....	.....	0'003	0'001	.....	.....
20	0'050	0'020	.....	0'190	.....	.....	.....	.....	0'001
21	0'250	0'280	.....	0'400	0'001	0'005	.....	0'044	.....
22	0'100	.....	.....	.....	0'005	.....	0'001	.....	0'210
23	.....	.....	.....	.....	0'447	0'044	0'001	.....	0'010
24	1'530	.....	0'020	0'100	0'035	0'894	.....	.....	.....
25	0'230	0'010	.....	0'060	0'010	0'544	0'001	.....	.....
26	.....	0'010	.....	.....	0'003	.....	.....	.....	0'024
27	.....	.....	.....	.....	0'002	0'055	.....	0'045	0'047
28	0'030	.....	0'040	.....	.....	0'002	0'001	0'147	.....
29	.....	.....	.....	.....	.....	0'036	0'015	0'001	.....
30	.....	.....	.....	.....	.....	0'070	.....	.....	.....
Sum...	3'350	2'010	1'630	1'050	0'572	2'282	1'594	2'100	1'700
October.									
1	.....	.....	.....	.....	0'020	0'095	0'002	0'495	.....
2	.....	.....	0'080	.....	0'555	0'001	0'004	0'255	.....
3	.....	.....	0'020	0'004	0'021	.....	0'012	0'001	0'001
4	.....	.....	0'200	.....	.....	2'588	0'001	0'005	.....
5	.....	.....	0'010	.....	0'136	1'133	.....	0'120	.....
6	.....	.....	0'320	.....	0'013	0'064	0'205	0'025	0'125
7	.....	.....	.....	.....	0'100	.....	0'292	0'001	0'029
8	.....	.....	.....	0'009	0'922	0'001	0'040	.....	.....
9	.....	.....	.....	0'468	0'394	0'155	0'010	.....	0'001
10	0'080	.....	0'010	0'063	0'015	0'250	0'279	.....	0'404
11	.....	.....	0'040	0'304	0'002	0'003	0'001	.....	0'089
12	.....	0'090	0'050	0'136	.....	0'307	0'665	.....	.....
13	.....	0'160	0'100	0'702	.....	0'003	0'002	.....	.....
14	.....	.....	.....	1'350	0'002	0'416	0'169	0'001	0'013
15	0'020	.....	.....	0'057	.....	.....	0'001	0'001	.....
16	.....	.....	.....	.....	0'002	.....	.....	0'028	.....
17	.....	1'060	0'190	.....	0'401	0'496	0'001	.....	.....
18	.....	.....	0'060	0'165	.....	0'073	.....	.....	.....
19	.....	.....	0'030	0'087	.....	.....	.....	.....	.....
20	.....	.....	0'020	0'103	.....	0'001	0'010	.....	.....
21	.....	.....	.....	0'034	0'014	0'001	.....	1'142	0'160
22	.....	.....	.....	.....	0'002	.....	0'001	0'003	0'198
23	0'090	.....	.....	0'001	.....	.....	0'310	0'001	0'002
24	.....	.....	0'020	0'155	0'190	.....	.....	0'114	0'010
25	.....	.....	.....	.....	0'007	.....	.....	0'474	.....
26	.....	0'040	.....	0'044	0'248	0'001	.....	0'665	.....
27	.....	0'050	.....	0'013	0'154	.....	0'090	0'542	.....
28	.....	.....	0'010	0'305	0'140	.....	0'001	0'002	.....
29	0'020	.....	0'220	0'018	0'105	.....	0'001	0'001	0'023
30	.....	.....	.....	0'110	0'023	0'121	0'001	.....	.....
31	.....	0'060	0'200	0'090	0'002	0'061	0'037	.....	.....
Sum...	0'210	1'460	1'760	4'188	3'468	5'770	2'135	3'876	1'055

TABLE
SHOWING the daily

DAY.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.
November.									
1	.....	0'052	0'047	.....	.....	.....	.....	.....	.....
2	.....	0'497	.....	.....	.....	.....	.....	0'200	.....
3	.....	.....	.....	0'032	.....	.....	.....	2'010	.....
4	.....	.....	.....	0'540	.....	.....	0'691	1'643	0'030
5	.....	.....	0'012	.....	0'098	0'035	.....	.....	.....
6	.....	0'070	0'210	.....	.....	0'110	.....	0'885	.....
7	0'015	.....	0'448	0'001	.....	.....	.....	.....	0'016
8	1'177	.....	0'123	0'084	.....	.....	.....	.....	0'267
9	.....	.....	.....	.....	.....	0'153	.....	.....	0'007
10	0'072	.....	.....	.....	.....	0'263	.....	.....	.....
11	0'021	.....	0'200	.....	0'002	0'052	.....	.....	1'413
12	.....	.....	.....	0'383	0'162	.....	0'002	0'003	0'464
13	0'060	0'052	0'030	0'090	.....	.....	.....	0'140	.....
14	0'544	0'003	.....	.....	.....	.....	.....	.....	.....
15	0'091	0'050	0'017	.....	0'230	.....	0'175	.....	.....
16	.....	.....	0'885	.....	0'049	.....	.....	.....	.....
17	.....	0'032	1'613	.....	0'008	.....	0'090	.....	.....
18	.....	.....	0'765	0'045	.....	.....	0'144	.....	.....
19	.....	.....	1'106	.....	.....	.....	.....	0'024	.....
20	.....	.....	.....	.....	0'142	.....	.....	.....	.....
21	.....	0'002	1'003	.....	0'020	.....	.....	.....	.....
22	.....	.....	.....	0'317	.....	.....	.....	.....	0'050
23	.....	.....	.....	0'070	.....	.....	0'057	0'002	0'040
24	.....	.....	0'030	.....	.....	.....	.....	0'003	0'885
25	0'018	.....	0'650	.....	.....	.....	.....	0'541	0'057
26	0'012	.....	.....	.....	.....	.....	0'072	3'950	.....
27	.....	.....	0'040	.....	.....	0'066	0'023	0'449	0'212
28	0'106	.....	.....	.....	.....	.....	.....	0'001	0'001
29	0'163	0'330	0'110	0'050	.....	.....	.....	.....	.....
30	0'205	0'225	.....	0'007	0'320	.....	.....	0'026	0'163
Sum	2'484	1'313	7'289	1'619	1'031	0'679	1'254	9'877	3'605
December.									
1	0'091	0'065	.....	.....	.....	.....	.....	0'193	0'020
2	0'204	.....	0'220	0'104	.....	.....	.....	0'048	1'000
3	.....	.....	.....	0'047	.....	.....	0'045	.....	.....
4	.....	.....	.....	0'137	.....	0'017	0'207	0'073	0'180
5	0'105	.....	0'050	.....	.....	0'047	0'026	.....	0'117
6	0'124	0'012	.....	.....	.....	.....	.....	.....	0'016
7	0'015	0'001	.....	.....	.....	0'018	.....	0'001	.....
8	0'010	0'053	.....	.....	.....	.....	.....	.....	.....
9	0'646	.....	.....	.....	0'126	0'070	0'762	.....	.....
10	0'095	.....	0'012	.....	.....	.....	0'363	.....	.....
11	.....	0'045	.....	.....	.....	0'330	.....	0'094	0'260
12	.....	.....	0'287	.....	.....	.....	.....	.....	.....
13	0'433	.....	0'050	0'087	.....	.....	.....	.....	.....
14	0'020	0'001	0'001	.....	0'010	0'182	0'370	.....	.....
15	0'002	.....	.....	0'055	1'902	.....	.....	.....	.....
16	.....	.....	0'067	0'020	0'010	.....	.....	0'204	.....
17	.....	.....	.....	.....	.....	.....	.....	0'087	0'020
18	0'001	0'045	0'241	.....	.....	.....	0'130	0'057	0'490
19	0'036	0'034	0'001	.....	.....	0'001	0'377	.....	0'146
20	.....	.....	.....	.....	.....	0'106	0'429	.....	.....
21	.....	.....	0'170	.....	.....	0'060	.....	.....	.....
22	.....	0'296	0'416	.....	0'070	.....	.....	.....	0'012
23	.....	0'072	.....	0'020	.....	.....	.....	.....	.....
24	.....	.....	.....	0'026	.....	.....	.....	.....	.....
25	.....	0'108	.....	0'075	.....	.....	0'521	0'013	.....
26	.....	0'469	0'036	.....	0'160	0'079	0'033	.....	.....
27	0'010	.....	0'060	.....	0'715	.....	.....	.....	.....
28	0'020	2'273	0'007	.....	.....	.....	.....	.....	.....
29	0'286	0'109	0'093	.....	.....	.....	.....	.....	.....
30	.....	0'037	0'040	.....	.....	.....	0'160	.....	.....
31	.....	.....	.....	0'035	.....	0'003	.....	.....	.....
Sum	2'099	3'620	1'751	0'606	2'993	0'913	3'323	0'772	2'261

