CHAPTER II.

PHYSIOGRAPHY.

§ 1. General Description of Australia.

1. **Geographical Position.**—(i) *General.* The Australian Commonwealth, which includes the island continent of Australia proper and the island of Tasmania, is situated in the Southern Hemisphere, and comprises in all an area of about 2,974.581 square miles, the mainland alone containing about 2,948,366 square miles. Bounded on the west and east by the Indian and Pacific Oceans respectively, it lies between longitudes 113° 9′ E. and 153° 39′ E., while its northern and southern limits are the parallels of latitude 10° 41′ S. and 39° 8′ S., or, including Tasmania, 43° 39′ S. On its north are the Timor and Arafura Seas and Torres Strait—on its south the Southern Ocean and Bass Strait. The extreme points are "Steep Point" on the west, "Cape Byron" on the east, "Cape York" on the north, "Wilson's Promontory" on the south, or, if Tasmania be included, "South-East Cape."

(ii) *Tropical and Temperate Regions.* Of the total area of Australia nearly 40 per cent. lies within the tropics. Assuming, as is usual, that the latitude of the Tropic of Capricorn is 23° 30′ S. (its mean value for 1939 was 23° 26′ 49.99″), the areas within the tropical and temperate zones are approximately as follows :—

AUSTRALIA: AREAS OF TROPICAL AND TEMPERATE REGIONS.

(STATES AND TERRITORY PARTIALLY WITHIN TROPICS.)

Area.	Queensland.	Western Australia.	Northern Territory.	Total.
Within Tropical Zone .. sq. miles	359,000	364,000	426,320	1,149,320
Within Temperate Zone „ „	311,500	611,920	97,300	1,020,720
Ratio of Tropical part to whole State ..	0.535	0.373	0.814	0.530
Ratio of Temperate part to whole State	0.465	0.627	0.186	0.470

Thus the tropical part is roughly about one-half (0.530) of the three territories mentioned above, or about five-thirteenths of the whole of Australia (0.386).

2. **Area of Australia compared with Areas of other Countries.**—The area of Australia is almost as great as that of the United States of America, four-fifths of that of Canada, more than one-fifth of the area of the British Empire, nearly three-fourths of the whole area of Europe, and about 25 times as large

as Great Britain and Ireland. This great area, coupled with a limited population, renders the solution of the problem of Australian development a particularly difficult one. The areas of Australia and of certain other countries are given in the following table :—

AREA OF AUSTRALIA AND OF OTHER COUNTRIES, *Circa* 1938.

Country.	Area.
Continental Divisions—	Sq. miles.
Europe	4,411,000
Asia	16,047,000
Africa	11,699,000
North and Central America and West Indies	8,658,000
South America	7,047,000
Australasia and Polynesia	3,462,000
Total, exclusive of Arctic and Antarctic Conts.	51,324,000
Europe—	
U.S.S.R. (Russia)	2,316,000
Germany(*a*)	225,000
France	213,000
Spain (inc. possessions)	194,000
Sweden	173,000
Poland	150,000
Finland	150,000
Italy(*b*)	130,000
Norway	125,000
Rumania	114,000
Yugoslavia	96,000
United Kingdom	95,000
Other	430,000
Total	4,411,000
Asia—	
U.S.S.R. (Russia)	5,860,000
China and Dependencies	4,287,000
British India and Administered Territories	1,097,000
Arabia and Autonomous States	1,004,000
Feudatory Indian States	712,000
Iran	634,000
Netherlands Indies	574,000
French Indo-China	286,000
Turkey	285,000
Japan and Dependencies	262,000
Afghanistan	251,000
Thai	200,000
Other	595,000
Total	16,047,000
Africa—	
French West Africa	1,815,000
Anglo-Egyptian Sudan	969,000
French Equatorial Africa	960,000
Belgian Congo	910,000
Algeria	851,000
Libya	680,000

Country.	Area.
AFRICA—*continued.*	Sq. miles.
Italian East Africa	659,000
Angola	488,000
Union of South Africa	472,000
Egypt	386,000
Tanganyika Territory	374,000
Nigeria and Protectorate	338,000
South-West Africa	322,000
Mozambique	298,000
Northern Rhodesia	288,000
Bechuanaland Protectorate	275,000
Madagascar	229,000
Kenya Colony and Protectorate	225,000
Other	1,160,000
Total	11,699,000
North and Central America—	
Canada	3,684,000
United States of America	3,027,000
Mexico	760,000
Alaska	586,000
Newfoundland and Labrador	163,000
Honduras	59,000
Nicaragua	49,000
Other	330,000
Total	8,658,000
South America—	
Brazil	3,286,000
Argentine Republic	1,078,000
Bolivia	507,000
Peru	482,000
Colombia (exc. of Panama)	440,000
Venezuela	352,000
Chile	287,000
Paraguay	177,000
Ecuador	176,000
Other	262,000
Total	7,047,000
Australasia and Polynesia—	
Commonwealth of Australia	2,974,581
Dutch New Guinea	161,000
New Zealand and Dependencies	103,934
Territory of New Guinea	93,000
Papua	90,540
Other	38,945
Total	3,462,000
British Empire	13,353,952

(*a*) Including Austria and part of Czecho-Slovakia. (*b*) Including Albania.

The figures quoted in the table have been extracted from the *Statistical Year Book of the League of Nations* or the *Statesman's Year Book.*

3. **Areas of Political Subdivisions.**—As already stated, Australia consists of six States and the Northern and Australian Capital Territories. The areas of these, and their proportions of the total of Australia, are shown in the following table :—

AUSTRALIA: AREA OF STATES AND TERRITORIES.

State or Territory.	Area.	Percentage on Total.
	Sq. miles.	%
New South Wales	309,433	10.40
Victoria	87,884	2.96
Queensland	670,500	22.54
South Australia	380,070	12.78
Western Australia	975,920	32.81
Tasmania	26,215	0.88
Northern Territory	523,620	17.60
Australian Capital Territory ..	939	0.03
Total	2,974,581	100.00

4. **Coastal Configuration.**—(i) *General.* There are no striking features in the configuration of the coast; the most remarkable indentations are the Gulf of Carpentaria on the north, and the Great Australian Bight on the south. The Cape York Peninsula on the extreme north is the only other remarkable feature in the outline. In Official Year Book No. 1, an enumeration was given of the features of the coast-line of Australia (see pp. 60-68).

(ii) *Coast-line.* The lengths of coast-line, exclusive of minor indentations, of each State and of the whole continent, and the area per mile of coast-line, are shown in the following table :—

AUSTRALIA: COAST-LINE AND AREA PER MILE THEREOF.

State.	Coast-line.	Area per Mile of Coast-line.	State.	Coast-line.	Area per Mile of Coast-line.
	Miles.	Sq. miles.		Miles.	Sq. miles.
New South Wales(*a*)	700	443	South Australia	1,540	247
Victoria ..	680	129	Western Australia	4,350	224
Queensland ..	3,000	223	Continent (*b*) ..	11,310	261
Northern Territory	1,040	503	Tasmania ..	900	29

(*a*) Including Australian Capital Territory. (*b*) Area 2,948,366 square miles.

For the entire Commonwealth of Australia this gives a coast-line of 12,210 miles and an average of 244 square miles for one mile of coast-line. According to Strelbitski, Europe has only 75 square miles of area to each mile of coast-line, and, according to recent figures, England and Wales have only one-third of this, namely, 25 square miles.

(iii) *Historical Significance of Coastal Names.* It is interesting to trace the voyages of some of the early navigators by the names bestowed by them on various coastal features—thus Dutch names are found on various points of the Western Australian coast, in Nuyts' Archipelago, in the Northern Territory, and in the Gulf of Carpentaria; Captain Cook can be followed along the coasts of New South Wales and Queensland; Flinders' track is easily recognized from Sydney southwards, as far as Cape Catastrophe, by the numerous Lincolnshire names bestowed by him; and the French navigators of the end of the eighteenth and the beginning of the nineteenth century have left their names all along the Western Australian, South Australian and Tasmanian coasts.

5. **Geographical Features of Australia.**—In each of the earlier issues of the Official Year Book fairly complete information has been given concerning some special geographical element. The nature of this information and its position in the various issues can be readily ascertained on reference to the special index following the index to maps and graphs at the end of this issue.

6. **Fauna, Flora, Geology and Seismology of Australia.**—Special articles dealing with these features have appeared in previous issues of the Official Year Book, but limits of space naturally preclude their repetition in each volume. As pointed out in par. 5, however, the nature and position of these articles can be readily ascertained from the special index.

§ 2. Climate and Meteorology of Australia.*

1. **Introductory.**—In Official Year Book No. 3, pp. 79 and 80, some account was given of the history of Australian meteorology, including a reference to the development of magnetic observations. In Official Year Book No. 4, pp. 84 and 87, will be found a short sketch of the creation and organization of the Commonwealth Bureau of Meteorology, and a résumé of the subjects dealt with at the Meteorological Conference in 1907.

2. **Meteorological Publications.**—Reference to publications issued by the Central Meteorological Bureau will be found in Official Year Book No. 22, pp. 40 and 41. The following publications have since been issued:—Volume of "Results of Rainfall Observations made in Western Australia," for all years of record to 1927; Map of Normal Meteorological Conditions in Australia affecting Aviation; a Paper "A Basis for Seasonal Forecasting", by H. A. Hunt; Bulletin No. 18, "Foreshadowing Monsoonal Rains in Northern Australia"; Bulletin No. 19, "Thunderstorms in Australia"; Bulletin No. 20, "Zones of Relative Physical Comfort in Australia"; Bulletin No. 21, "Air Masses over Eastern Australia"; Bulletin No. 22, "Australian Rainfall in Sunspot Cycles"; Bulletin No. 23, "Australian Rainfall in District Averages"; Bulletin Nos. 24 and 25, "Weather Conditions affecting Aviation in the Tasman Sea"; a Paper on "Frost Risks and Frost-Forecasting"; Booklet containing Meteorological Data for certain Australian Localities; a volume of "Results of Rainfall Observations made in Tasmania"; a volume of "Results of Rainfall Observations made in Victoria" (Supplementary volume to 1936); and a volume of "Mean Diurnal Variations of Corrected Mean Sea Level Pressures in 1-1,000 inches."

3. **Equipment.**—The determination of the climatological data has been made by records of the following instruments:—

(i) *Rainfall.* Rainfall has been measured by a cylindrical gauge generally 8 inches in diameter.

(ii) *Temperature.* Temperatures have been recorded by means of self-registering maximum and minimum thermometers which are read and set daily.

(iii) *Humidity.* Humidities have been determined by the aid of tables from readings of dry and wet bulb thermometers.

(iv) *Atmospheric Pressure.* Pressures have been measured by mercurial barometers of the Kew (or Fortin) pattern.

(v) *Evaporation.* The standard evaporimeter in use consists of a cylindrical galvanized iron tank 3 feet in diameter with a water jacket. Concrete tanks of similar form and dimensions are also used.

(vi) *Wind Mileage and Pressures.* The travel of the wind has been measured by means of anemometers of the Robinson pattern. The wind pressures corresponding to the observed mileage per hour have been calculated from the formula $P = 0.003V^2$ in which P denotes pressure in lb. per square foot and V the velocity in miles per hour.

4. **General Description of Australia.**—A considerable portion (0.530) of three divisions of Australia is north of the tropic of Capricorn—that is to say, within the States of Queensland and Western Australia, and the Northern Territory, no less than 1,149,320 square miles belong to the tropical zone and 1,020,720 to the temperate zone. The whole area of Australia within the temperate zone, however, is 1,825,261 square miles; thus the tropical part is about 0.386, or about five-thirteenths of the whole, or the "temperate" region is half as large again as the "tropical" (more accurately 1.588). By reason of its insular geographical position and the absence of striking physical features, Australia is, on the whole, less subject to extremes of weather than are regions of similar area in other parts of the globe, and latitude for latitude Australia is, on the whole, more temperate.

The altitudes of the surface of Australia range up to a little over 7,300 feet, hence its climate embraces a great many features, from the characteristically tropical to what is essentially alpine, a fact indicated in some measure by the name Australian Alps given to the southern portion of the great Dividing Range.

* Prepared from data supplied by the Commonwealth Meteorologist.

On the coast, the rainfall is often abundant and the atmosphere moist, but in some portions of the interior it is very limited, and the atmosphere dry. The distribution of forest, therefore, with its climatic influence, is very uneven. In the interior, in places, there are fine belts of trees, but there are large areas also which are treeless, and here the air is hot and parching in summer. Again, on the coast, even so far south as latitude 35°, the vegetation is tropical in its luxuriance, and to some extent also in character. Climatologically, therefore, Australia may be said to present a great variety of features.

5. **Meteorological Divisions.**—(i) *General.* Reference to the divisions adopted by the Commonwealth Meteorologist will be found in Official Year Book No. 22, p. 41.

(ii) *Special Climatological Stations.* The latitudes, longitudes and altitudes of special stations, the climatological features of which are graphically represented hereinafter, are as follows :—

SPECIAL CLIMATOLOGICAL STATIONS: AUSTRALIA.

Locality.	Height above Sea Level.	Latitude. S.		Longitude. E.		Locality.	Height above Sea Level.	Latitude. S.		Longitude. E.	
	Feet.	deg.	min.	deg.	min.		Feet.	deg.	min.	deg.	min.
Perth ..	197	31	57	115	50	Canberra ..	1,837	35	20	149	15
Adelaide ..	140	34	56	138	35	Darwin ..	97	12	28	130	51
Brisbane ..	137	27	28	153	2	Alice Springs	1,926	23	38	133	37
Sydney ..	138	33	52	151	12	Dubbo ..	870	32	18	148	35
Melbourne ..	115	37	49	144	58	Laverton, W.A.	1,530	28	40	122	23
Hobart ..	177	42	53	147	20	Coolgardie ..	1,389	30	57	121	10

6. **Temperatures.**—(i) *Comparisons with other Countries.* In respect of Australian temperatures generally, it may be pointed out that the mean annual isotherm for 70° Fahrenheit extends in South America and South Africa as far south as latitude 33°, while in Australia it reaches only as far south as latitude 30°, thus showing that, on the whole, Australia has latitude for latitude a more temperate climate than other places in the Southern Hemisphere.

The comparison is even more favourable when the Northern Hemisphere is included, for in the United States of America the 70° isotherm extends in several of the western States as far north as latitude 41°. In Europe, the same isotherm reaches almost to the southern shores of Spain, passing, however, afterwards along the northern shores of Africa till it reaches the Red Sea, when it bends northward along the eastern shore of the Mediterranean till it reaches Syria. In Asia, nearly the whole of the land area south of latitude 40° N. has a higher temperature than 70°.

The extreme range of temperature is less than 100° over practically the whole of Australia, that figure being only slightly exceeded at a very few places; it is mostly 70° to 90° over inland areas, and somewhat less on the coast. In parts of Asia and North America, the extreme range exceeds 130° and 150° in some localities.

Along the northern shores of Australia the temperatures are very equable. At Darwin, for example, the difference in the means for the hottest and coldest months is only 8.5°, and the extreme readings for the year, or the highest maximum on record and the lowest minimum, show a difference of under 50°.

(ii) *Hottest and Coldest Parts.* A comparison of the temperatures recorded at coast and inland stations shows that, in Australia, as in other continents, the range increases with increasing distance from the coast.

In the interior of Australia, and during exceptionally dry summers, the temperature occasionally reaches or exceeds 120° in the shade, and during the dry winters the major portion of the country to the south of the tropics is subject to ground frosts. The hottest area of the continent is situated in the northern part of Western Australia about the Marble Bar and Nullagine gold-fields, where the maximum shade temperature during the summer sometimes exceeds 100° continuously for days and weeks. The coldest part of Australia is the extreme south-east of New South Wales and extreme east of Victoria—the region of the Australian Alps. Here the temperature seldom, if ever, reaches 100° even in the hottest of seasons, while in winter, readings slightly below zero are occasionally recorded.

Tasmania as a whole enjoys a most moderate and equable range of temperature throughout the year, although occasionally hot winds may cause the temperature to rise to 100° in the eastern half of the State.

(iii) *Monthly Maximum and Minimum Temperatures.* The normal monthly maximum and minimum temperatures can be best shown by means of graphs, which exhibit the nature of the fluctuation of each for all available years. In the diagram herein for nine representative places in Australia, the upper heavy curves show the mean maximum, and the lower heavy curves the mean minimum temperatures based upon daily observations, while the other curves show the humidities.

7. **Humidity.**—After temperature, humidity is the most important element of climate particularly as regards its effects on human comfort, rainfall supply, and conservation and related problems.

In this publication the *absolute humidity* has been graphically represented in inches of vapour pressure (i.e., that portion of the barometric pressure due to vapour). It is this total quantity of moisture in the air which affects personal comfort, plays an important part in varying the density of the atmosphere, and in heating and refrigerating processes. The more commonly quoted value, called the *relative humidity*, refers to the ratio which the actual moisture content of the air bears to the total amount possible if saturation existed at the given temperature, and is usually quoted as a percentage. The relative humidity is an important factor in all drying operations, but *is much less important than the absolute humidity as affecting animal life.*

The mean monthly vapour pressure has also been added to the tables of climatological data for the capital cities included herein.

The annual curve of vapour pressure derived from the normal monthly values for this element is comparable with the maximum and minimum temperature curves, but the relative humidities consisting as they do of the extremes for each month do not show the normal annual fluctuation which would be approximately midway between the extremes.

The order of stations in descending values of 9 a.m. vapour pressure is Darwin, Brisbane, Sydney, Perth, Melbourne, Adelaide, Canberra, Hobart and Alice Springs, while the relative humidity diminishes in the order, Sydney, Canberra, Melbourne, Darwin, Hobart, Brisbane, Perth, Adelaide and Alice Springs.

8. **Evaporation.**—(i) *General.* The rate and quantity of evaporation in any territory is influenced by the prevailing temperature, and by atmospheric humidity, pressure and movement. In Australia, the question is of perhaps more than ordinary importance, since in its drier regions water has often to be conserved in "tanks"* and dams. The magnitude of the economic loss by evaporation will be appreciated from the tabular records herein, which show that the yearly amount varies from about 31 inches at Hobart to more than 100 inches in the Central parts of Australia. Over the *inland* districts of the continent it has been calculated that evaporation equals the rainfall where the annual totals are about 36 inches, the variations above and below this quantity being inverse.

(ii) *Monthly Evaporation Curves.* The diagrams herein showing the mean monthly evaporation in various parts of Australia disclose how characteristically different are the amounts for the several months in different localities.

(iii) *Loss by Evaporation.* In the interior of Australia the possible evaporation is greater than the actual rainfall. Since the loss by evaporation depends largely on the exposed area, tanks and dams so designed that the surface shall be a minimum are advantageous. Further, the more protected from the direct rays of the sun and from winds by means of suitable tree planting, the less will be the loss by evaporation. These matters are naturally of more than ordinary concern in the drier districts of Australia.

9. **Rainfall.**—(i) *General.* The rainfall of any region is determined mainly by the direction and route of the prevailing winds, by the varying temperatures of the earth's surface over which they blow, and by its physiographical features.

* In Australia, artificial storage ponds or reservoirs are called "tanks."

Australia lies within the zones of the south-east trades and prevailing westerly winds. The southern limit of the south-east trade strikes the eastern shores at about 30° south latitude, and, with very few exceptions, the heaviest rains of the Australian continent are precipitated along the Pacific slopes to the north of that latitude, the varying quantities being more or less regulated by the differences in elevation of the shores and of the chain of mountains from the New South Wales northern border to Thursday Island, upon which the rain-laden winds blow. The converse effect is exemplified on the north-west coast of Western Australia, where the prevailing winds blowing from the interior of the continent instead of from the ocean, result in the lightest coastal rain in Australia.

The westerly winds, which skirt the southern shores, are responsible for the reliable, generally light to moderate rains enjoyed by the south-western portion of Western Australia, the agricultural areas of South Australia, a great part of Victoria, and the whole of Tasmania.

(ii) *Distribution of Rainfall.* The average annual rainfall map of Australia herein shows that the heaviest yearly falls—over 50 inches—occur over the coastal region of the Northern Territory, over most of the Cape York Peninsula and coastal districts of Queensland, over many of the coastal areas of New South Wales, and the western parts of Tasmania. A great part of the interior of the continent, stretching from the far west of New South Wales and the south-west of Queensland to the vicinity of Shark Bay in Western Australia, has a very low average rainfall of less than 10 inches a year. Between these two regions of heavy and very low rainfall are the extensive areas which experience useful to good rains, and in the southern and eastern parts of which are found the best country and most of the population and primary production.

(iii) *Factors Determining Occurrence, Intensity and Seasonal Distribution of Rainfall.* Reference has already been made to the frequent rains occurring in the north-eastern coastal districts of Queensland with the prevailing south-east trade winds and to similar rains in the west of Tasmania with the prevailing westerly winds. Other rains in Australia are associated mainly with tropical and southern depressions.

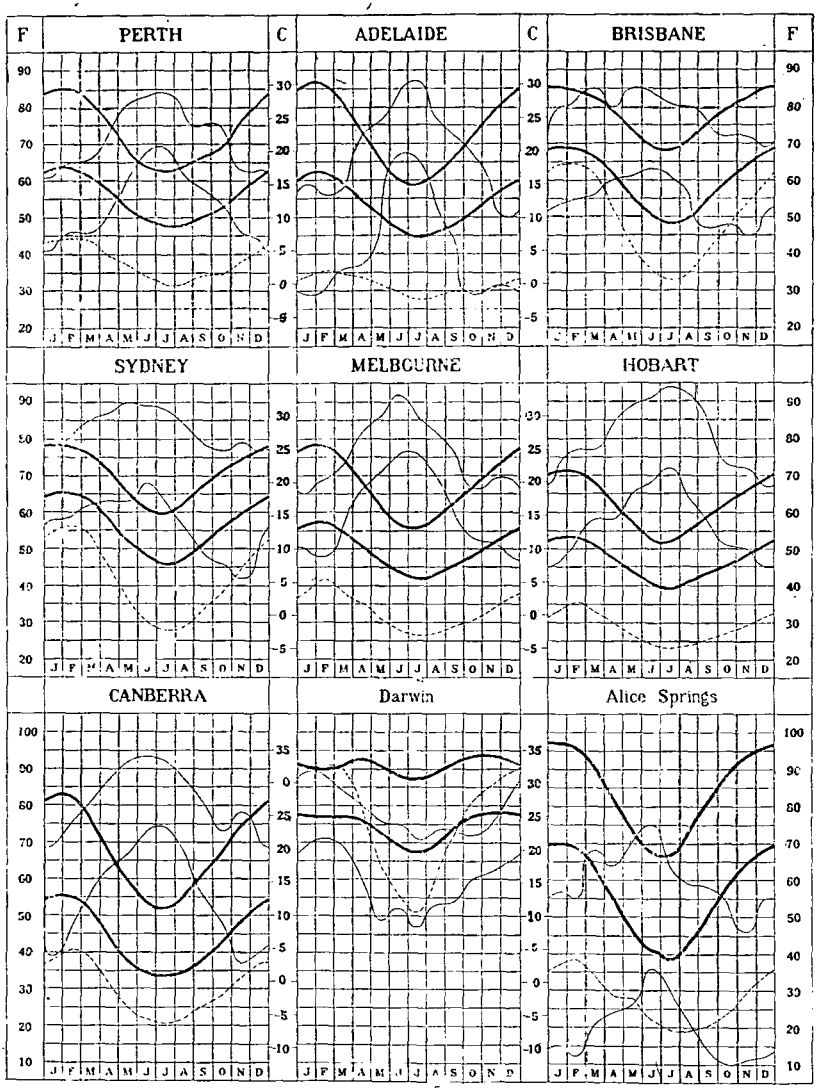
The former chiefly affect the northern, eastern, and to some extent the central parts of the continent and operate in an irregular manner during the warmer half of the year, but principally from December to March. They vary considerably in activity and scope from year to year, occasionally developing into severe storms off the east and north-west coasts. Tropical rainstorms sometimes cover an extensive area, half of the continent on occasions receiving moderate to very heavy falls during a period of a few days. Rain is also experienced, with some regularity, with thunderstorms in tropical areas, specially near the coast. All these tropical rains, however, favour mostly the northern and eastern parts of the area referred to; the other parts further inland receive lighter, less frequent and less reliable rainfall. With the exception of districts near the east coast, where some rain falls in all seasons, the tropical parts of the continent receive useful rains only on rare occasions from May to September.

The southern depressions are most active in the winter—June to August—and early spring months. The rains associated with them are fairly reliable and frequent over Southern Australia and Tasmania, and provide during that period the principal factor in the successful growing of wheat. These depressions also operate with varying activity during the remainder of the year, but the accompanying rains are usually lighter. The southern rains favour chiefly the south-west of Western Australia, the agricultural districts of South Australia, Victoria, Tasmania, and the southern parts of New South Wales. They sometimes extend into the drier regions of the interior, but only infrequently and with irregular rains.

The map showing mean monthly distribution of rainfall over Australia gives information on the amount and occurrence of rain in graphic form.

(iv) *Wettest and Driest Regions.* The wettest known part of Australia is on the north-east coast of Queensland, between Port Douglas and Cardwell, where Tully on the Tully River has an average rainfall of 176.89 inches yearly, while three stations situated on, or adjacent to, the Johnstone and Russell Rivers have an average annual rainfall of between 143 and 169 inches. The maximum and minimum falls there are:—

AVERAGE ANNUAL FLUCTUATIONS OF NORMAL MAXIMUM AND MINIMUM TEMPERATURE AND HUMIDITY.



EXPLANATION.—The upper and lower heavy lines in each graph represent the mean maximum and mean minimum temperatures respectively. The Fahrenheit temperature scales are shown on the outer edge of the sheet under " F " and the centigrade scales in the two inner columns under " C."

The broken line shows the normal absolute humidity in the form of 9 a.m. vapour pressures for which the figures in the outer " F " columns represent hundredths of an inch of barometric pressure.

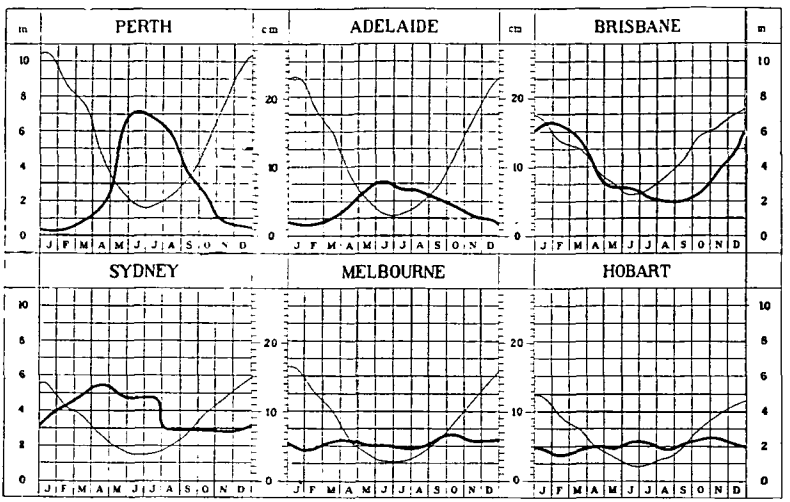
The upper and lower fine lines join the greatest and the least monthly means of relative humidity respectively, the figures under the outer columns " F " indicating percentage values.

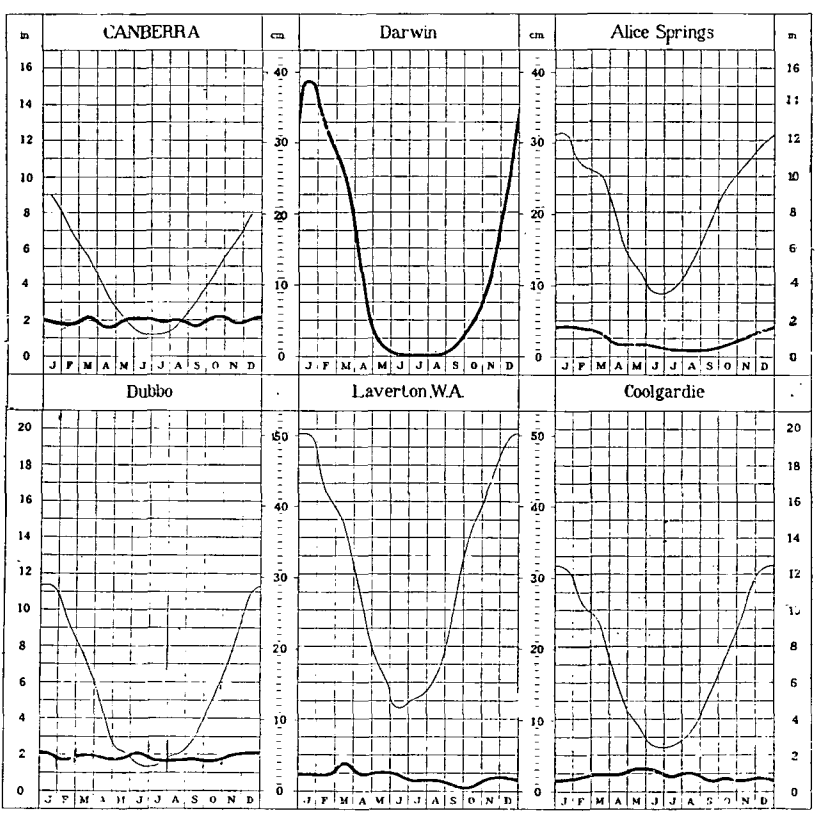
The curves for temperature and vapour pressure joining the mean monthly values serve to show the annual fluctuation of these elements, but the relative humidity graphs joining the extreme values for each month do not indicate any normal annual variation.