XVII—continued.
Rainfall at Sydney.

DAY.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.
November.									
1	0'240	.....	.....	0'001	0'019	.....	0'030
2	0'020	.....	.....	.....	.....	.....	.....
3	0'140	0'140	.....	0'015	0'066	0'010	.....	.....
4	0'140	0'125	.....	.....	0'001	.....	.....
5	0'200	0'050	.....	0'164	0'001	.....	.....	.....
6	0'050	0'870	.....	0'108	.....	0'305	.....	0'005
7	0'500	.....	0'140	0'395	.....	0'049
8	0'166	.....	0'002	0'092	.....	.....
9	0'300	.....	.....	0'001	.....	0'010	.....	.....
10	0'040	.....	0'025	0'036	.....	0'340	.....	0'014
11	0'001	0'790	3'040	0'051	.....
12	0'010	0'350	.....	.....	.....	.....	2'931	0'005	.....
13	0'060	0'510	0'270	.....	0'200	0'001	.....	.....
14	0'330	0'030	0'047	.....	0'210	.....	.....	0'272
15	0'380	.....	0'075	.....	0'001	0'024	0'245	.....
16	0'040	.....	0'055	0'376	0'001	0'721	.....	.....
17	0'190	.....	.....	0'450	0'493	.....	0'002	0'832	0'322
18	0'070	.....	0'380	.....	.....	0'010	.....	.....
19	0'100	0'450	.....	0'002	.....	.....	.....
20	2'007	.....	0'002	0'234	.....	.....
21	0'430	1'580	0'074	.....	0'089	0'41	.....	0'002
22	0'010	1'140	0'223	0'071	0'225	0'319	.....	.....
23	0'020	0'010	.....	0'381	0'497	0'600	.....	0'027
24	0'410	0'305	0'480	.....	.....	0'003	.....
25	0'140	.....	.....	.....	.....	1'715	.....
26	0'002	0'045	.....
27	0'168	.....	.....	.....	.....	.....
28	0'170	0'001	1'058	.....	0'434	.....
29	0'003	0'003	0'005	0'340	.....	0'090
30	0'190	.....	.....	.....	0'010	.....	0'070
Sum	0'200	2'420	5'570	5'493	2'130	3'290	9'447	3'330	0'881
December.									
1	0'100	.....	.....	.....	.....	.....	0'585	.....	0'199
2	0'050	0'280	.....	.....	0'069	0'453	.....	.....
3	0'020	.....	.....	.....	0'007	.....
4	0'004	0'641	0'016	0'017	.....
5	0'170	.....	.....	.....	0'616	0'035	.....	.....
6	0'010	.....	.....	.....	.....	0'359	0'036	.....	.....
7	0'002	0'107	.....	0'013
8	0'080	.....	.....	0'086	0'001	0'110	0'290	.....	.....
9	0'390	0'140	0'307	0'003	0'001	.....	0'140
10	0'280	0'131	0'075	0'275	.....	.....	.....
11	0'100	.....	0'067	0'071	.....	0'544	.....
12	0'480	.....	.....	.....	0'065	.....	.....	.....	.....
13	0'004	.....	.....	.....
14	0'110	.....	.....	0'100	.....	0'120	0'001	.....	.....
15
16	0'090	.....	0'010	.....	0'860	0'001	.....	.....
17	0'140	0'070	.....	0'005	.....	.....	.....	0'010
18	0'030	.....	.....	0'020	.....	0'220	.....	.....
19	0'002	0'017	0'001	.....
20	0'020	0'074	.....	.....	0'056	.....	.....
21	0'430	.....	.....	.....	.....	0'205
22	0'010	0'712	.....	.....	.....	0'001	.....
23	0'560	1'007	.....	.....	.....	.....	.....
24	1'174	.....	.....	.....	.....	0'203
25	0'020	.....	2'590	0'010	.....	0'002	.....	0'010
26	0'210	0'060	0'060	0'003	.....	.....	.....	.....
27	0'010	.....	.....	.....	0'002	.....	.....	.....	0'140
28	0'060	.....	0'050	0'055	0'001	.....	0'001	.....	.....
29	0'070	0'241	.....	.....	2'604	.....	.....
30	0'110	0'094	0'005	.....	0'387	0'382	0'947
31	0'241	.....	0'880	.....	.....	.....	.....	.....
Sum	0'850	0'920	2'030	7'804	0'565	3'523	4'425	0'952	1'867

TABLE XVIII.
 AMOUNT OF Evaporation in each Month at Sydney, 1859 to 1875.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.	Year.
1859	.....*	.....*	.....*	.....*	.....*	2'640	1'941	2'236	3'072	7'482	7'846	7'592	32'719	1859
1860	7'941	4'393	3'090	2'667	1'907	1'290	1'065	1'725	2'197	4'124	4'817	5'947	41'183	1860
1861	6'470	4'300	3'290	1'886	2'020	1'270	1'790	1'550	3'310	6'540	8'000	9'100	49'520	1861
1862	8'800	6'680	6'700	5'320	1'680	3'260	4'860	4'860	7'110	7'510	9'150	7'860	76'820	1862
1863	6'247	5'197	3'938	3'088	2'686	1'642	1'880	3'902	4'688	6'545	9'540	9'466	58'819	1863
1864	6'872	5'686	3'351	1'579	2'042	1'239	2'103	4'315	3'800	6'368	5'966	7'243	50'564	1864
1865	5'195	5'294	5'126	3'473	2'777	1'986	1'495	2'898	4'922	6'157	5'678	7'655	52'656	1865
1866	6'640	4'524	4'633	2'270	1'525	1'172	1'181	1'884	4'554	5'548	5'766	6'497	46'266	1866
1867	7'546	4'109	4'163	1'930	1'375	0'746	2'951	1'400	3'281	6'717	7'210	7'921	48'449	1867
1868	5'261	3'339	4'845	2'740	1'016	0'799	1'342	1'631	3'070	5'266	4'774	6'105	40'188	1868
1869	5'957	4'273	4'027	2'377	1'530	1'211	1'031	1'967	3'309	4'010	5'680	5'468	40'840	1869
1870	5'775	5'675	3'145	1'686	1'090	1'407	1'105	1'761	2'809	3'405	4'844	5'036	38'338	1870
1871	4'976	3'388	4'339	2'215	1'304	1'511	2'191	2'559	3'615	4'189	5'044	6'158	40'589	1871
1872	5'545	4'238	3'873	3'145	1'959	1'672	2'052	2'234	2'990	4'665	5'237	5'499	43'109	1872
1873	6'005	5'280	4'535	3'182	2'042	1'376	1'956	2'887	4'611	5'403	5'326	6'928	49'531	1873
1874	5'344	4'654	4'205	2'346	2'467	1'672	1'582	3'633	4'523	5'574	7'541	9'571	53'112	1874
1875	8'622	3'988	4'087	3'074	1'999	1'219	1'583	3'839	4'963	6'489	8'981	10'704	59'628	1875
Sums	102'302	75'018	67'347	42'978	29'419	26'112	31'238	45'281	66'844	95'992	111'400	125'330	822'271	Sums.
Means	6'394	4'689	4'209	2'686	1'839	1'536	1'838	2'664	3'932	5'647	6'553	7'372	48'369	Means.

* Observations not taken until June, 1859. The average of three years comparison between the glass evaporator and one of 4 feet diameter sunk in the ground, given 34 per cent. as the excess of evaporation in the glass vessel; or, in other words, the average evaporation from a tank in the ground at Sydney is 31·94 inches.

TABLE XIX.
Amount of Ozone in each Month at Sydney, 1859 to 1875.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Means.
1859	.....*	.....*	.....*	7.2	6.2	6.8	6.0	6.4	7.9	6.4	6.6	7.0	6.72
1860	6.0	7.1	8.2	7.4	5.3	6.5	7.8	5.8	6.4	5.3	4.3	3.7	6.15
1861	4.1	6.6	6.4	6.5	5.3	4.8	...†	.....†	.....†	4.6	4.3	4.2	5.20
1862	4.7	4.9	4.0	3.7	3.3	4.5	2.9	4.5	3.4	3.8	5.4	5.7	4.23
1863	5.5	4.2	5.5	5.5	4.2	6.3	2.6	3.1	2.9	4.1	2.3	1.8	4.00
1864	3.9	4.2	4.9	4.0	4.9	4.9	5.4	4.4	5.3	6.4	4.7	5.0	4.53
1865	1.7	1.5	2.1	2.7	1.9	10.0	5.2	5.8	5.8	6.3	6.1	4.9	4.80
1866	5.4	5.0	5.4	5.2	5.1	5.6	5.5	5.0	4.9	5.4	5.6	4.1	5.18
1867	3.6	3.5	4.5	4.7	5.0	5.4	4.5	4.6	5.3	4.5	4.7	4.4	4.56
1868	5.2	5.1	4.4	3.9	4.4	5.0	5.2	5.4	6.2	6.5	6.6	5.0	5.24
1869	4.5	4.4	3.9	6.0	4.9	5.3	5.3	3.7	4.1	3.8	3.7	3.9	4.46
1870	3.4	4.1	5.2	4.6	4.5	3.7	4.1	4.1	4.3	4.7	4.3	4.4	4.28
1871	3.8	3.8	4.0	4.2	4.5	4.5	3.9	4.1	4.5	4.5	4.3	4.2	4.19
1872	3.7	3.8	3.9	4.1	4.3	4.3	5.0	5.2	6.2	5.9	6.2	5.1	4.81
1873	4.7	3.9	5.0	5.7	5.7	6.8	6.9	6.4	6.3	6.0	6.2	5.4	5.77
1874	5.7	5.9	5.5	5.9	6.0	6.0	6.5	5.8	6.2	6.8	6.3	5.3	5.99
1875	5.9	5.3	5.5	5.4	5.2	4.9	5.7	5.6	5.9	6.0	5.6	5.3	5.53
Sums..	71.8	73.3	78.4	86.7	80.7	95.3	82.5	79.9	85.6	91.0	87.2	79.4	85.64
Means..	4.5	4.6	4.9	5.1	4.7	5.6	5.2	5.0	5.4	5.4	5.1	4.7	5.04

* Observations were not taken until April, 1859.

† Ozono papers exhausted—fresh supply not received.

TABLE XX.

SHOWING the decrease of Rain from the Coast Inland.

Stations.	No. of Years of Observation.	Distance from East Coast in miles.	Rainfall inches. (average.)	Remarks.
Port Macquarie	11	.....	63.314	
South Reef	2	.....	58.872	
South Head	18	.....	48.286	
Wollongong	2	.....	38.325	
Cape St. George	9	.....	56.247	
Eden	7	.....	45.056	
Newcastle	14	1	49.994	
Terara	3	4	54.450	
Sydney	20	5	50.906	
Cordeaux River	5	6	62.050	
Lambton	5	7	53.102	
Wilton	4	13	37.043	
Liverpool	6	16	42.743	
Parramatta	9	16	39.308	
West Maitland	7	18	34.780	
Grafton	5	22	38.132	
Casino	5	27	42.006	
Dalwood	10	27	32.569	
Windsor	14	27	34.319	
Moss Vale	4	31	40.080	
Kurrajong	8	36	56.811	Mountain Station.
Woodford	3	50	53.563	do.
Cooma	11	52	18.417	
Goulburn	12	54	26.296	
Lake George	1	58	27.190	do.
Queanbeyan	5	60	23.744	
Mount Victoria	3	61	34.840	do.
Muswellbrook	2	68	21.661	
Gungahleen	11	70	28.004	
Soome	2	78	24.400	
Armidale	11	80	35.761	do.
Tenterfield	5	80	30.800	
Kiandra	8	88	61.228	{ Highest Station— snow included in rainfall.
Murrurundi	4	94	27.845	
Bathurst	14	96	25.037	
Goonoo Goonoo	2	110	26.555	
Casillis	5	120	25.634	
Mudgee	4	121	28.012	
Inverell	1	122	21.130	
Orange	5	124	41.052	
Young	3	140	30.843	High Station.
Wagga Wagga	4	161	25.991	
Albury	12	175	28.965	
Dubbo	4	182	10.698	
Narrabri	6	196	23.238	
Crana	6	218	22.058	
Deniliquin	15	287	16.443	
Bourke	2	393	17.950	
Wentworth	6	476	13.541	
Thargomindah	2	670	16.265	

TABLE XXI—continued.
SUMMER Wind at Sydney, from a self-registering Anemometer.