Comparison of the maximum and minimum temperature curves affords a measure of the mean diurnal range of temperature. At Perth in the middle of January, for instance, there is normally a range of 21° from 63° F. to 84° F., but in July it is only 15° from 48° F. to 63° F.

The relative humidity curves illustrate the extreme range of the mean monthly humidity over a number of years.

MEAN MONTHLY RAINFALL AND EVAPORATION.





EXPLANATION.—On the preceding graphs thick lines denote rainfall, and thin lines evaporation, and show the fluctuation of the mean rate of fall or evaporation *per month* throughout the year. The results, plotted from the Climatological Tables herein, are shown in inches (see the outer columns), and the corresponding metric scale (centimetres) is shown in the two inner columns. The evaporation is not given for Darwin.

At Perth, Adelaide, Brisbane, Melbourne, Hobart, Canberra, Alice Springs, and Coolgardie the results have been obtained from jacketed tanks sunk in the ground. At Sydney and Dubbo sunken tanks without water jackets are used, whilst at Laverton (W.A.) the records are taken from a small portable jacket evaporation dish of 8 inches in diameter.

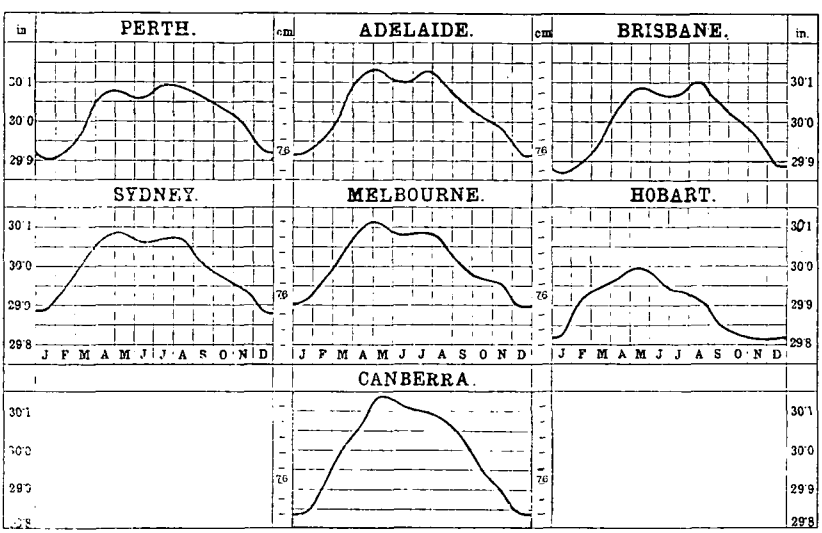
The distance for any date from the zero line to the curve represents the average number of inches, reckoned as per month, of rainfall at that date. Thus, taking the curve for Adelaide in the middle of January, the rain falls on the average at the rate of about three-fourths of an inch per month or, say, at the rate of about 9 inches per year. In the middle of June it falls at the rate of a little over 3 inches per month, or, say, at the rate of about 37 inches per year. At Dubbo, the evaporation is at the rate of nearly 11¾ inches per month about the middle of January, and only about 1½ inches at the middle of June.

The mean annual rainfall and evaporation at the places indicated are given in the appended table.

MEAN ANNUAL RAINFALL AND EVAPORATION.

Place.	Rainfall.	Evaporation.	Place.	Rainfall.	Evaporation.
	In.	In.		In.	In.
Perth ..	34.90	66.17	Canberra ..	23.30	53.42
Adelaide ..	21.17	55.65	Darwin ..	58.84	—
Brisbane ..	44.91	56.15	Alice Springs ..	10.57	97.21
Sydney ..	46.90	39.86	Dubbo ..	21.85	66.37
Melbourne ..	25.64	39.11	Laverton, W.A.	9.10	145.17
Hobart ..	24.08	31.32	Coolgardie ..	10.22	85.37

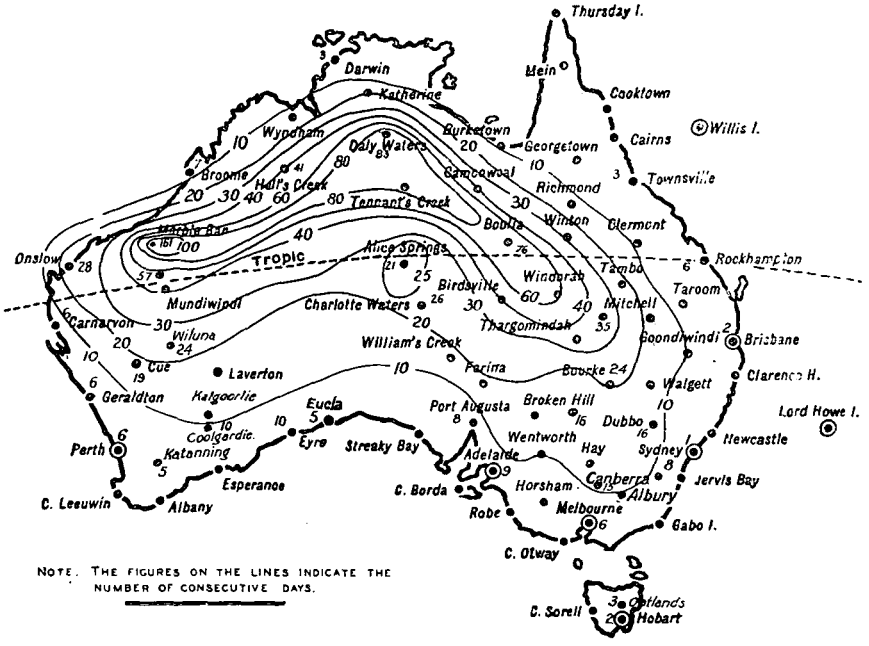
MEAN BAROMETRIC PRESSURE.—CAPITAL CITIES.



EXPLANATION.—The lines representing the yearly fluctuations of barometric pressure at the State capital cities are means for long periods, and are plotted from the Climatological Tables herein. The pressures are shown in inches on about 2½ times the natural scale, and the corresponding pressures in centimetres are also shown in the two inner columns, in which each division represents one millimetre.

Taking the Brisbane graph for purposes of illustration, it will be seen that the mean pressure in the middle of January is about 29.87 inches, and there are maxima in the middle of May and August of about 30.09 inches.

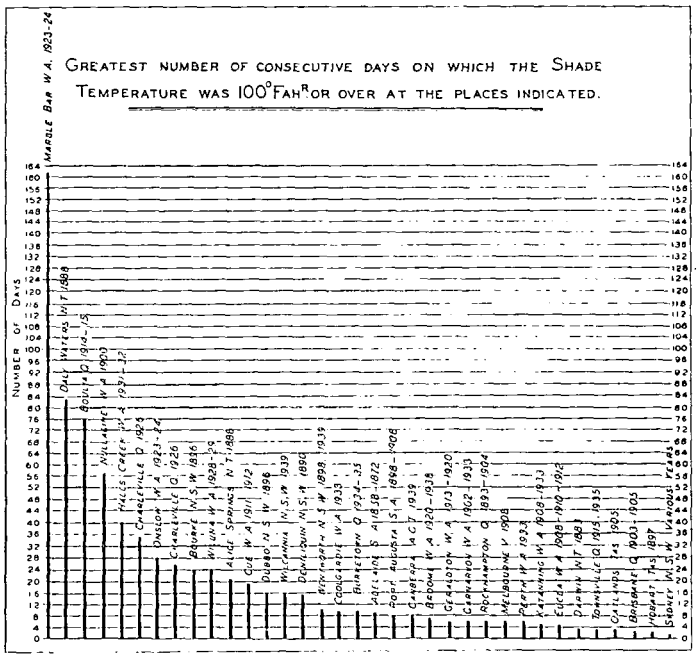
AREA AFFECTED AND PERIOD OF DURATION OF THE LONGEST HEAT WAVES WHEN THE MAXIMUM TEMPERATURE FOR CONSECUTIVE 24 HOURS REACHED OR EXCEEDED 100°F.

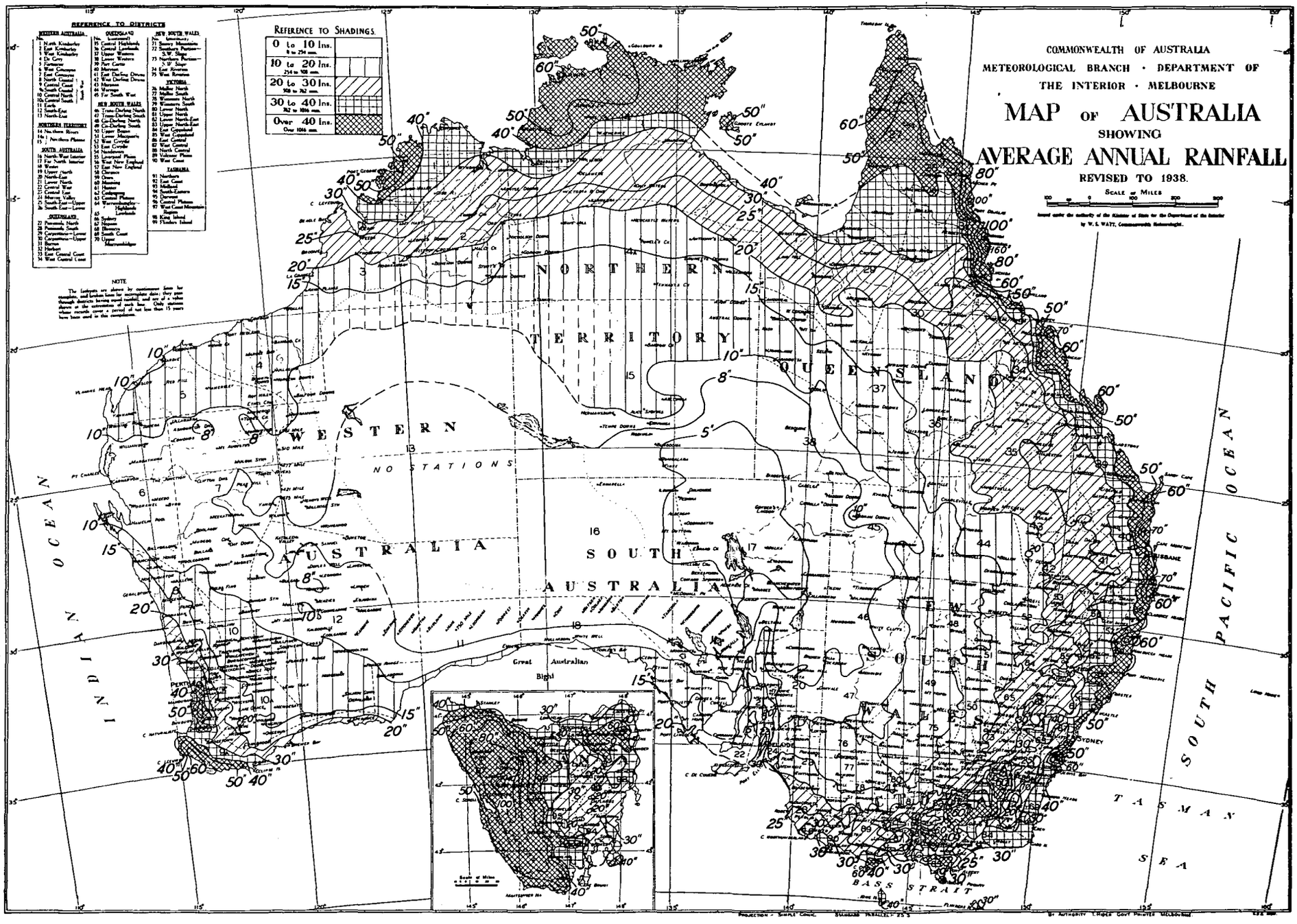


NOTE. THE FIGURES ON THE LINES INDICATE THE NUMBER OF CONSECUTIVE DAYS.

JUNE 1940.

GREATEST NUMBER OF CONSECUTIVE DAYS ON WHICH THE SHADE TEMPERATURE WAS 100°FAHR OR OVER AT THE PLACES INDICATED.




COMMONWEALTH OF AUSTRALIA
METEOROLOGICAL BRANCH · DEPARTMENT OF THE INTERIOR · MELBOURNE
MAP OF AUSTRALIA
SHOWING
AVERAGE ANNUAL RAINFALL
REVISED TO 1938.
Scale of Miles
REFERENCE TO SHADINGS.
0 to 10 Ins.
10 to 20 Ins.
20 to 30 Ins.
30 to 40 Ins.
Over 40 Ins.
REFERENCE TO DISTRICTS
NOTE
NO STATIONS
NORTHERN TERRITORY
QUEENSLAND
WESTERN AUSTRALIA
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA
INDIAN OCEAN
SOUTH PACIFIC OCEAN
TASMAN SEA
BASS STRAIT
Great Australian Bight

COMMONWEALTH OF AUSTRALIA.

BUREAU OF METEOROLOGY.

MELBOURNE.