	Number of times the wind blew from each point.													Velocity.		Greatest pressure, direction of wind, and date.			
	S.	S.W.	S.W.	W.	W.N.W.	N.W.	N.W.	N.	N.N.W.	N.N.E.	E.	E.S.E.	S.E.	Total miles.	Mean per hour.				
1867 ...	46	41	21	44	62	30	31	20	23	52	126	101	30	37	29	8,136	10.5	S.W.	
1868 ...	50	45	17	28	53	34	17	10	46	67	71	81	56	63	65	8,846	11.9	S.W.	
1869 ...	101	21	8	23	32	21	19	54	62	123	101	54	29	36	49	8,765	11.9	N.	
1870 ...	126	42	12	26	25	35	16	22	17	56	70	53	55	56	81	9,665	13.9	N.	
1871 ...	107	32	14	24	12	16	18	18	77	145	130	53	15	31	38	9,277	12.5	N.	
1872 ...	110	34	11	27	36	14	9	52	64	100	69	66	44	41	26	8,593	11.5	N.	
1873 ...	102	41	38	44	20	26	9	30	31	61	53	38	79	82	53	7,642	10.3	N.	
1874 ...	118	58	47	37	9	14	7	8	21	39	69	74	25	24	51	7,657	10.6	W.N.W.	
1875 ...	59	72	27	40	45	48	12	9	22	61	94	76	28	40	32	9,431	13.0	W.N.W.	
1876 ...	143	76	5	7	11	43	30	10	13	91	124	41	19	33	74	8,649	11.6	W.N.W.	
1877 ...	56	95	19	26	26	31	38	6	14	19	60	171	67	49	29	9,101	12.4	E.N.E.	
1878 ...	95	63	14	15	34	27	21	12	70	105	69	34	40	41	28	9,372	12.6	E.N.E.	
1879 ...	87	27	7	11	30	22	27	12	72	76	92	113	47	19	29	42	9,321	12.5	N.N.E.
1880 ...	104	52	37	17	13	8	19	9	26	49	84	105	49	65	60	8,316	11.2	N.N.E.	
1881 ...	132	67	4	6	9	3	4	13	20	141	193	50	32	17	25	8,308	11.2	N.E.	
1882 ...	129	53	8	14	20	13	4	6	16	83	121	80	46	30	33	88	9,947	13.4	N.E.
1883 ...	169	31	8	6	14	3	2	8	33	41	119	100	62	23	39	84	8,647	12.0	N.E.
1884 ...	110	36	23	18	13	18	13	7	6	101	186	112	16	25	27	8,683	11.7	S.S.W.	
1885 ...	110	43	18	16	20	37	16	19	28	72	78	25	30	61	79	6,887	10.2	S.	
1886 ...	81	84	16	20	7	24	18	41	19	46	69	91	36	52	62	7,186	11.1	S.S.W.	
1887 ...	96	22	10	11	47	54	31	18	39	45	45	22	52	82	38	7,321	11.2	S.S.W.	
1888 ...	127	66	31	9	24	24	13	2	31	52	69	67	39	49	41	9,349	13.9	S.	
1889 ...	131	35	15	21	27	24	8	14	80	37	49	50	56	20	22	7,025	10.5	S.S.W.	
1890 ...	141	78	20	7	9	6	2	7	26	35	48	91	40	40	65	8,220	11.8	S.S.W.	
1891 ...	52	24	18	24	15	1	16	26	91	145	98	64	20	22	13	6,040	10.4	E.N.E.	
1892 ...	116	98	29	56	59	26	25	18	16	36	79	27	35	11	15	26	9,303	13.8	S.S.W.
1893 ...	139	72	23	8	1	1	1	1	39	83	45	88	54	54	54	7,448	15.5	S.S.W.	
Mean	105	52	19	19	27	25	18	13	29	41	84	95	60	37	40	8,446	12.0		

Up to December 1870, the direction of wind was taken; and from January, 1871, the number of hours the wind blew in each direction was taken.
* 27 days only (Leap year).

TABLE XXI—continued.
WINTER wind at Sydney, from a self-registering Anemometer.

	Number of times the wind blew from each point.												Velocity.		Greatest pressure, and direction of wind, and date.				
	W	W	W	W	W	W	W	W	W	W	W	W	Total Miles.	Mean per hour.					
1867 ...	15	12	8	24	128	219	42	7	26	36	40	57	58	21	15	12	6,470	9.0	N.E. 20th.
1868 ...	10	54	21	55	68	230	78	28	64	37	11	14	14	7	3	10	6,465	9.0	N.W. 29th.
1869 ...	13	27	28	24	87	194	149	39	37	31	10	3	3	1	37	41	7,087	11.1	N.W. 5th.
1870 ...	19	22	21	46	219	191	70	31	41	18	30	8	0	1	2	1	8,956	12.4	W. 25th.
1871 ...	23	50	43	72	291	192	52	34	24	4	6	4	3	0	5	17	7,071	9.8	W.N.W. 10th.
1872 ...	38	31	14	65	236	174	68	52	50	32	11	2	0	1	5	1	8,013	11.1	W.N.W. 4th.
1873 ...	32	37	26	41	207	59	58	64	32	30	47	35	17	6	15	10	7,487	10.4	N.E. 5th.
1874 ...	3	31	14	41	231	219	79	40	33	11	4	6	1	4	2	1	8,175	11.4	W. 8th.
1875 ...	10	44	40	51	75	159	138	72	55	27	9	7	9	19	5	6	7,200	10.0	N. 26th.
1867 ...	16	26	18	37	141	174	126	53	89	17	14	11	5	1	7	4	7,394	10.1	W. and. 26th.
1868 ...	19	56	25	50	100	238	95	38	25	10	20	15	20	22	2	9	9,121	12.3	S.S.W. 29th.
1869 ...	36	65	33	25	96	201	133	35	44	10	13	9	11	3	8	22	7,089	9.8	W.N.W. 4th.
1870 ...	19	30	30	50	216	142	62	12	29	30	31	11	18	12	28	20	7,577	10.2	S.S.W. 20th.
1871 ...	6	11	22	92	337	150	33	25	16	8	20	7	11	0	6	0	8,768	11.8	S.S.W. 23rd.
1872 ...	22	55	43	81	269	121	55	19	12	16	19	8	8	12	4	0	8,731	12.1	W. 18th.
1873 ...	35	67	34	103	341	60	177	5	3	9	4	2	0	4	29	31	8,292	11.1	W. 1st.
1874 ...	23	40	31	74	270	173	51	21	18	23	7	1	1	1	5	5	7,569	10.2	W.N.W. 15th.
1875 ...	7	46	54	45	171	253	61	45	19	28	14	1	1	0	0	0	7,226	9.7	W.N.W. 9th.
1867 ...	56	34	24	42	158	177	89	21	24	18	15	21	14	7	9	13	5,142	7.2	S.S.W. 18th.
1868 ...	60	41	39	74	110	181	41	9	72	67	26	38	18	23	25	19	7,169	9.6	S.S.W. 20th.
1869 ...	13	8	18	36	78	128	153	72	41	27	14	26	30	20	19	9	6,770	9.4	S.S.W. 19th.
1870 ...	29	28	33	80	163	173	66	41	27	19	16	16	13	10	9	18	7,836	10.6	W.S.W. 31st.
1871 ...	12	14	24	73	225	120	48	47	33	38	23	16	7	6	17	7	7,042	9.5	W. 18th.
1872 ...	45	29	23	47	177	122	50	37	76	44	24	7	12	7	3	16	9,416	12.3	W. 25th.
1873 ...	18	22	19	41	165	164	77	65	57	29	41	25	5	3	1	12	8,060	12.1	S.S.W. 2nd.
1874 ...	18	22	19	41	165	164	77	65	57	29	41	25	5	3	1	12	8,060	12.1	S.S.W. 7th.
1875 ...	18	22	19	41	165	164	77	65	57	29	41	25	5	3	1	12	8,060	12.1	S.S.W. 30th.
Mean ...	23	36	29	56	191	157	73	35	36	21	20	15	11	9	10	11	7,636	10.5	W.N.W. 20th.