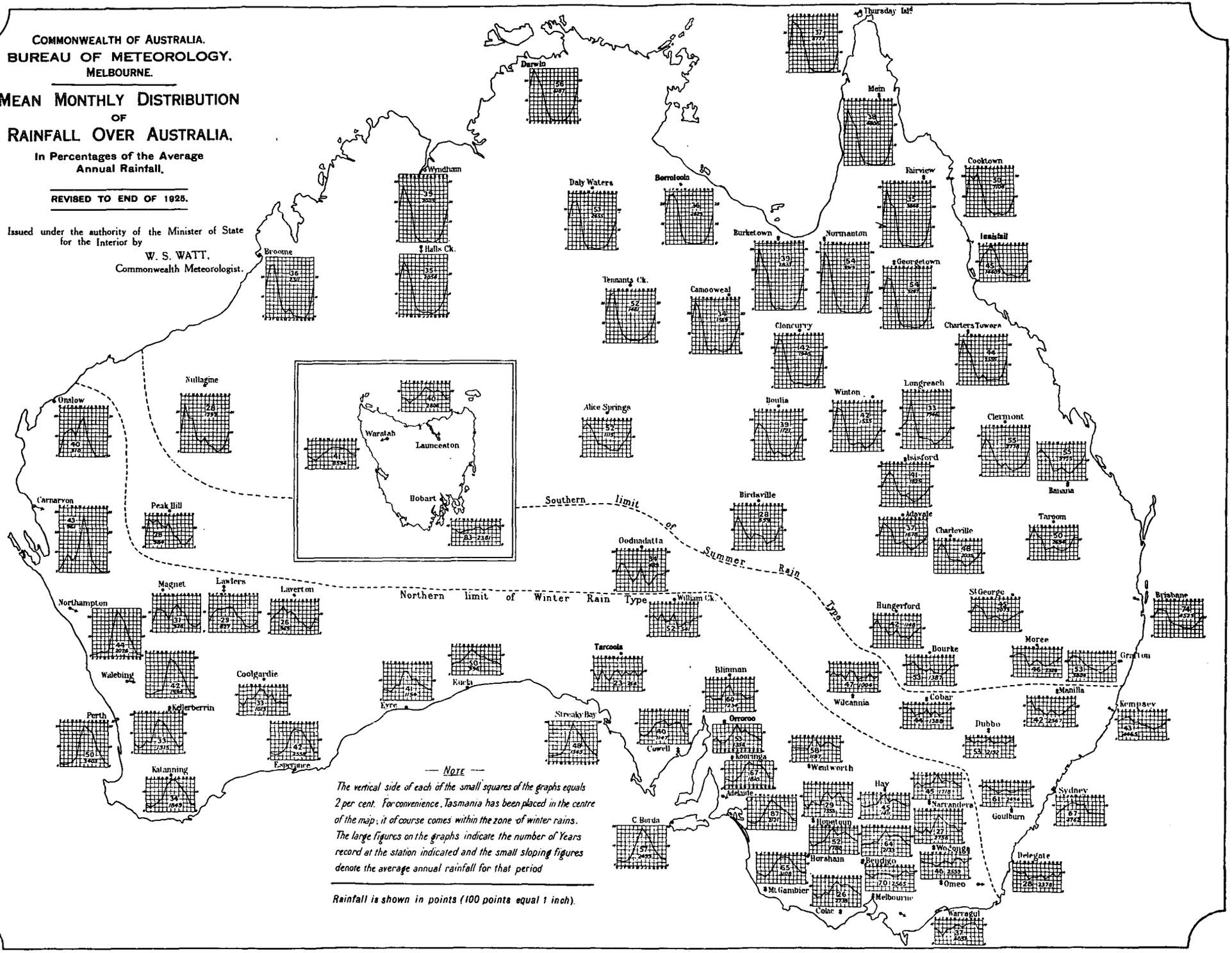
MEAN MONTHLY DISTRIBUTION OF RAINFALL OVER AUSTRALIA.

In Percentages of the Average Annual Rainfall.

REVISED TO END OF 1928.

Issued under the authority of the Minister of State for the Interior by

W. S. WATT,
Commonwealth Meteorologist.



— *NOTE* —

The vertical side of each of the small squares of the graphs equals 2 per cent. For convenience, Tasmania has been placed in the centre of the map; it of course comes within the zone of winter rains. The large figures on the graphs indicate the number of Years record at the station indicated and the small sloping figures denote the average annual rainfall for that period

Rainfall is shown in points (100 points equal 1 inch).

Tully, 234.37 in 1936 and 133.23 inches in 1938, or a range of 101.14 inches; Goondi, 241.53 in 1894 and 67.88 inches in 1915, or a range of 173.65 inches; Innisfail, 211.24 in 1894 and 69.87 inches in 1902, or a range of 141.37 inches; Harvey Creek, 254.77 in 1921 and 80.47 inches in 1902, or a range of 174.30 inches.

On four occasions more than 200 inches have been recorded at Goondi, the last of these being in 1910, when 204.82 inches were registered. The record at this station covers a period of 53 years.

Both Tully and Harvey Creek, in the shorter periods of 13 and 30 years respectively, have four times exceeded 200 inches. At Tully 234 37 inches were recorded during 1936 and at Harvey Creek the total for 1921 was 254.77 inches. At the South Johnstone Sugar Experiment Station 202.52 inches were recorded in 1921.

In Tasmania the wettest part is in the West Coast region, the average annual rainfall at Lake Margaret being 145 inches, with a maximum of 175.12 inches in 1924.

The driest known part of the continent is in the Lake Eyre district in South Australia (the only part of the continent below sea level), where the annual average is only 5 inches, and where the fall rarely exceeds 10 inches for the twelve months.

The inland districts of Western Australia were at one time regarded as the driest part of Australia, but authentic observations in recent years over most settled districts in the east of that State show that the annual average is about 10 inches.

(v) *Quantities and Distribution of Rainfall.* The general distribution is best seen from the rainfall map herein, which shows the areas subject to average annual rainfalls lying between certain limits. The areas enjoying varying quantities of rainfall determined from the latest available information are shown in the following table :—

AVERAGE ANNUAL RAINFALL DISTRIBUTION.

Average Annual Rainfall.	N.S.W. (a)	Victoria.	Queensland.	South Australia	Western Australia.	Tasmania. (b)	Northern Territory	Total. (b)
	sq. mls.	sq. mls.	sq. mls.	sq. mls.	sq. mls.	sq. mls.	sq. mls.	sq. mls.
Under 10 inches	48,749	nil	80,496	310,660	486,952	nil	140,500	1,067,357
10—15 ,,	78,454	18,701	81,549	36,460	255,092	nil	132,780	603,036
15—20 ,,	55,762	13,800	111,833	19,940	94,101	304	63,026	358,766
20—25 ,,	45,140	13,551	143,610	8,620	44,340	3,844	49,157	308,262
25—30 ,,	30,539	14,528	99,895	3,258	31,990	3,016	41,608	224,834
30—40 ,,	33,557	15,802	61,963	1,036	59,520	5,027	37,642	214,547
Over 40 ,,	18,171	11,502	91,154	96	3,925	11,247	58,907	195,002
Total area ..	310,372	87,884	670,500	380,070	975,920	23,438	523,620	2,971,804

(a) Including Australian Capital Territory. (b) Over an area of 2,777 square miles no records are available.

Referring first to the capital cities the records of which are given in the next table, it will be seen that Sydney, with a normal rainfall of 47.30 inches, occupies the chief place; Brisbane, Perth, Melbourne, Hobart, Canberra and Adelaide follow in that order, Adelaide with 21.17 inches being the driest. The extreme range from the wettest to the driest year is greatest at Brisbane (72.09 inches) and least at Adelaide (19.48 inches).

In order to show how the rainfall is distributed throughout the year in various parts of the continent, the figures for representative towns have been selected. (See map.) The figures for Darwin, typical of the Northern Territory, show that nearly the whole of the rainfall occurs there in the summer months, while little or none falls in the middle of the year. The figures for Perth, as representing the south-western part of the continent, are the reverse for while the summer months are dry, the winter ones are very wet. In Melbourne and Hobart the rain is fairly well distributed throughout the twelve months, with a maximum in October for the former, and in November for the latter. The records at Alice Springs and Daly Waters indicate that in the central parts of Australia most of the rain occurs from November to March. In Queensland, the heaviest rains fall in the summer months, but good averages are also maintained during the other seasons in eastern parts.

On the coast of New South Wales, the first six months of the year are the wettest, with a maximum in the autumn; the averages during the last six months are fair, and moderately uniform. Generally it may be said that approximately one-third of the area of the continent, principally in the eastern and northern parts, enjoys an annual average rainfall of from 20 to 50 or more inches, the remaining two-thirds averaging from 5 to 20 inches.

(vi) *Curves of Rainfall and Evaporation.* The relative amounts of rainfall and evaporation at different times through the year are clearly indicated in the graphs herein. Inspection thereof will show how large is the evaporation when water is fully exposed to the direct rays of the sun and to wind.

(vii) *Tables of Rainfall.* The table of rainfall for a long period of years for each of the various Australian capitals affords information as to the variability of the fall in successive years, and the list of the more remarkable falls furnishes information as to what may be expected on particular occasions.

RAINFALL: AUSTRALIAN CAPITAL CITIES.

Year.	Canberra.(a)		Perth.		Adelaide.		Brisbane.		Sydney.		Melbourne.		Hobart.	
	Amount.	No. of Days.	Amount.	No. of Days.	Amount.	No. of Days.	Amount.	No. of Days.	Amount.	No. of Days.	Amount.	No. of Days.	Amount.	No. of Days.
	in.		in.		in.		in.		in.		in.		in.	
1906 ..	..	..	32.37	121	26.51	127	42.85	125	31.89	160	22.29	114	23.31	155
7 ..	..	..	40.12	132	17.78	125	31.46	119	31.32	132	22.26	102	25.92	166
8 ..	..	..	30.52	106	24.56	125	44.01	125	45.65	167	17.72	130	16.50	148
9 ..	..	..	39.11	107	27.69	138	34.06	111	32.45	177	25.86	171	27.29	170
10 ..	..	..	37.02	135	24.62	116	49.00	133	46.91	160	24.61	167	25.22	205
11 ..	..	..	23.38	108	15.99	127	35.21	128	50.24	155	36.61	168	26.78	193
12 ..	19.27	76	27.85	123	19.57	116	41.30	114	47.51	172	20.37	157	23.14	181
13 ..	16.38	71	38.28	141	18.16	102	40.81	115	57.70	141	21.17	157	19.36	165
14 ..	18.49	81	20.21	128	11.39	91	33.99	141	56.42	149	18.57	129	15.42	154
15 ..	22.31	87	43.61	164	19.38	117	25.66	93	34.79	117	20.95	167	20.91	198
16 ..	31.26	119	35.16	128	28.16	142	52.80	136	44.91	161	38.04	170	43.39	203
17 ..	29.70	144	45.64	146	28.90	153	40.92	127	52.40	151	30.57	171	30.62	214
18 ..	18.27	95	39.58	138	17.41	107	24.95	121	42.99	149	27.13	160	26.04	179
19 ..	16.31	85	30.66	120	17.21	108	19.36	93	58.71	152	24.89	141	22.48	153
20 ..	29.30	107	40.35	124	26.70	119	39.72	122	43.42	159	28.27	162	18.00	182
21 ..	..	..	41.09	135	22.64	100	54.31	167	43.34	140	29.76	154	18.04	159
22 ..	..	..	31.86	135	23.20	117	35.82	109	39.35	136	25.02	151	28.27	189
23 ..	..	..	44.47	134	29.79	139	23.27	93	37.01	123	22.64	158	32.93	198
24 ..	25.95	68	33.79	119	23.44	143	41.08	114	37.01	136	36.48	171	28.76	197
25 ..	33.71	59	31.41	126	21.91	118	53.10	139	50.35	145	17.57	144	22.67	170
26 ..	20.53	97	49.22	167	22.20	116	30.82	111	37.07	127	20.51	149	25.79	187
27 ..	21.40	83	36.59	133	16.92	101	62.08	130	48.56	138	17.98	135	20.13	185
28 ..	17.82	96	44.88	140	19.43	107	52.64	145	40.07	130	24.09	151	30.23	205
29 ..	22.34	88	36.77	132	17.51	119	39.78	118	57.90	129	28.81	168	26.55	194
30 ..	16.52	86	39.80	129	18.65	116	41.22	144	44.47	141	25.41	145	19.38	152
31 ..	24.25	105	39.18	118	22.26	145	66.72	136	49.22	153	28.63	164	27.17	179
32 ..	19.13	107	39.40	121	25.04	141	24.79	97	37.47	146	31.08	179	30.29	155
33 ..	20.30	88	32.47	116	22.12	130	49.71	118	42.71	153	22.28	136	23.18	182
34 ..	35.89	118	40.61	120	20.24	125	54.26	117	64.91	183	33.53	157	23.17	194
35 ..	24.40	102	32.28	129	23.45	140	34.64	111	30.97	131	29.98	183	32.22	196
36 ..	29.49	121	30.64	118	19.34	121	21.77	101	30.22	130	24.30	187	19.60	178
37 ..	22.50	93	35.28	120	23.01	128	34.79	113	52.00	157	21.45	144	20.65	160
38 ..	20.15	85	29.64	111	19.26	119	43.49	110	39.17	132	17.63	131	31.32	169
39 ..	26.95	128	45.70	123	23.29	139	41.43	122	33.67	127	33.11	166	27.23	188
Average	23.30	95	34.90	121	21.17	124	44.73	126	47.30	152	26.11	140	24.08	153
No. of Years	25	25	64	64	101	101	90	80	100	100	97	84	97	96

(a) Records commenced in 1912; details are not available for the years 1921 to 1923.

NOTE.—The foregoing average rainfall figures for Brisbane, Sydney and Melbourne differ slightly from the average annual falls given in the Climatological Tables and on page 46, which are for a less number of years. Annual totals from 1860 to 1901 inclusive will be found in Official Year Book No. 15, p. 53.

10. **Remarkable Falls of Rain.**—The following are the most remarkable falls of rain in the various States and Territories which have occurred within a period of twenty-four hours. For other very heavy falls at various localities reference may be made to Official Year Book No. 14, pp. 60–64, No. 22, pp. 46–48 and No. 29, pp. 43, 44 and 51 :—

HEAVY RAINFALLS: NEW SOUTH WALES, UP TO 1939, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		in.			in.
Broger's Creek ..	14 Feb., 1898	20.05	South Head (near Sydney) ..	16 Oct., 1844	20.41
„ „ ..	13 Jan., 1911	20.83	Towamba ..	5 Mar., 1893	20.00
Cordeaux River ..	14 Feb., 1898	22.58	Viaduct Creek ..	15 „ 1936	20.00
Morpeth	9 Mar., 1893	21.52			

HEAVY RAINFALLS: QUEENSLAND, UP TO 1939, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		in.			in.
Babinda (Cairns) ..	2 Mar., 1935	24.14	Mackay ..	21 Jan., 1918*a*	24.70
Buderim Mountain	11 Jan., 1898	26.20	Macnade Mill ..	6 „ 1901	23.33
Crohamhurst (Blackall Range)	2 Feb., 1893	35.71	Plane Creek (Mackay) ..	26 Feb., 1913	27.73
Deeral	2 Mar., 1935	27.60	Port Douglas ..	1 Apr., 1911	31.53
Goondi	30 Jan., 1913	24.10	Tully	19 Jan., 1932	27.20
Harvey Creek ..	3 „ 1911	27.75	Woodlands (Yepp'n)	31 Jan., 1893	23.07
Kuranda (Cairns) ..	2 Apr., 1911	28.80	Yarrabah ..	2 Apr., 1911	30.65

(*a*) 37½ hours.