Up to December, 1870, the direction of wind was taken; and from January, 1871, the number of hours the wind blew in each direction was taken.
* 28 days only.

TABLE XXII.
 SELF-REGISTERING ANEMOMETER.
 NUMBER of hours the wind blew from each point, and the number of miles,—years 1873, 1874, and 1875.

Date.	S.		S.W.		W.		N.W.		N.		N.E.		E.		S.E.		
	Hours	Miles.	Hours	Miles.	Hours	Miles.	Hours	Miles.	Hours	Miles.	Hours	Miles.	Hours	Miles.	Hours	Miles.	
1873 {	Hours and miles	1,282	16,481	787	8,454	2,430	19,577	653	4,708	745	4,589	1,253	14,407	715	6,767	622	5,639
	Average force	13		11		8		7		6		11		9		9	
1874 {	Hours and miles	1,393	18,022	826	9,184	2,714	26,476	876	6,620	578	4,083	1,159	13,519	690	6,081	381	3,017
	Average force	13		11		10		8		7		12		9		8	
1875 {	Hours and miles	1,318	15,448	779	9,138	1,789	27,431	1,340	8,953	710	5,057	1,312	13,560	912	8,830	468	5,342
	Average force	12		12		15		7		7		10		10		11	
Mean {	Hours and miles	1,331	16,650	797	8,925	2,311	24,495	956	6,750	678	4,576	1,241	13,829	772	7,226	490	4,666
	Average force	13		11		11		7		7		11		9		10	

TABLE
EARTH

Year.	19 Feet.					10 Feet.								
	Mean.	Max.	Min.	Range.	Mean.	Max.	Min.	Range.	Max.					
		Date.	Date.			Date.	Date.		Mean.					
1870...	63.2	65.8	April	60.4	Sept.	5.4	63.3	68.5	Feb.	57.9	Aug.	10.6	63.9	71.9
1871...	62.8	65.1	"	60.4	Oct.	4.7	62.8	67.4	Mar.	58.0	"	9.4	63.4	69.9
1872...	63.2	65.8	"	60.4	"	5.4	63.4	69.8	Jan.	58.0	Sept.	11.8	64.0	71.7
1873...	63.0	65.8	Feb.	60.6	"	5.2	63.0	68.5	Feb.	58.0	"	10.5	63.7	70.5
1874...	62.7	65.4	April	59.7	{ Sept. & Oct.}	5.7	62.7	67.5	Mar.	56.8	{ Aug. & Sept.}	10.7	63.3	69.0
1875...	63.0	65.4	{ Mar. & April}	60.4	Sept.	5.0	63.2	68.6	"	57.8	Aug.	10.8	63.9	70.7
Mean	63.0	65.8	*	59.7	{ 1874. Sept. & Oct.}	5.2	63.1	69.8	Jan.	56.8	{ 1874. Aug. & Sept.}	10.6	63.7	71.9

* April, 1870, April, 1872, and February, 1873.

These thermometers were made by Mr. Grimaldi, of Melbourne, and the lengths are 20 feet, 11 above ground. Before they were put in, they were compared with a standard thermometer from and 4 feet in diameter, was dug in the Observatory grounds, to receive them; and the strata cut stone; 8 feet solid sandstone. The thermometers were carefully placed vertical, and the pit filled. There is a wooden case, 3 inches square, round the stem of each thermometer, and a wooden case, glass front.

XXIII.
THERMOMETERS at Sydney.

5 Feet.				2 Feet 6 Inches.				1 inch.							
Date.	Min.	Range.	Mean.	Max.	Min.	Range.	Mean.	Max.	Min.	Range.					
	Date.			Date.	Date.			Date.	Date.		Date.				
Feb. ...	56.6	Aug.	15.3	64.2	76.1	Feb.	54.0	Aug.	22.1	63.0	81.2	Jan.	47.9	Aug.	33.3
" ...	56.7	Sept.	13.2	63.9	73.7	Dec.	53.8	July	19.9	62.7	77.9	Dec.	48.0	July	29.9
" ...	56.3	Aug.	15.4	64.1	75.7	Feb.	53.7	Aug.	22.0	62.5	78.7	Jan.	46.9	Aug.	31.8
" ...	56.1	July	14.4	63.9	73.3	"	53.7	July	19.6	62.8	76.2	Dec.	48.6	July	27.6
{ Feb. Mar. April }	54.9	Aug.	14.1	63.7	72.6	Dec.	52.0	Aug.	20.6	62.7	77.7	"	45.4	Aug.	31.3
Jan. ...	56.5	"	14.2	64.1	74.4	Jan.	53.7	July	20.7	62.8	77.3	Jan.	47.6	July	29.7
1870.	1874.	Mean				1870.	1874.	Mean				1870.	1874.	Mean	
Feb. ...	54.9	Aug.	14.4	64.0	76.1	Feb.	52.0	Aug.	20.8	62.8	81.2	Jan.	46.4	Aug.	30.6

feet, 6 feet, 3 feet 6 inches, and 1 foot 1 inch. One foot of each is occupied with the scale and is Kew, and the errors then determined have been applied to the above results. A pit, 20 feet deep were as follows:—5 feet red clay, with a few stones in it; 7 feet bands white clay and iron-sand-in with the material which came out of it, care being taken to put sand round the bulb of each. with a glass front, protects the scales from the weather. The readings can be taken through the

TABLE XXV.
TEMPERATURE of Sea Water in Sydney Harbour, 3 feet below the Surface.

Month.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	Mean.	Mean air.	Water warmer than air.
January .....	..	71.3	68.9	70.4	72.2	69.4	72.2	..	71.7	72.3	72.1	70.8	72.4	70.7	70.9	70.4	71.1	71.1	0.0
February .....	..	73.1	71.6	71.6	72.1	70.7	71.9	..	71.5	72.4	73.6	72.1	71.3	71.3	70.4	68.7	71.6	70.6	1.0
March .....	..	73.9	70.5	72.0	69.7	68.7	..	..	71.5	72.4	70.5	70.2	70.7	71.0	70.5	68.5	70.8	68.9	1.9
April	66.4	68.6	66.8	70.3	67.5	68.1	..	68.4	67.8	70.1	68.6	68.5	69.2	68.8	69.9	67.9	68.5	64.6	3.9
May	64.2	63.8	62.6	68.1	63.6	64.0	..	65.7	64.3	66.0	63.3	65.9	64.6	65.2	66.1	63.1	64.7	58.0	6.7
June	59.5	57.9	59.8	60.7	59.7	59.5	..	61.2	62.0	60.2	59.5	62.5	59.4	62.8	61.5	60.1	60.4	54.3	6.1
July	56.3	53.9	56.7	57.5	59.1	59.7	..	58.9	57.9	57.4	56.5	58.3	57.3	60.0	58.0	58.4	57.7	51.9	5.8
August	57.3	55.0	54.8	57.5	58.6	58.7	..	58.4	57.9	57.4	57.0	57.3	56.1	58.8	58.0	59.2	57.5	54.0	3.5
September	60.5	58.2	57.9	59.9	61.4	61.9	..	61.2	61.4	59.5	59.1	60.2	58.6	61.1	58.7	60.4	60.0	58.1	1.9
October	63.1	63.6	61.1	63.2	63.8	65.2	..	64.4	65.7	63.4	63.0	62.3	61.8	63.4	62.4	63.3	63.3	63.2	0.1
November	66.5	67.1	65.5	66.0	66.3	69.2	..	68.8	67.3	67.1	67.7	66.6	66.4	65.0	65.9	65.1	66.7	66.1	0.6
December	68.0	66.5	67.7	68.0	67.2	71.3	..	72.0	71.2	71.4	70.9	70.5	70.2	68.5	68.0	67.4	69.3	69.4	-0.1
Mean	62.0	64.4	63.7	65.4	65.1	65.5	..	64.0	65.9	65.8	65.2	65.4	64.8	65.6	65.0	64.4	65.1	62.5	2.6

* Mean for last six months of year only.

TABLE XXVI (GOING NORTH.)

OBSERVATIONS on the Temperature of the Warm Current setting South along the East Coast of Australia, made during the Voyage of the Australian Eclipse Expedition, 1871.

Sydney to Eclipse Island.				Sydney to Eclipse Island.			
Date.	Hour.	Temp.	Place.	Date.	Hour.	Temp.	Place.
1871.				1871.			
Nov. 28	A.M. 8	64.7	Off Port Stephens.	Dec. 2	A.M. 5	76.7	
	9	63.7			7	77.7	
	10	63.7			8	77.7	
	11	63.7			9	77.7	Off Northumberland Islands.
	12	65.7			10	78.0	
	P.M. 1	67.7			11	78.7	
	2	67.7	Off Port Macquarie.		12	78.7	
	3	69.2			P.M. 1	79.7	
	4	69.2			2	78.7	
	5	67.7			3	78.7	
	6	67.7			4	78.7	
Nov. 29	A.M. 6	64.2			5	78.7	Whitsunday Passage
	7	65.7	Off Richmond River.		6	77.7	
	8	65.7	Off Cape Byron.	Dec. 3	A.M. 6	79.7	Magnetic Island.
	9	73.7			7	79.7	
	10	72.7			8	80.2	
	11	72.7			9	80.2	
	12	73.7			10	80.2	
	P.M. 1	75.2			11	80.2	
	2	75.7			12	80.2	
	3	74.7			P.M. 1	80.7	
	4	75.7			2	80.7	
	5	73.7	Off Point Look-out.		3	80.7	
	6	74.7			4	79.7	
Nov. 30	A.M. 6	73.7			5	81.7	
	7	73.7		Dec. 4	A.M. 6	80.7	
	8	73.7			7	81.2	At Fitz Roy Island.
	9	75.7			8	80.7	
	10	76.7		Dec. 5	A.M. 6	80.7	
	11	77.7			7	80.7	
	12	77.7			8	81.7	
	P.M. 1	78.0	Off Sandy Cape.		12	81.7	
	2	77.7			P.M. 1	82.0	
	3	76.7			2	82.0	
	4	76.7			3	82.0	
	5	77.7			4	82.0	Near Lizard Island.
	6	75.7		Dec. 6	A.M. 6	81.7	
Dec. 1	A.M. 6	75.7			7	81.7	
	7	75.7			8	81.7	
	8	75.7			9	82.0	
	9	76.7			10	82.0	
	10	76.7			11	82.0	
	11	77.7			12	82.7	
	12	77.7	Off High Peak Island		P.M. 1	82.7	
	P.M. 1	77.7			2	82.7	
	2	77.7			3	83.7	
	3	77.7			4	83.7	
	4	77.7	Off No. 2 Percy Island		5	83.7	Eclipse Island.
	5	76.7			6	83.7	
	6	76.7					

TABLE XXVI (RETURN)—*continued*.
OBSERVATIONS on Temperature of Warm Current—*continued*.

Eclipse Island to Sydney.				Eclipse Island to Sydney.			
Date.	Hour.	Temp.	Place.	Date.	Hour.	Temp.	Place.
1871.				1871.			
Dec. 13	A.M. 6	82.7	Eclipse Island.	Dec. 17	P.M. 5	80.7	
	7	82.7			6	80.2	
	8	82.2		Dec. 18	A.M. 6	77.7	Near High Peak
	9	81.7			7	77.7	Island.
	10	82.2			8	77.7	Out of sight of land.
	11	82.7			9	77.7	
	12	82.7			10	78.7	
	P.M. 1	82.7			11	79.2	
	2	82.7			12	79.2	
	3	82.7			P.M. 1	79.7	
	4	82.7			2	78.7	
	5	82.2			3	78.7	
	6	81.7	No. 6 Howick Group.		4	79.7	
Dec. 14	A.M. 6	81.7			5	79.2	
	7	81.7			6	79.2	
	8	81.7		Dec. 19	A.M. 6	78.7	
	9	81.7			7	76.7	
	10	82.7	Off Lizard Island.		8	75.7	
	11	82.7			9	75.7	
	12	82.7			10	75.7	
	P.M. 1	82.7			11	76.7	
	2	82.7			12	75.7	
	3	82.7			P.M. 1	75.2	
	4	82.7			2	75.7	
	5	82.7			3	75.7	
	6	82.7			4	76.7	
Dec. 15	A.M. 6	80.7			5	75.7	
	7	81.7			6	75.7	
	8	82.7		Dec. 20	A.M. 8	79.7	Brisbane.
	9	82.7		Dec. 23	7	89.7	Moreton Bay (in the
	10	82.7	At Fitzroy Island.				River.)
	P.M. 2	82.7			P.M. 1	76.7	Off Cape Morton.
Dec. 16	A.M. 6	83.7	At Cardwell.		2	76.7	
	7	84.7			3	76.7	
	P.M. 3	83.7			4	76.2	
	4	82.7			5	76.7	
	5	82.7			6	76.7	Off Cape Byron.
	6	82.2		Dec. 24	A.M. 6	71.7	
Dec. 17	A.M. 6	80.7			7	70.7	
	7	80.7			8	69.7	
	8	80.7			9	70.7	
	9	80.7			10	71.7	
	10	81.2			11	70.7	
	11	80.7	Off Port Denison.		12	66.7	Steered close in to
	12	81.7	In Whitsunday Pas- age.		P.M. 1	62.7	the land.
	P.M. 1	81.7			2	63.7	
	2	80.7			3	62.7	Port Stephens.
	3	81.7			4	65.7	
	4	80.7			5	65.7	
					6	65.7	

The Temperature was obtained by taking a bucket of water from near the bows of the steamer, and placing the thermometer in it for a few minutes, or until it attained the same temperature, and then reading it quickly.