HEAVY RAINFALLS: WESTERN AUSTRALIA, UP TO 1939, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		in.			in.
Balla Balla ..	21 Mar., 1899	14.40	Roebuck Plains ..	5 Jan., 1917	14.01
Boodarie ..	21 Jan., 1896	14.53	„ „ ..	6 „ 1917	22.36
Broome	6 „ 1917	14.00	Thangoo ..	17-19 Feb.'96	24.18
Derby	7 Jan., 1917	16.47	Whim Creek ..	3 Apr., 1898	29.41
Fortescue ..	3 May, 1890	23.36	Winderrie ..	17 Jan., 1923	14.23
Pilbara	2 Apr., 1898	14.04			

HEAVY RAINFALLS: NORTHERN TERRITORY, UP TO 1939, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		in.			in.
Bathurst Island Mission ..	7 Apr., 1925	11.85	Brock's Creek ..	24 Dec., 1915	14.33
Birrimbah ..	6 Mar., 1935	16.50	Cape Don ..	13 Jan., 1934	13.58
Borroloola ..	14 „ 1899	14.00	Darwin	7 Dec., 1915	11.67

HEAVY RAINFALLS: SOUTH AUSTRALIA, UP TO 1939, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		in.			in.
Coober Pedy ..	19 Feb., 1938	6.50	Nunjikompita ..	21 Feb., 1938	6.50
Lobethal ..	18 Apr., 1938	6.44	Wilmington ..	1 Mar., 1921	7·12

HEAVY RAINFALLS: VICTORIA, UP TO 1939, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		in.			in.
Cann River ..	16 Mar., 1938	9.94	Mt. Buffalo ..	6 June, 1917	8.53
Cunninghame ..	26 Dec., 1935	8.50	Murrungowar ..	16 Mar., 1938	8.36
Hazel Park ..	1 Dec., 1934	10.50	Olinda	1 Dec., 1934	9.10
Kalorama ..	1 ,, ,,	10.05	Tambo Crossing ..	13 July, 1925	8.89
Korumburra ..	1 ,, ,,	8.51	Tonghi Creek ..	27 Feb.. 1919	9.90

HEAVY RAINFALLS: TASMANIA, UP TO 1939, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		in.			in.
Cullenswood ..	5 Apr., 1929	11.12	Riana	5 Apr., 1929	11.08
Gould's Country ..	8-10 Mar., '11	15.33	The Springs ..	30-31 Jan., '16	10.75
Lottah	8-10 Mar., '11	18.10	Triabunna ..	5 June, 1923	10.20
Mathinna ..	5 Apr., 1929	13.25			

HEAVY RAINFALLS: AUSTRALIAN CAPITAL TERRITORY, UP TO 1939, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		in.			in.
Canberra ..	27 May, 1925	6.84	Uriarra	27 May, 1925	6.57
Cotter Junction ..	,, ,,	7.13			

11. **Snowfall.**—Light snow has been known to fall occasionally as far north as latitude 31° S., and from the western to the eastern shores of the continent. During exceptional seasons, it has fallen simultaneously over two-thirds of the State of New South Wales, and has extended at times along the whole of the Great Dividing Range, from its southern extremity in Victoria as far north as Toowoomba in Queensland. During the winter, for several months, snow covers the ground to a great extent on the

Australian Alps, where also the temperature falls below zero Fahrenheit during the night. In the ravines around Mt. Kosciusko and similar localities the snow never entirely disappears.

12. **Hail.**—Hail falls most frequently along the southern shores of the continent in the winter, and over eastern Australia during the summer months. The size of the hailstones generally increases with distance from the coast. A summer rarely passes without some station experiencing a fall of stones exceeding in size an ordinary hen-egg, and many riddled sheets of light-gauge galvanized iron bear evidence of the weight and penetrating power of the stones.

The hailstones occur most frequently when the barometric readings indicate a flat and unstable condition of pressure. Tornadoes or tornadic tendencies are almost invariably accompanied by hail, and on the east coast the clouds from which the stones fall are frequently of a remarkable sepia-coloured tint.

13. **Barometric Pressures.**—The mean annual barometric pressure (corrected to sea-level and standard gravity) in Australia varies from 29.80 inches on the north coast to 29.92 inches over the central and 30.03 inches in the southern parts of the continent. In January, the mean pressure ranges from 29.70 inches in the northern and central areas to 29.95 inches in the southern. The July mean pressure ranges from 29.90 inches at Darwin to 30.11 inches at Alice Springs. Barometer readings corrected to mean sea-level and standard gravity have, under anticyclonic conditions in the interior of the continent, ranged as high as 30.78 inches (at Kalgoorlie on the 28th July, 1901) and have fallen as low as 27.55 inches. This lowest record was registered at Mackay during a tropical hurricane on the 21st January, 1918. An almost equally abnormal reading of 27.88 inches was recorded at Innisfail during a similar storm on the 10th March, 1918. The mean barometric pressure for the capitals of Australia is shown on the graphs herein.

14. **Wind.**—(i) *Trade Winds.* The two distinctive wind currents in Australia are as previously stated, the south-east and westerly trade winds. As the belt of the earth's atmosphere in which they blow apparently follows the sun's ecliptic path north and south of the equator, so the area of the continent affected by these winds varies at different seasons of the year. During the summer months the anticyclonic belt travels in very high latitudes, thereby bringing the south-east trade winds as far south as 30° south latitude. The westerly trade winds retreat a considerable distance to the south of Australia, and are rarely in evidence in the hot months. When the sun passes to the north of the equator, the south-east trade winds follow it, and only operate to the north of the tropics for the greater part of the winter. The westerly winds come into lower latitudes during the same period of the year. They sweep across the southern areas of the continent from the Leeuwin to Cape Howe, and during some seasons are remarkably persistent and strong, and occasionally penetrate to almost tropical latitudes.

(ii) *Land and Sea Breezes.* The prevailing winds second in order of importance are the land and sea breezes. On the east coast the sea breezes which come in from the north-east, when in full force, frequently reach the velocity of a gale during the afternoon in the summer months, the maximum hourly velocity, ordinarily attained about 3 p.m., not infrequently attaining a rate of 35 to 40 miles per hour. This wind, although strong, is usually shallow in depth, and does not ordinarily penetrate more than 9 or 12 miles inland.

The land breezes on the east coast blow out from a westerly direction during the night.

On the western shores of the continent the directions are reversed. The sea breezes come in from the south-west, and the land breezes blow out from the north-east.

(iii) *Inland Winds.* Inland, the direction of the prevailing winds is largely regulated by the seasonal changes of pressure, so disposed as to cause the winds to radiate spirally outward from the centre of the continent during the winter months, and to circulate spirally from the seaboard to the centre of Australia during the summer months.

(iv) *Prevailing Direction at the Capital Cities.* In Canberra, the winds are mainly from easterly and north-westerly directions, the former predominating to a somewhat greater degree in the mornings, the latter in the afternoons and in the colder half of the year.

In Perth, southerly (south-west to south-east) is the prevailing direction for August to April inclusive and north-north-west to north-north-east for the midwinter months.

In Adelaide the summer winds are from the south-west and south, and in the winter from north-east to north.

In Brisbane, south-east winds are in evidence all the year round, but more especially from January to April.

In Sydney from May to September the prevailing direction is westerly, and for the remaining seven months north-easterly.

Melbourne winter winds are from north-west to north-east, and those of the summer from south-west to south-east, with a moderate percentage of northerly.

At Hobart the prevailing direction for the year is from north-west.

Over the greater part of Australia, January is the most windy month, i.e., is the month when the winds are strongest on the average, though the most violent wind storms occur at other times during the year, the time varying with the latitude.

15. **Cyclones and Storms.**—The "elements" in Australia are ordinarily peaceful, and while destructive cyclones have visited various parts, more especially coastal areas, such visitations are rare, and may be properly described as erratic.

During the winter months, the southern shores of the continent are subject to cyclonic storms, evolved from the V-shaped depressions of the southern low-pressure belt. They are felt most severely over the south-western parts of Western Australia, to the south-east of South Australia, in Bass Strait, including the coast-line of Victoria, and on the west coast of Tasmania. Apparently the more violent wind pressures from these cyclones are experienced in their northern half, or in that part of them which has a north-westerly to a south-westerly circulation.

The north-east coast of Queensland is occasionally visited by hurricanes from the north-east tropics. During the first four months of the year, these hurricanes appear to have their origin in the neighbourhood of the South Pacific Islands, their path being a parabolic curve first to the S.W. and finally towards the S.E. Only a small percentage, however, reach Australia, the majority recurving in their path to the east of New Caledonia.

Very severe cyclones, locally known as "willy willies," are peculiar to the north-west coast of Western Australia from the months of November to April, inclusive. They apparently originate in the ocean in the vicinity of Cambridge Gulf, and travel in a south-westerly direction with continually increasing force, displaying their greatest energy near Cossack and Onslow, between latitudes 20° and 22° South. The winds in these storms, like those from the north-east tropics, are very violent and destructive, and cause great havoc amongst the pearl-fishers. The greatest velocities are usually to be found in the south-eastern quadrant of the cyclones, with north-east to east winds. After leaving the north-west coast, these storms either travel southwards, following the coast-line, or cross the continent to the Great Australian Bight. When they take the latter course, their track is marked by torrential rains, as much as 29.41 inches, for example, being recorded in 24 hours at Whim Creek from one such occurrence. Falls of 10 inches and over have frequently been recorded in the northern interior of Western Australia from similar storms.

Some further notes on severe cyclones and on " southerly bursters," a characteristic feature of the eastern part of Australia, will be found in previous issues of the Official Year Book (see No. 6, pp. 84–86).

A special article dealing with " Australian Hurricanes and Related Storms " appeared in Official Year Book No. 16, pp. 80–84.

16. **Influences affecting Australian Climate.**—(i) *General.* Australian history does not cover a sufficient period, nor is the country sufficiently occupied, to ascertain whether or not the advance of settlement has materially affected the climate as a whole. Local changes have, however, taken place, a fact which suggests that settlement and the treatment of the land have a distinct effect on local conditions. For example, the mean temperature of Sydney shows a rise of two tenths of a degree during the last twenty years, a change probably brought about by the great increase of residential and manufacturing buildings within the city and in the surrounding suburbs. Again, low-lying lands on the north coast of New South Wales, which originally were seldom subject to frosts, have, with the denudation of the surrounding hills from forests, experienced annual visitations, the probable explanation being that through the absence of trees the cold air of the highlands now flows unchecked and untempered down the sides of the hills to the valleys and lower lands.

(ii) *Influence of Forests on Climate.* As already indicated, forests doubtless exercise a great influence on local climate, and hence, to the extent that forestal undertakings will allow, the weather can be controlled by human agency. The direct action of forests is an equalizing one; thus, especially in equatorial regions, and during the warmest portion of the year, they considerably reduce the mean temperature of the air. They also reduce the diurnal extremes of shade temperatures by altering the extent of radiating surface by evaporation, and by checking the movement of air, and while decreasing evaporation from the ground, they increase the relative humidity. Vegetation greatly diminishes the rate of flow-off of rain and the washing away of surface soil, and when a region is protected by trees, a steadier water supply is ensured, and the rainfall is better conserved. In regions of snowfall, the supply of water to rivers is similarly regulated, and without this and the sheltering influence of ravines and " gullies," watercourses supplied mainly by melting snow would be subject to alternative periods of flooding and dryness. This is borne out in the case of the inland rivers, the River Murray, for example, which has never been known to become dry, deriving its steadiness of flow mainly through the causes indicated.

(iii) *Direct Influence of Forests on Rainfall.* Whether forests have a direct influence on rainfall is a debatable question, some authorities alleging that precipitation is undoubtedly induced by forests, while others take the opposite view.

Sufficient evidence exists, however, to prove that, even if the rainfall has not increased, the beneficial climatic effect of forest lands more than warrants their protection and extension. Rapid rate of evaporation, induced by both hot and cold winds, injures crops and makes life uncomfortable on the plains, and, while it may be doubted that the forest aids in increasing precipitation, it must be admitted that it does check winds and the rapid evaporation due to them. Trees as wind-breaks have been successfully planted in central parts of the United States of America, and there is no reason why similar experiments should not be successful in many parts of the treeless interior of Australia. The belts should be planted at right angles to the direction of the prevailing parching winds, and if not more than half a mile apart will afford shelter to the enclosed areas.

In previous issues some notes on observations made in other countries were added (see Official Year Book No. 6, pp. 86 and 95).

17. **Rainfall and Temperatures, Various Cities.**—The following table shows rainfall and temperature for various important cities throughout the world, for the Australian capital, and for the capitals of the Australian States.

RAINFALL AND TEMPERATURES: VARIOUS CITIES.

Place.	Height above M.S.L.	Annual Rainfall.			Temperature.					
		Average.	Highest.	Lowest.	(a) Mean Summer.	(b) Mean Winter.	Highest on Record.	Lowest on Record.	Average Hottest Month.	Average Coldest Month.
	Ft.	In.	In.	In.	Fahr.	Fahr.	Fahr.	Fahr.	Fahr.	Fahr.
Amsterdam (Gardens) ..	3	31.26	38.39	20.24	61.3	37.4	93.2	3.2	64.0	37.0
Auckland ..	160	44.85	74.15	26.32	65.8	52.3	85.0	35.0	66.6	51.6
Athens.. ..	351	15.48	33.33	4.56	79.2	49.1	109.4	19.6	81.0	47.4
Bergen ..	116	73.43	107.32	54.33	56.1	34.7	86.0	7.3	57.4	34.2
Berlin (Central) ..	161	22.72	30.04	14.25	64.8	33.0	98.6	−13.4	66.0	31.8
Berne	1,877	36.30	58.23	24.69	62.2	30.1	91.4	− 3.6	64.4	28.0
Bombay ..	32	70.54	114.89	33.42	82.7	74.7	100.2	53.2	84.3	73.9
Breslau ..	410	22.60	32.51	15.91	64.2	30.9	99.9	−25.6	64.2	30.9
Brussels ..	328	28.35	41.18	17.73	62.6	36.0	95.4	− 4.4	63.7	34.5
Budapest ..	425	24.96	37.05	16.81	69.3	32.2	101.7	−10.1	71.2	30.2
Buenos Aires ..	82	38.78	79.72	20.04	72.7	50.9	104.0	22.3	73.8	50.0
Calcutta ..	21	61.82	98.48	38.43	85.6	68.0	111.3	44.2	86.0	66.4
Capetown ..	40	25.50	36.72	17.71	68.1	54.7	102.0	34.0	68.8	53.9
Caracas ..	3,420	30.03	47.36	23.70	68.3	65.3	87.8	48.2	69.2	63.7
Chicago ..	823	33.28	45.86	24.52	70.0	26.1	103.0	−23.0	72.4	23.7
Christchurch ..	22	25.21	35.30	13.54	60.8	43.5	95.7	21.3	61.6	42.7
Christiania (Oslo)	82	25.39	36.18	16.24	61.0	25.5	95.0	−13.4	63.1	24.4
Colombo ..	24	88.53	123.96	53.56	81.6	78.7	97.2	61.6	82.0	78.6
Constantinople ..	245	28.75	42.74	14.78	74.0	43.5	103.6	13.0	75.7	42.0
Copenhagen ..	43	22.80	32.52	14.02	60.9	32.7	91.4	−13.0	62.6	31.8
Dresden ..	115	24.22	34.42	11.73	64.6	33.2	93.4	−15.3	66.0	31.6
Dublin (City) ..	54	27.66	35.56	16.60	59.1	42.8	87.0	13.0	60.4	42.5
Dunedin ..	300	36.92	54 51	21.86	57.3	43.5	94.0	23.0	58.0	42.5
Durban ..	260	40.79	71.27	27.24	75.6	64.4	110.6	41.1	76.7	63.8
Edinburgh (Leith)	441	25 21	32.05	16.44	55.9	39.0	90.0	6.0	57.3	38.7
Geneva ..	1,332	32.13	47.60	18.73	64.0	33.4	100.0	−13.5	65.8	31.8
Genoa	157	51.29	108.22	28.21	73.8	46.8	94.5	16.7	75.4	45.5
Glasgow ..	139	38.49	56.18	29.05	57.0	39.5	84.9	6.6	58.3	39.3
Greenwich ..	149	23.50	35.54	16.38	61.7	40.4	100.0	4.0	63.3	40.1
Hong Kong ..	109	85.61	119.72	45.84	81.5	60.5	97.0	32.0	82.0	58.8
Johannesburg ..	5,750	31.63	50.00	21.66	65.4	54.4	93.6	20.8	68.2	48.0
Leipzig ..	394	24.69	31.37	17.10	63.9	31.6	96.4	−16.6	64.8	30.0
Leningrad ..	16	21.30	29.52	13.75	61.1	17.4	89.6	−30.3	63.7	15.2
Lisbon ..	313	26.97	52.82	16.34	70.0	52.9	102.9	29.3	71.1	51.8
London (Kew) ..	18	23.80	38.18	12.16	60.8	39.9	94.0	9.0	62.3	39.1
Madras ..	22	49.85	78.92	21.74	89.0	76.8	113.0	57.5	89.9	76.1
Madrid ..	2,149	16.23	27.48	9.13	73.0	41.2	107.1	10.5	75.7	39.7
Marseilles ..	246	22.10	43.04	11.11	70.4	45.5	101.5	6.3	72.0	44.3
Moscow ..	526	18.94	29.07	12.07	63.4	14.7	95.0	−41.4	66.1	11.9
Naples ..	489	34.00	56.58	21.75	73.6	48.0	99.1	23.9	75.4	46.8
New York ..	314	44.63	58.68	33.17	71.4	31.8	102.0	−13.0	73.5	30.2
Ottawa ..	236	33.51	51.25	25.63	66.6	14.0	98.0	−33.0	69.1	11.8
Paris (Parc-St. Maur) ..	174	22.68	29.80	10.94	63.5	37.9	101.1	−19.5	64.8	36.7
Pekin	123	22.66	36.00	18.00	77.9	26.8	100.2	2.7	79.3	23.7
Quebec ..	296	41.25	53.79	32.12	63.4	12.6	97.0	−34.0	65.6	9.8
Rome	166	32.57	57.89	12.72	74.3	46.0	103.0	21.4	76.1	44.6
San Francisco ..	155	22.27	38.82	9.00	58.8	50.5	101.0	29.0	59.3	49.5
Shanghai ..	21	45.00	62.52	27.92	78.0	41.1	102.9	10.2	80.4	37.8
Singapore ..	8	91.99	158.68	32.71	81.2	78.6	94.2	63.4	81.5	78.1
Stockholm ..	146	21.60	28.47	11.77	62.2	26.4	91.8	−22.0	59.7	27.3
Tokio	65	61.45	86.37	45.72	74.8	39.2	91.0	29.7	77.7	37.5
Trieste.. ..	85	42.94	63.14	26.57	73.9	41.3	99.5	14.0	76.3	39.9
Vienna.. ..	664	25.51	35.55	16.54	65.3	31.3	97.2	−14.4	66.7	29.5
Vladivostock (Mt.)	420	29.23	38.48	21.17	65.5	9.7	92.3	−22.2	69.4	3.6
Washington ..	112	43.50	61.33	30.85	74.7	34.5	106.0	−15.0	76.8	32.9
Wellington ..	10	39.86	67.68	27.83	61.9	48.7	88.0	28.6	62.6	48.0
Zürich ..	1,542	45.15	78.27	29.02	63.3	31.3	94.1	− 0.8	65.1	29.5
AUSTRALIAN CAPITAL.										
Canberra ..	1,837	23.30	35.89	16.31	68.0	43.9	109.0	14.0	68.9	42.6
STATE CAPITALS.										
Perth	197	34.90	49.22	20.21	73.1	56.1	112.2	34.2	74.1	55.3
Adelaide ..	140	21.17	30.87	11.39	72.9	53.2	117.7	32.0	73.9	51.9
Brisbane ..	137	44.86	88.26	16.17	76.7	59.8	108.9	36.1	77.2	58.6
Sydney ..	138	46.90	82.76	23.01	71.0	54.3	113.6	35.7	71.6	52.9
Melbourne ..	115	25.64	38.04	15.61	66.6	50.0	114.1	27.0	67.6	48.8
Hobart ..	177	24.08	43.39	13.43	61.4	47.0	105.2	27.0	62.3	45.9

(a) Mean of the three hottest months. (b) Mean of the three coldest months.

18. **Climatological Tables.**—The averages and extremes for a number of climatological elements have been determined from long series of observations at the Australian capitals up to and including the year 1939. These are given in the following tables :—

CLIMATOLOGICAL DATA: CANBERRA, AUSTRALIAN CAPITAL TERRITORY.

LAT. 35° 20′ S., LONG. 149° 15′ E. HEIGHT ABOVE M.S.L. 1,837 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 9 a.m. and 3 p.m. readings.	Wind. Greatest Number of Miles in One Day.	Wind. Mean Hourly Pressure. (lb.)	Wind. Total Miles.	Wind. Prevailing Direction. 9 a.m.	Wind. Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observations extend.	22	11	11	11	23	23	11(a)	12	21	14
January	29.832	358 23/33	0.10	4,271	E	W	8.97	4	4.5	9
February	29.901	366 24/33	0.08	3,410	E	W	7.00	4	4.7	8
March	30.003	351 22/31	0.06	3,309	E	E	5.59	4	4.7	8
April	30.060	326 29/29	0.06	3,106	E & SE	W	3.40	3	4.7	7
May	30.143	302 3/30	0.03	2,470	E	N	2.09	1	4.9	8
June	30.113	386 2/30	0.05	3,075	N	NW	1.30	1	5.2	6
July	30.117	562 7/31	0.04	2,837	E	W	1.28	0	5.0	7
August	30.064	377 25/36	0.07	3,602	N	N & W	1.84	1	4.9	7
September	30.037	418 28/34	0.09	3,888	E	N	3.08	2	4.2	9
October	29.955	293 19/36	0.07	3,679	E	W	4.71	2	4.9	7
November	29.904	402 14/30	0.08	3,755	E	W	6.24	4	4.9	8
December	29.840	386 11/38	0.09	4,166	E	W&NW	7.92	6	5.0	6
Year Totals	—	—	—	—	—	—	53.42	32	—	90
Year Averages	29.997	—	0.07	3,464	E	W	—	—	4.8	—
Year Extremes	—	562 7/7/31	—	—	—	—	—	—	—	—

(a) Canberra Forestry School Record.

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observations extend.	23	23	23	23	23	23	(a)	21	16
January	82.4	55.4	68.9	109.0 11/39	38.2 8/38	70.8	—	33.2 17/33	244.0
February	82.1	55.3	68.7	102.6 16/19	33.0 21/33	69.6	—	26.8 21/33	205.7
March	76.0	51.1	63.5	99.2 6/38	31.0 24/35	68.2	—	25.5 24/17	216.9
April	67.0	44.0	55.5	91.0 6/38	26.5 29/17	64.5	—	17.5 29/17	194.2
May	59.7	37.2	48.5	74.7 9/19	19.0 30/24	55.7	—	12.0 28/20	157.9
June	53.2	34.4	43.8	66.2 5/17	17.8 20/35	48.4	—	9.9 20/35	126.9
July	52.1	33.2	42.6	65.0 8/19	14.0 19/24	51.0	—	10.0 (c)	147.4
August	55.5	35.0	45.3	73.0 (b)	18.0 5/19	55.0	—	11.8 5/19	173.9
September	61.3	38.1	49.7	83.2 27/19	24.0 12/39	59.2	—	17.0 26/36	211.2
October	68.1	43.0	55.5	93.8 31/19	27.0 2/18	66.8	—	20.0 (d)	233.3
November	74.8	48.3	61.5	97.7 29/36	28.1 24/15	69.6	—	22.4 11/36	232.4
December	79.6	53.1	66.3	103.4 27/38	32.0 3/24	71.4	—	30.2 2/39	244.8
Year Averages	67.6	44.0	55.8	—	—	—	—	—	2388.6(e)
Year Extremes	—	—	—	109.0 11/1/39	14.0 19/7/24	95.0	—	9.9 20/6/35	—

(a) No record. (b) 28/1923 and 23/1924. (c) 19/1924 and 24/1935. (d) 1 and 3/1923.
(e) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%.) Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest in One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observations extend.	21	21	21	21	25	25	25	25	25	7
January	0.381	56	69	39	1.93	6	5.18 1936	0.07 1919, 1932	2.92 6/27	4
February	0.407	61	75	47	1.73	6	4.07 1936	0.00 1933	2.75 23/16	5
March	0.382	69	81	56	2.19	7	5.81 1914	0.21 1924	1.86 7/20	9
April	0.311	75	87	63	1.64	7	3.63 1935	0.20 1925	1.94 8/21	9
May	0.246	82	92	67	1.83	7	13.37 1925	0.06 1934	6.84 27/25	9
June	0.217	85	93	73	2.10	9	5.86 1931	0.44 1935	3.95 22/25	6
July	0.205	85	92	74	1.82	10	4.15 1933	0.25 1913	2.40 13/33	4
August	0.219	81	87	67	2.22	11	4.67 1939	0.01 1914	1.90 18/25	4
September	0.252	72	81	55	1.64	8	5.26 1915	0.36 1928	2.18 20/15	5
October	0.288	64	73	48	2.24	9	7.50 1934	0.62 1936	2.74 25/34	6
November	0.330	59	78	37	1.92	8	6.95 1924	0.09 1918	2.38 5/23	5
December	0.366	56	70	40	2.04	8	4.49 1910	0.11 1925	2.10 28/29	3
Year Totals	—	—	—	—	23.30	96	—	—	—	69
Year Averages	0.288	70	—	—	—	—	—	—	—	—
Year Extremes	—	—	93	37	—	—	13.37 5/1925	0.00 2/1933	6.84 27/5/25	—

CLIMATOLOGICAL DATA: PERTH, WESTERN AUSTRALIA.

LAT. 31° 57′ S., LONG. 115° 50′ E. HEIGHT ABOVE M.S.L. 197 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 9 a.m. and 3 p.m. readings.	Wind. Greatest Number of Miles in One Day.	Wind. Mean Hourly Pressure. (lb.)	Wind. Total Miles.	Wind. Prevailing Direction. 9 a.m.	Wind. Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m. 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observations extend.	55	42	42	42	41	41	41	42	32	43
January	29.905	797 27/98	0.54	10,907	ESE	SSW	10.39	1.9	2.9	14.2
February	29.923	650 6/08	0.58	9,497	ESE	SSW	8.64	1.5	3.1	12.0
March	29.983	651 6/13	0.51	9,747	E	SSW	7.58	1.6	3.5	12.2
April	30.071	955 25/00	0.37	8,025	ENE	SSW	4.73	1.5	4.2	8.5
May	30.068	825 24/32	0.34	7,974	NE	SW	2.73	2.4	5.5	5.4
June	30.062	914 17/27	0.35	7,879	NNE	WNW	1.77	2.3	5.9	4.0
July	30.091	1,015 20/26	0.38	8,462	NNE	W	1.73	2.2	5.6	5.1
August	30.083	966 15/03	0.42	8,851	NNE	WSW	2.36	1.6	5.6	5.4
September	30.065	864 11/05	0.44	8,772	NE	WSW	3.41	1.2	4.9	6.4
October	30.031	809 6/16	0.50	9,633	SE	SW	5.35	1.0	4.7	6.7
November	29.991	777 18/97	0.56	9,891	SE	SW	7.65	1.4	3.9	8.3
December	29.927	776 6/22	0.61	10,689	SE	SSW	9.81	1.9	3.1	12.7
Year Totals	—	—	—	—	—	—	66.17	20.5	—	100.9
Year Averages	30.017	—	0.47	9,192	E	SW	—	—	4.4	—
Year Extremes	—	1,015 20/7/26	—	—	—	—	—	—	—	—

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observations extend.	43	43	43	43	43	43	41	41	42
January	84.5	63.2	73.9	110.2 21/34	48.6 20/25	61.6	177.3 22/14	40.4 1/21	324.2
February	84.9	63.4	74.1	112.2 8/33	47.7 1/02	64.5	173.7 4/34	39.8 1/13	273.7
March	81.5	61.3	71.4	106.4 14/22	45.8 8/03	60.6	167.0 19/18	36.7 8/03	269.7
April	76.2	57.3	66.7	99.7 9/10	39.3 20/14	60.4	157.0 8/16	31.0 20/14	219.8
May	68.9	52.8	60.9	90.4 2/07	34.3 11/14	56.1	146.0 4/25	25.3 11/14	176.0
June	64.1	49.5	56.8	81.7 2/14	35.0 30/20	46.7	135.5 9/14	26.3 11/37	145.3
July	62.8	47.8	55.3	76.4 21/21	34.2 7/16	42.2	132.9 25/13	25.1 30/20	166.3
August	63.8	48.4	56.1	81.0 12/14	35.4 31/08	45.6	145.1 29/21	26.7 24/35	186.1
September	66.5	50.4	58.5	90.9 30/18	38.8 18/00	52.1	153.6 29/16	29.2 21/16	210.0
October	69.3	52.5	60.9	95.3 30/22	40.0 16/31	55.3	157.5 31/36	29.8 16/31	244.9
November	75.9	56.9	66.4	104.6 24/13	42.0 1/04	62.6	167.0 30/15	35.4 6/10	288.7
December	81.2	60.9	71.0	107.9 20/04	48.0 2/10	59.9	168.8 11/27	39.0 (a)	325.7
Year Averages	73.3	55.4	64.3	—	—	—	—	—	2830.4b
Year Extremes	—	—	—	112.2 8/2/33	34.2 7/7/16	78.0	177.3 22/1/14	25.1 30/7/20	—

(a) 2/1910 and 12/1920. (b) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%.) Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest in One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observations extend.	43	43	43	43	64	64	64	64	64	43
January	0.437	52	61	41	0.33	3	2.17 1879	0.00 (a)	1.74 27/79	2.9
February	0.440	53	65	46	0.41	3	2.98 1915	0.00 (a)	1.63 26/15	4.2
March	0.436	58	66	46	0.83	4	5.71 1934	0.00 (a)	3.03 9/34	6.6
April	0.394	61	73	51	1.70	7	5.85 1926	0.00 1920	2.62 30/04	10.6
May	0.371	73	81	61	5.13	14	12.13 1879	0.98 1903	2.80 20/79	13.2
June	0.338	76	83	68	7.11	17	12.80 1923	2.16 1877	3.90 6/20	13.0
July	0.316	76	84	69	6.74	18	12.28 1926	2.42 1876	3.00 4/91	13.4
August	0.320	73	79	62	5.79	18	12.21 1928	0.46 1902	2.79 7/03	11.9
September	0.340	67	75	58	3.36	15	7.84 1923	0.34 1916	1.82 4/31	10.8
October	0.344	60	75	54	2.18	12	7.87 1890	0.49 1892	1.73 3/33	6.4
November	0.376	54	63	46	0.77	6	2.78 1916	0.00 1891	1.11 30/03	3.7
December	0.409	50	63	44	0.55	4	3.05 1888	0.00 1886, 1924	1.72 1/88	2.7
Year Totals	—	—	—	—	34.90	121	—	—	—	99.4
Year Averages	0.371	61	—	—	—	—	—	—	—	—
Year Extremes	—	—	84	41	—	—	12.80 6/1923	0.00 (b)	3.90 6/6/20	—

(a) Various years. (b) Various months in various years.