TABLE XXVII.

WATER Temperatures taken during passage of S.S. "HIBERNIA," laying New Zealand Cable.

Date.	Time.	Temperature.		Date.	Time.	Temperature.	
		Sea.	Air.			Sea.	Air.
1876.		° /	° /	1876.		° /	° /
Feb. 5 ...	h.m.			Feb. 7 ...	h.m.		
	Noon	73·5	...	10·0	73·5	73·0	
	4·0 p.m.	74·0	...	10·30 p.m.	75·0	73·0	
	8·0	75·0	...	same to			
	Midnight	73·0	...	8 ...	2·0 a.m.	75·5	72·5
6 ...	4·0 a.m.	77·5	...	2·30	75·5	73·0	
	8·0	78·5	...	3·0	75·0	72·5	
	Noon	79·0	...	3·30	74·0	72·0	
	2·30	72·5	74·0	4·0	73·0	72·0	
	same to			4·30	72·5	72·0	
	4·30	73·5	...	5·0	71·5	71·5	
	same to			5·30	71·0	71·5	
	9·30	73·0	...	6·0	70·5	73·0	
	same to			6·30	70·5	73·0	
7 ...	2·30 a.m.	74·5	...	7·0	70·0	73·5	
	same to			7·30	70·0	74·0	
	3·30	75·0	...	8·0	69·0	75·0	
	same to		72·0	8·30	70·5	76·0	
	10·30 a.m.	75·5	73·0	same to			
	11·0	75·0	74·0	4	Noon	71·0	78·5
	11·30	75·0	...	0·30	71·5	81·0	
	Noon	74·5	74·0	same to			
	0·30	73·5	...	4·0	72·0	77·0	
	1·0	73·5	...	4·30	72·0	77·0	
	1·30	74·0	...	5·0	71·0	77·5	
	2·0	74·0	78·5	5·30	71·5	77·0	
	2·30	73·0	79·0	6·0	71·5	76·0	
	same to		78·5	6·30	71·5	...	
	5·0	73·5	78·0	7·0 p.m.	71·0	72·0	
	5·30	73·5	...	same to			
	6·0	74·0	73·5	9 ...	2·30 a.m.	70·5	69·0
	6·30	74·0	73·5	5·30	71·5	69·0	
	7·0	74·0	73·5	6·0	68·5	69·0	
	7·30	74·0	73·5	6·30	68·5	70·0	
	8·0	73·5	73·5	7·0	65·5	70·0	
	8·30	74·0	73·5	7·30	69·0	71·0	
	9·0	73·5	...	same to			
	9·30	73·5	73·0	11·0	69·5	74·5	

¹ Noon, 5th.—Lat. 34° 6' 17·5" S.; long. 151° 24' 45" E.

² Noon, 6th.—Lat. 34° 45' 0" S.; long. 153° 49' 0" E.

³ 3 p.m., 6th.—Lat. 34° 51' 30" S.; long. 154° 7' 30" E.

³ Noon, 7th.—Lat. 35° 30' 0" S.; long. 156° 20' 0" E.

¹ p.m., 7th.—Lat. 35° 30' 0" S.; long. 156° 20' 0" E.

⁴ Noon, 8th.—Lat. 36° 19' 12" S.; long. 158° 58' 0" E.

TABLE XXVII—continued.

WATER Temperature taken during passage of S.S. "HIBERNIA," &c.

Date.	Time.	Temperature.		Date.	Time.	Temperature.	
		Sea.	Air.			Sea.	Air.
1876.		°	'	1876.		°	'
Feb. 9 ...	h.m.			Feb. 11 ...	h.m.		
	11:30	69.0	75.0		same to		
	Noon	69.0	75.5		2.0	66.0	66.0
	0.30	69.5	76.0		same to		
	1.0	70.0	78.0	12 ...	5.30 a.m.	66.5	63.0
	1.30	70.5	80.5		same to		
	2.0	71.0	80.0		7.30	67.0	63.0
	same to				same to		
	5.0	70.5	75.0		9.30	66.5	65.0
	5.30	70.5	75.0		same to		
	6.0	70.0	73.0	8	Noon	70.5	66.5
	6.30	69.5	72.0		0.30	66.5	66.5
	7.0	69.5	70.0		same to		
	7.30	69.0	69.0		2.0	67.0	67.5
	same to						
	11.30	68.5	67.5				
	Midnight	68.5	67.5				
10 ...	0.30	69.5	67.0				
	1.0	69.5	67.0	15 ⁹	Noon	69.0	76.0
	1.30	69.0	67.0		0.30	68.0	76.0
	2.0	68.0	67.0		same to		
	same to				2.30	68.5	72.0
	7.0	68.5	68.0		3.0	69.0	72.0
	same to				same to		
	8.30	68.0	69.5		4.0	68.0	69.0
	same to				same to		
	10.0	68.5	70.0		8.0	67.5	67.0
	10.30 a.m.	69.0	71.0	16 ...	same to		
	same to				2.0 a.m.	66.0	66.0
	8.0 p.m.	68.5	69.0		2.30	67.0	66.0
	8.30	68.0	69.0		3.0	65.0	66.0
	same to				3.30	64.0	66.0
11 ...	3.30 a.m.	67.5	...		4.0	64.0	65.0
	same to				4.30	63.5	65.0
	5.0	68.0	68.0		5.0	62.5	64.0
	same to				6.0	61.5	65.0
	8.0	67.5	67.5	18 ...	6.30	62.0	65.5
	8.30	68.0	67.5		1.30	67.0	64.0
	same to				2.30	66.0	68.0
	10.30	67.5	69.0		same to		
	same to				4.30	66.0	63.5
7	Noon	67.0	70.0		8.30	67.0	68.0
	0.30	66.5	67.0		10.30	66.0	68.0
					11.30	66.0	68.0

⁵ Noon, 9th.—Lat. 37° 4' 26" S.; long. 161° 41' 0" E.
⁶ Noon, 10th.—Lat. 37° 52' 41" S.; long. 164° 40' 0" E.
⁷ Noon, 11th.—Lat. 38° 36' 0" S.; long. 167° 37' 0" E.
⁸ Noon, 12th.—Lat. 39° 21' 41" S.; long. 170° 43' 0" E.
⁹ Noon, 15th.—Lat. 39° 32' 22" S.; long. 171° 21' 45" E.

TABLE XXVIII.

TEMPERATURE of Sea Water taken between Sydney and Port Darwin by telegraph s.s. "Edinburgh."