CLIMATOLOGICAL DATA—ADELAIDE, SOUTH AUSTRALIA.

LAT. 34° 56′ S., LONG. 138° 35′ E. HEIGHT ABOVE M.S.L. 140 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 9 a.m. and 3 p.m. readings.	Wind. Greatest Number of Miles in One Day.	Wind. Mean Hourly Pressure. (lb.)	Wind. Total Miles.	Wind. Prevailing Direction. 9 a.m.	Wind. Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observations extend.	83	62	62	62	62	62	70	68	72	58
January	29.915	758 19/99	0.33	7,804	SW	SW	9.10	2.3	3.6	8.7
February	29.952	691 22/96	0.28	6,578	NE	SW	7.42	2.0	3.5	7.7
March	30.038	628 9/12	0.23	6,556	S	SW	6.01	2.1	4.0	7.4
April	30.118	773 10/96	0.21	6,078	NE	SW	3.56	1.6	5.0	4.6
May	30.125	760 9/80	0.20	6,187	NE	NW	2.10	1.6	5.8	2.4
June	30.102	750 12/78	0.23	6,395	NE	N	1.28	1.9	6.2	1.8
July	30.125	674 25/82	0.23	6,620	NE	NW	1.31	1.6	5.9	1.9
August	30.093	773 31/97	0.27	7,120	NE	SW	1.90	2.1	5.6	2.6
September	30.044	720 2/87	0.29	7,184	NNE	SW	2.91	2.2	5.2	3.4
October	29.999	768 28/98	0.32	7,744	NNE	SW	4.84	3.2	5.1	4.0
November	29.979	677 2/04	0.32	7,462	SW	SW	6.69	3.3	4.6	5.4
December	29.921	675 12/91	0.32	7,782	SW	SW	8.53	2.5	3.9	7.0
Year Totals	—	—	—	—	—	—	55.65	26.4	—	56.9
Year Averages	30.034	—	0.27	6,959	NE	SW	—	—	4.9	—
Year Extremes	—	773 (a)	—	—	—	—	—	—	—	—

(a) 10/4/96 and 31/8/97.

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observations extend.	83	83	83	83	83	83	56	79	58
January	86.0	61.5	73.8	117.7 12/39	45.1 21/84	72.6	180.0 18/82	36.5 14/79	307.2
February	86.1	61.9	74.0	113.6 12/99	45.5 23/18	68.1	170.5 10/00	35.8 23/26	262.2
March	80.9	58.9	69.9	110.5 9/34	43.9 21/33	66.6	174.0 17/83	32.1 21/33	240.5
April	73.3	54.6	63.9	98.6 5/38	39.6 15/59	59.0	155.0 1/83	30.2 16/17	180.1
May	65.9	50.3	58.1	89.5 4/21	36.9 (a)	52.6	148.2 12/79	25.6 19/28	149.8
June	60.4	46.7	53.6	76.0 23/65	32.5 27/76	43.5	138.8 18/79	22.9 12/13	123.2
July	59.1	44.7	51.9	74.0 11/06	32.0 24/08	42.0	134.5 26/90	22.1 30/29	130.4
August	62.0	45.9	54.0	85.0 31/11	32.3 17/59	52.7	140.0 31.92	22.8 11/29	163.1
September	66.4	48.0	57.2	90.7 23/82	32.7 4/58	58.0	160.5 23/82	25.0 25/27	185.1
October	72.4	51.4	61.9	102.9 21/22	36.0 —/57	66.9	162.0 30/21	27.8 (c)	226.0
November	78.6	55.4	67.0	113.5 21/65	40.8 2/09	72.7	166.9 20/78	31.5 2/09	262.3
December	83.1	58.9	71.0	114.6 29/31	43.0 (b)	71.6	175.7 7/99	32.5 4/84	298.8
Year Averages	72.8	53.2	63.0	—	—	—	—	—	2534.7 (d)
Year Extremes	—	—	—	117.7 12/1/39	32.0 24/7/08	85.7	180.0 18/1/82	22.1 30/7/29	—

(a) 26/1895 and 24/1904. (b) 16/1861 and 4/1906. (c) 2/1918 and 4/1931. (d) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%.) Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest in One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observations extend.	72	72	72	72	101	101	101	101	101	68
January	0.337	38	59	29	0.75	4	4.00 1850	0.00 (a)	2.30 2/89	3.5
February	0.355	41	56	30	0.74	4	6.09 1925	0.00 (a)	5.57 7/25	5.5
March	0.345	46	58	36	1.02	6	4.60 1878	0.00 (a)	3.50 5/78	10.4
April	0.335	55	72	37	1.75	10	6.78 1853	0.03 1923	3.15 5/60	13.9
May	0.316	67	76	49	2.71	13	7.75 1875	0.10 1934	2.75 1/53	16.3
June	0.297	76	84	67	3.07	16	8.58 1916	0.42 1886	2.11 1/20	16.2
July	0.277	76	87	66	2.61	16	5.38 1865	0.37 1899	1.75 10/65	17.5
August	0.286	69	77	54	2.56	16	6.24 1852	0.35 1914	2.23 19/51	16.8
September	0.296	60	72	44	2.06	14	5.83 1923	0.45 1896	1.59 20/23	15.8
October	0.298	51	67	29	1.71	11	3.83 1870	0.17 1914	2.24 16/08	12.8
November	0.307	42	57	31	1.16	8	4.10 1934	0.04 1885	2.08 7/34	6.6
December	0.323	39	50	31	1.03	6	3.98 1861	0.00 1904	2.42 23/13	4.3
Year Totals	—	—	—	—	21.17	124	—	—	—	139.6
Year Averages	0.309	53	—	—	—	—	—	—	—	—
Year Extremes	—	—	87	29	—	—	8.58 6/16	0.00 (b)	5.57 7/2/25	—

(a) Various years. (b) Various months in various years.

CLIMATOLOGICAL DATA: BRISBANE, QUEENSLAND.

LAT. 27° 28′ S., LONG. 153° 1′ E. HEIGHT ABOVE M.S.L. 127 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 9 a.m. and 3 p.m. readings.	Wind. Greatest Number of Miles in One Day. (a)	Wind. Mean Hourly Pressure. (lb.) (a)	Wind. Total Miles. (a)	Wind. Prevailing Direction. 9 a.m.	Wind. Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observations extend.	53	25	25	25	53	53	31	53	48	31
January	29.866	361 1/22	0.14	5,236	SE	E & NE	6.676	7.2	5.7	3.5
February	29.903	503 5/31	0.14	4,767	S & SE	NE & E	5.464	5.7	5.7	2.5
March	29.964	488 1/29	0.13	4,970	S	SE & E	5.038	4.6	5.3	5.0
April	30.039	400 3/25	0.11	4,388	S	SE & E	3.964	4.0	4.5	7.6
May	30.087	430 17/26	0.10	4,362	S	SE	3.054	3.2	4.3	8.3
June	30.072	455 14/28	0.10	4,166	SW & S	S & W	2.409	2.4	4.2	9.2
July	30.076	359 2/23	0.09	4,219	S & SW	SW	2.657	2.5	3.8	12.2
August	30.095	355 4/35	0.10	4,361	S & SW	SW & NE	3.447	3.7	3.4	13.0
September.. ..	30.048	329 4/31	0.10	4,308	S & SW	NE & E	4.387	5.6	3.4	12.7
October	30.006	355 14/36	0.11	4,696	S	NE	5.764	6.8	4.1	8.4
November.. ..	29.960	371 10/28	0.13	4,867	SE & NE	NE	6.252	8.6	4.9	5.7
December.. ..	29.888	467 15/26	0.15	5,287	SE	NE	7.037	9.4	5.2	3.8
Year Totals ..	—	—	—	—	—	—	56.149	63.6	—	91.9
Year Averages ..	30.000	—	0.12	4,636	S	NE	—	—	4.5	—
Year Extremes ..	—	503 5/2/31	—	—	—	—	—	—	—	—

(a) Records prior to August, 1914, have been discarded as unreliable.

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observations extend.	53	53	53	53	53	53	45	53	31
January	85.4	69.0	77.2	108.9 14/02	58.8 4/93	50.1	169.0 2/37	49.9 4/93	233.5
February	84.5	68.6	76.6	105.7 21/25	58.5 23/31	47.2	165.2 6/10	49.1 22/31	209.9
March	82.3	66.4	74.3	99.4 5/19	52.4 29/13	47.0	161.7 4/25	45.4 29/13	214.1
April	78.9	61.5	70.2	95.2 (a)	44.4 25/25	50.8	153.8 11/16	36.7 24/25	211.1
May	73.6	55.6	64.6	90.3 21/23	41.3 24/99	49.0	147.0 1/10	29.8 8/97	203.8
June	69.3	51.1	60.2	88.9 19/18	36.3 29/08	52.6	136.0 3/18	25.4 23/88	185.4
July	68.4	48.7	58.6	83.4 28/98	36.1 (b)	47.3	146.1 20/15	23.9 11/90	209.3
August	71.2	49.9	60.6	88.5 25/28	37.4 6/87	51.1	141.9 20/17	27.1 9/99	239.4
September.. ..	75.5	54.7	65.1	95.2 16/12	40.7 1/96	54.5	155.5 26/03	30.4 1/89	244.0
October	79.5	60.1	69.8	101.4 18/93	43.3 3/99	58.1	157.4 31/18	34.9 8/89	257.6
November.. ..	82.4	64.2	73.3	106.1 18/13	48.5 2/05	57.6	162.3 7/89	38.8 1/05	243.3
December.. ..	84.8	67.4	76.1	105.9 26/93	56.4 13/12	49.5	162.1 26/37	49.1 3/94	254.9
Year Averages ..	78.0	59.8	68.9	—	—	—	—	—	2706.3
Year Extremes ..	—	—	—	108.9 14/1/02	36.1 (c)	72.8	169.0 2/1/37	23.9 11/7/90	(d)

(a) 9/1896 and 5/1903. (b) 12/1894 and 2/1896. (c) 12/7/94 and 2/7/96. (d) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%). Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest in One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observations extend.	53	53	53	53	88	79	88	88	70	53
January	0.639	66	79	53	6.34	13	27.72 1895	0.32 1919	18.31 21/87	9.2
February.. ..	0.645	69	82	55	6.28	14	40.39 1893	0.58 1849	10.61 6/31	9.4
March	0.614	72	85	56	5.75	15	34.04 1870	0.00 1849	11.18 14/08	12.5
April	0.520	71	80	60	3.76	12	15.28 1867	0.05 1897	5.46 5/33	15.1
May	0.426	73	85	61	2.83	10	13.85 1876	0.00 1846	5.62 9/79	16.2
June	0.356	73	84	63	2.66	8	14.03 1873	0.00 1847	6.01 9/93	14.5
July	0.328	72	81	61	2.21	8	8.46 1889	0.00 1841	3.54 (c)	15.6
August	0.347	68	80	56	1.95	7	14.67 1879	0.00 (a)	4.89 12/87	14.8
September ..	0.406	64	76	47	1.97	8	5.43 1886	0.10 1907	2.46 2/94	14.2
October	0.474	60	72	48	2.56	9	9.99 1882	0.14 1900	3.75 3/27	12.7
November ..	0.536	61	72	45	3.78	10	12.41 1917	0.00 1842	4.46 16/86	8.9
December ..	0.597	61	69	51	4.82	12	13.99 1910	0.35 1865	6.60 28/71	8.6
Year Totals ..	—	—	—	—	44.91	126	—	—	—	151.7
Year Averages ..	0.491	67	—	—	—	—	—	—	—	—
Year Extremes ..	—	—	85	45	—	—	40.39 2/93	0.00 (b)	18.31 21/1/87	—

(a) 1862, 1869, 1880. (b) Various months in various years. (c) 15/1876 and 16/1889.

CLIMATOLOGICAL DATA: SYDNEY, NEW SOUTH WALES.

LAT. 33° 52′ S., LONG. 151° 12′ E. HEIGHT ABOVE M.S.L. 138 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from hourly readings.	Wind.(a)					Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
		Greatest Number of Miles in One Day.	Mean Hourly Pressure. (lb.)	Total Miles.	Prevailing Direction. 9 a.m.	Prevailing Direction. 3 p.m.				
No. of yrs. over which observations extend.	81	73	73	73	73	73	60	80	78	29
January	29.892	627 3/93	0.26	6,957	NE	ENE	5.420	5.1	5.8	4.8
February	29.941	697 12/69	0.23	5,984	NE	ENE	4.300	4.3	5.9	5.4
March	30.012	754 20/70	0.18	5,802	W	ENE	3.674	4.1	5.6	5.6
April	30.070	642 6/82	0.16	5,299	W	ENE	2.664	3.7	5.1	7.2
May	30.086	682 6/98	0.17	5,373	W	NE	1.862	2.9	4.9	7.5
June	30.063	642 13/08	0.21	5,815	W	W	1.477	2.1	4.8	8.3
July	30.072	744 17/79	0.19	5,965	W	W	1.551	2.2	4.4	10.1
August	30.065	649 22/72	0.19	5,862	W	NE	1.996	3.1	4.0	11.0
September	30.011	771 6/74	0.22	6,091	W	NE	2.777	3.8	4.3	10.0
October	29.969	741 4/72	0.24	6,608	W	ENE	3.924	4.9	5.0	7.3
November	29.940	583 12/87	0.24	6,500	ENE	ENE	4.714	5.4	5.6	5 7
December	29.881	750 3/84	0.26	6,924	ENE	ENE	5.498	5.8	5.7	4.9
Year Totals	—	—	—	—	—	—	39.857	47.4	—	87.8
Year Averages	30.000	—	0.21	6,098	W	ENE	—	—	5.1	—
Year Extremes	—	771 6/9/74	—	—	—	—	—	—	—	—

(a) Early records revised during 1929. Values for period 1867 to September 1885, reduced 20 per cent.; for period September 1885 to March 1913, reduced 10 per cent.