Date.	Time.	Temp.	Temp. in air.	Wind.	Date.	Temp.	Temp. in air.	Wind.	Date.	Temp.	Temp. in air.	Wind.
June 15	1 a.m.	66.5	...	...	June 15	...	...	...	June 15	...	...	...
"	"	66.0	...	...	"	...	...	...	"	...	...	...
"	2 "	66.0	...	...	"	...	...	...	"	...	...	...
"	3 "	66.0	...	...	"	...	...	...	"	...	...	...
"	4 "	66.0	...	...	"	...	...	...	"	...	...	...
"	5 "	66.0	...	...	"	...	...	...	"	...	...	...
"	6 "	66.0	...	...	"	...	...	...	"	...	...	...
"	7 "	66.0	...	...	"	...	...	...	"	...	...	...
"	8 "	66.0	...	...	"	...	...	...	"	...	...	...
"	9 "	66.0	...	...	"	...	...	...	"	...	...	...
"	10 "	66.0	...	...	"	...	...	...	"	...	...	...
"	11 "	66.0	...	...	"	...	...	...	"	...	...	...
"	12 "	66.0	...	...	"	...	...	...	"	...	...	...
"	1 p.m.	66.0	...	...	"	...	...	...	"	...	...	...
"	2 "	66.0	...	...	"	...	...	...	"	...	...	...
"	3 "	66.0	...	...	"	...	...	...	"	...	...	...
"	4 "	66.0	...	...	"	...	...	...	"	...	...	...
"	5 "	66.0	...	...	"	...	...	...	"	...	...	...
"	6 "	66.0	...	...	"	...	...	...	"	...	...	...
"	7 "	66.0	...	...	"	...	...	...	"	...	...	...
"	8 "	66.0	...	...	"	...	...	...	"	...	...	...
"	9 "	66.0	...	...	"	...	...	...	"	...	...	...
"	10 "	66.0	...	...	"	...	...	...	"	...	...	...
"	11 "	66.0	...	...	"	...	...	...	"	...	...	...
"	12 "	66.0	...	...	"	...	...	...	"	...	...	...
June 16	1 a.m.	68.5	...	...	June 16	...	...	...	June 16	...	...	...
"	"	68.0	...	...	"	...	...	...	"	...	...	...
"	2 "	68.0	...	...	"	...	...	...	"	...	...	...
"	3 "	68.0	...	...	"	...	...	...	"	...	...	...
"	4 "	68.0	...	...	"	...	...	...	"	...	...	...
"	5 "	68.0	...	...	"	...	...	...	"	...	...	...
"	6 "	68.0	...	...	"	...	...	...	"	...	...	...
"	7 "	68.0	...	...	"	...	...	...	"	...	...	...
"	8 "	68.0	...	...	"	...	...	...	"	...	...	...
"	9 "	68.0	...	...	"	...	...	...	"	...	...	...
"	10 "	68.0	...	...	"	...	...	...	"	...	...	...
"	11 "	68.0	...	...	"	...	...	...	"	...	...	...
"	12 "	68.0	...	...	"	...	...	...	"	...	...	...
June 17	1 a.m.	72.0	...	...	June 17	...	...	...	June 17	...	...	...
"	"	72.0	...	...	"	...	...	...	"	...	...	...
"	2 "	72.0	...	...	"	...	...	...	"	...	...	...
"	3 "	72.0	...	...	"	...	...	...	"	...	...	...
"	4 "	72.0	...	...	"	...	...	...	"	...	...	...
"	5 "	72.0	...	...	"	...	...	...	"	...	...	...
"	6 "	72.0	...	...	"	...	...	...	"	...	...	...
"	7 "	72.0	...	...	"	...	...	...	"	...	...	...
"	8 "	72.0	...	...	"	...	...	...	"	...	...	...
"	9 "	72.0	...	...	"	...	...	...	"	...	...	...
"	10 "	72.0	...	...	"	...	...	...	"	...	...	...
"	11 "	72.0	...	...	"	...	...	...	"	...	...	...
"	12 "	72.0	...	...	"	...	...	...	"	...	...	...
June 18	1 a.m.	71.0	...	...	June 18	...	...	...	June 18	...	...	...
"	"	71.0	...	...	"	...	...	...	"	...	...	...
"	2 "	71.0	...	...	"	...	...	...	"	...	...	...
"	3 "	71.0	...	...	"	...	...	...	"	...	...	...
"	4 "	71.0	...	...	"	...	...	...	"	...	...	...
"	5 "	71.0	...	...	"	...	...	...	"	...	...	...
"	6 "	71.0	...	...	"	...	...	...	"	...	...	...
"	7 "	71.0	...	...	"	...	...	...	"	...	...	...
"	8 "	71.0	...	...	"	...	...	...	"	...	...	...
"	9 "	71.0	...	...	"	...	...	...	"	...	...	...
"	10 "	71.0	...	...	"	...	...	...	"	...	...	...
"	11 "	71.0	...	...	"	...	...	...	"	...	...	...
"	12 "	71.0	...	...	"	...	...	...	"	...	...	...
June 19	1 a.m.	69.5	...	...	June 19	...	...	...	June 19	...	...	...
"	"	69.5	...	...	"	...	...	...	"	...	...	...
"	2 "	69.5	...	...	"	...	...	...	"	...	...	...
"	3 "	69.5	...	...	"	...	...	...	"	...	...	...
"	4 "	69.5	...	...	"	...	...	...	"	...	...	...
"	5 "	69.5	...	...	"	...	...	...	"	...	...	...
"	6 "	69.5	...	...	"	...	...	...	"	...	...	...
"	7 "	69.5	...	...	"	...	...	...	"	...	...	...
"	8 "	69.5	...	...	"	...	...	...	"	...	...	...
"	9 "	69.5	...	...	"	...	...	...	"	...	...	...
"	10 "	69.5	...	...	"	...	...	...	"	...	...	...
"	11 "	69.5	...	...	"	...	...	...	"	...	...	...
"	12 "	69.5	...	...	"	...	...	...	"	...	...	...

* Off Cape Hawke. † Lat. 28° 51' S.; Long. 153° 47' E. ‡ Lat. 25° 35' S.; Long. 153° 31' E. § Lat. 25° 25' S.; Long. 152° 30' E. || Lat. 21° 36' S.; Long. 154° 11' E.

Strong S.E. gale, and clear.

Moderate S.W. breeze and cloudy.

Moderate N.W. breeze, and cloudy.

Fresh northerly breeze, and fine clear weather.

Fresh southerly wind, and dull cloudy weather.

TABLE XXIX.

SHOWING the dates on which Auroras were observed in New South Wales—1870 to 1875.

1870.		1871.		1872.		1873.		1874.	
February 1	August 22	November 9	May 14	January 4	March 9	January 23			
" 2	September 21	" 17	" 30	February 5	June 20	March 4			
" 12	" 23	" 22	June 11	June 24	December 8	August 3			
" 22	" 24	December 10	July 22	October 14					
March 22	" 25	" 16	" 30	" 15					
" 23	October 23	" 24	October 15	" 16					
April 5	" 24	" 29	" 16	" 17					
" 28	" 25	"	November 19	" 18					
May 13	" 26			" 19					
" 20	November 8			" 20					

Sydney: Charles Potter, Acting Government Printer.—1876.