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observations extend.	81	81	81	81	81	81	77	81	19(a)
January	78.4	64.9	71.6	113.6 14/39	51.2 14/65	62.4	164.3 26/15	43.7 6/25	227.4
February	77.7	65.0	71.3	107.8 8/26	49.3 28/63	58.5	168.3 14/39	42.8 22/33	205.0
March	75.8	63.0	69.4	102.6 3/69	48.8 14/86	53.8	158.3 10/26	39.9 17/13	198.3
April	71.4	58.0	64.7	91.4 1/36	44.6 27/64	46.8	144.1 10/77	33.3 24/09	183.0
May	65.7	52.2	59.0	86.0 1/19	40.2 22/59	45.8	129.7 1/96	29.3 25/17	176.3
June	61.3	48.2	54.7	80.4 11/31	35.7 22/32	44.7	125.5 2/23	28.0 22/32	160.5
July	59.9	45.9	52.9	78.3 22/26	35.9 12/90	42.4	124.7 19/77	24.0 4/93	187.6
August	63.0	47.5	55.2	82.0 31/84	36.8 3/72	45.2	149.0 30/78	26.1 4/09	219.0
September	67.1	51.3	59.2	92.3 27/19	40.8 18/64	51.5	142.2 12/78	30.1 17/05	221.3
October	71.3	55.8	63.6	98.9 19/98	42.2 6/27	56.7	152.2 20/33	32.7 9/05	232.0
November	74.3	59.6	67.0	102.7 21/78	45.8 1/05	56.9	158.5 28/99	36.0 6/06	231.4
December	77.1	63.0	70.0	107.5 31/04	48.4 3/24	59.1	164.5 27/89	41.4 3/24	231.2
Year Averages	70.3	56.2	63.2	—	—	—	—	—	2473.0(b)
Year Extremes	—	—	—	113.6 14/1/39	35.7 22/6/32	77.9	168.3 14/2/39	24.0 4/7/93	—

(a) From 1921 only; previous records discarded owing to faulty exposure of instruments. (b) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%). Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest in One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observations extend.	81	81	81	81	81	81	81	81	81	80
January	0.546	67	78	58	3.63	14	15.26 1911	0.25 1932	7.08 13/11	1.7
February	0.562	70	81	59	4.17	13	18.56 1873	0.12 1939	8.90 25/73	3.0
March	0.532	73	85	62	4.93	14	18.70 1870	0.42 1876	6.52 9/13	5.0
April	0.442	76	87	63	5.40	14	24.49 1861	0.06 1868	7.52 29/60	7.0
May	0.360	78	90	63	4.99	14	23.03 1919	0.18 1860	8.36 28/89	8.2
June	0.301	77	89	68	4.73	13	16.30 1885	0.19 1904	5.17 16/84	6.9
July	0.278	76	88	63	4.72	12	13.21 1900	0.12 1862	7.80 7/31	7.7
August	0.290	71	84	56	2.93	11	14.89 1899	0.04 1885	5.33 2/60	7.0
September	0.332	66	79	49	2.85	12	14.05 1879	0.08 1882	5.69 10/79	4.9
October	0.382	62	77	46	2.84	12	11.14 1916	0.21 1867	6.37 13/02	3.5
November	0.444	63	79	42	2.80	12	9.88 1865	0.07 1915	4.23 19/00	2.4
December	0.505	64	77	51	2.91	13	15.82 1920	0.23 1913	4.75 13/10	1.7
Year Totals	—	—	—	—	46.90	154	—	—	—	59.0
Year Averages	0.402	70	—	—	—	—	—	—	—	—
Year Extremes	—	—	90	42	—	—	24.49 4/1861	0.04 8/1885	8.90 25/2/73	—

CLIMATOLOGICAL DATA : MELBOURNE, VICTORIA.

LAT. 37° 49′ S., LONG. 144° 58′ E. HEIGHT ABOVE M.S.L. 115 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from hourly readings.	Wind. Greatest Number of Miles in One Day.	Wind. Mean Hourly Pressure. (lb.)	Wind. Total Miles.	Wind. Prevailing Direction. (a) 9 a.m.	Wind. Prevailing Direction. (a) 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observations extend.	82	66	66	66	21	21	67	32	82	32
January	29.907	583 10/97	0.25	6,831	S.&SW	S	6.421	1.8	5.1	6.9
February	29.957	566 8/68	0.23	5,880	N & S	S	5.029	2.3	4.9	6.7
March	30.032	677 9/81	0.19	5,896	N	S	4.017	1.7	5.4	5.4
April	30.098	597 7/68	0.16	5,330	N	S	2.420	1.2	5.9	4.5
May	30.108	693 12/65	0.16	5,122	N	N & S	1.509	0.5	6.4	3.2
June	30.082	761 13/76	0.19	5,764	N	N	1.136	0.4	6.6	2.5
July	30.089	755 8/74	0.18	5,837	N	N	1.094	0.4	6.3	3.0
August	30.058	637 14/75	0.22	6,328	N	N	1.496	0.9	6.3	2.8
September	30.000	617 11/72	0.24	6,448	N	S & N	2.324	1.2	6.1	3.3
October	29.967	899 5/66	0.25	6,770	N	S	3.363	1.8	6.0	3.8
November	29.952	734 13/66	0.25	6,541	S.&SW	S	4.550	2.5	5.9	3.8
December	29.898	655 1/75	0.26	6,968	SW& S	S	5.747	2.0	5.5	4.4
Year Totals	—	—	—	—	—	—	39.106	16.7	—	50.3
Year Averages	30.012	—	0.22	6,168	N	S	—	—	5.9	—
Year Extremes	—	899 5/10/66	—	—	—	—	—	—	—	—

(a) Revised for 21 years. 1919-39 inclusive.

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observations extend.	84	84	84	84	84	84	79	80	58
January	78.1	56.7	67.4	114.1 13/39	42.0 28/85	72.1	178.5 14/62	30.2 28/85	256.8
February	78.1	57.2	67.6	109.5 7/01	40.2 24/24	69.3	167.5 15/70	30.9 6/91	235.0
March	74.6	54.8	64.7	105.5 2/93	37.1 17/84	68.4	164.5 1/68	28.9 (a)	206.2
April	68.2	50.7	59.4	94.8 5/38	34.8 24/88	60.0	152.0 8/61	25.0 23/97	159.0
May	61.7	46.8	54.2	83.7 7/05	29.9 29/16	53.8	142.6 2/59	21.1 26/16	137.4
June	56.8	43.9	50.3	72.2 1/07	28.0 11/66	44.2	129.0 11/61	19.9 30/29	109.2
July	55.7	41.9	48.8	69.3 22/26	27.0 21/69	42.3	125.8 27/80	20.5 12/03	129.0
August	58.7	43.4	51.0	77.0 20/85	28.3 11/63	48.7	137.4 29/69	21.3 14/02	150.3
September	62.7	45.6	54.2	88.6 28/28	31.1 16/08	57.5	142.1 20/67	22.8 8/18	170.1
October	67.2	48.3	57.8	98.4 24/14	32.1 3/71	66.3	154.3 28/68	24.8 22/18	198.7
November	71.4	51.3	61.4	105.7 27/94	36.5 2/96	69.2	159.6 29/65	24.6 2/96	229.0
December	75.3	54.4	64.8	110.7 15/76	40.0 4/70	70.7	170.3 20/69	33.2 1/01	244.5
Year Averages	67.4	49.6	58.5	—	—	—	—	—	2225.2(b)
Year Extremes	—	—	—	114.1 13/1/39	27.0 21/7/69	87.1	178.5 14/1/62	19.9 30/6/20	—

(a) 17/1884 and 20/1897. (b) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%.) Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest in One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observations extend.	32	32	32	32	84	84	84	84	81	32
January	0.384	58	65	50	1.88	8	5.68 1904	0.01 1932	2.97 9/97	2.6
February	0.419	62	69	48	1.82	7	7.72 1939	0.03 1870	3.42 26/39	4.0
March	0.383	64	73	57	2.17	9	7.50 1911	0.14 1934	3.55 5/19	7.6
April	0.349	72	82	66	2.32	11	6.71 1901	0.00 1923	2.28 22/01	9.0
May	0.310	79	86	71	2.08	13	4.31 1862	0.14 1934	1.85 7/91	10.2
June	0.276	84	92	76	2.09	15	4.51 1859	0.73 1877	1.74 21/04	8.2
July	0.264	82	86	76	1.87	14	7.02 1891	0.57 1902	2.71 12/91	8.1
August	0.271	76	82	70	1.90	15	4.35 1939	0.48 1903	1.94 26/24	7.3
September	0.290	68	76	60	2.28	14	7.93 1916	0.52 1907	2.62 12/80	6.4
October	0.307	62	67	53	2.68	14	7.61 1869	0.29 1914	3.00 17/09	5.8
November	0.335	60	69	52	2.25	11	6.71 1916	0.25 1895	2.57 16/76	2.4
December	0.368	59	69	48	2.30	10	7.18 1863	0.11 1904	3.20 1/34	1.8
Year Totals	—	—	—	—	25.64	141	—	—	—	73.4
Year Averages	0.324	69	—	—	—	—	—	—	—	—
Year Extremes	—	—	92	48	—	—	7.93 9/1916	0.00 4/1923	3.55 5/3/10	—

CLIMATOLOGICAL DATA: HOBART, TASMANIA.

LAT. 42° 53′ S., LONG. 147° 20′ E. HEIGHT ABOVE M.S.L. 177 FT.

BAROMETER, WIND, EVAPORATION, LIGHTNING, CLOUDS AND CLEAR DAYS.

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 9 a.m. and 3 p.m. readings.	Wind. Greatest Number of Miles in One Day.	Wind. Mean Hourly Pressure. (lb.)	Wind. Total Miles.	Wind. Prevailing Direction. 9 a.m.	Wind. Prevailing Direction. 3 p.m.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m., 3 p.m. and 9 p.m.	No. of Clear Days.
No. of yrs. over which observations extend.	55	29	29	29	34	34	29	32	77	33
January	29.825	500 30/16	0.19	5,951	NNW to NW	SE	4.838	1.0	6.0	2.4
February	29.916	605 4/27	0.15	4,761	N to NW	SE	3.676	1.0	6.0	2.4
March	29.951	513 13/38	0.13	4,951	N to NNW	SE	3.060	1.2	5.9	2.4
April	29.971	533 27/26	0.13	4,825	N to NW	NW & SE	1.951	0.9	6.2	1.7
May	29.997	484 20/36	0.12	4,701	N to NW	N to NW	1.378	0.4	6.0	2.4
June	29.967	569 27/20	0.12	4,429	NNW to NW	N to NW	0.921	0.4	6.1	2.4
July	29.939	499 19/35	0.13	4,795	NNW to NW	N to NNW	0.938	0.4	5.9	2.2
August	29.914	612 19/26	0.14	5,054	N to NW	N to NW	1.267	0.4	5.9	2.1
September ..	29.851	516 26/15	0.18	5,648	N to NNW	NW	1.969	0.7	6.1	1.6
October	29.831	461 8/12	0.20	6,084	N to NW	NW & SE	3.052	0.6	6.4	1.1
November	29.817	508 18/15	0.19	5,704	N to NW	SE	3.882	0.9	6.4	1.5
December ..	29.813	562 1/34	0.17	5,681	N to NW	SE	4.385	0.7	6.4	1.2
Year Totals ..	—	—	—	—	—	—	31.317	8.6	—	23.4
Year Averages ..	29.899	—	0.15	5,215	N to NW	NNW & SE	—	—	6.1	—
Year Extremes ..	—	612 19/8/26	—	—	—	—	—	—	—	—

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.). Mean Max.	Mean Min.	Mean.	Extreme Shade Temperature (Fahr.). Highest.	Lowest.	Extreme Range.	Extreme Temperature (Fahr.). Highest in Sun.	Lowest on Grass.	Mean Hours of Sunshine.
No. of yrs. over which observations extend.	69	69	69	93	93	93	50	72	19(a)
January	70.9	52.8	61.8	105.0 (b)	40.0 3/72	65.0	160.0 (c)	30.6 19/97	235.8
February	71.1	53.3	62.2	104.4 12/99	39.0 20/87	65.4	165.0 24/98	28.3 —/87	195.3
March	67.9	50.9	59.4	99.0 —/61	35.2 31/26	63.8	150.0 3/05	27.5 30/02	196.2
April	62.6	47.8	55.2	90.0 1/56	30.0 25/56	60.0	142.0 18/93	25.0 —/86	142.7
May	57.5	43.9	50.7	77.8 5/21	29.2 20/02	48.6	128.0 (d)	20.0 19/02	142.5
June	52.7	41.0	46.9	75.0 7/74	28.0 22/79	47.0	122.0 12/94	21.0 6/87	118.1
July	52.1	39.6	45.9	72.0 22/77	27.0 18/66	45.0	121.0 12/93	18.7 16/86	129.1
August	55.0	41.2	48.1	77.0 3/76	30.0 10/73	47.0	129.0 —/87	20.1 7/09	156.3
September ..	58.8	43.2	51.0	81.7 23/26	30.0 12/41	51.7	138.0 23/93	18.3 16/26	173.4
October	62.6	45.6	54.1	92.0 24/14	32.0 12/89	60.0	156.0 9/93	23.8 (e)	191.3
November	65.9	48.3	57.1	98.3 26/37	35.2 5/13	63.1	154.0 19/92	26.0 1/08	218.2
December ..	69.0	51.2	60.1	105.2 30/97	38.0 13/06	67.2	161.5 10/39	27.2 —/86	217.4
Year Averages ..	62.2	46.6	54.4	—	—	—	—	—	2116.3f
Year Extremes ..	—	—	—	105.2 30/12/97	27.0 18/7/66	78.2	165.0 24/2/98	18.3 16/9/26	—

(a) Early records discarded owing to faulty instrument. (b) 27/49 and 1/00. (c) 5/86 and 13/05.
(d) —/89 and —/93. (e) 1/86 and —/99. (f) Total for year.

HUMIDITY, RAINFALL AND DEW.

Month.	Vapour Pressure (inches). Mean 9 a.m.	Rel. Hum. (%). Mean 9 a.m.	Highest Mean.	Lowest Mean.	Rainfall (inches). Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest in One Day.	Dew. Mean No. of Days Dew.
No. of yrs. over which observations extend.	53	53	53	53	97	96	97	97	73	30
January	0.328	59	72	46	1.84	10	5.91 1893	0.03 1841	2.96 30/16	0.6
February	0.355	63	77	52	1.53	9	9.15 1854	0.07 1847	4.50 27/54a	1.5
March	0.329	67	77	58	1.76	10	7.60 1854	0.02 1843	3.27 11/32	5.0
April	0.299	73	84	58	1.96	12	8.50 1935	0.07 1904	5.02 20/09	8.9
May	0.264	78	89	65	1.83	13	6.37 1905	0.10 1843	3.22 14/58	12.9
June	0.240	80	91	68	2.25	14	8.15 1889	0.22 1852	4.11 13/89	8.7
July	0.230	80	94	72	2.15	15	6.02 1922	0.30 1850	2.51 18/22	8.9
August	0.239	76	92	64	1.84	14	10.16 1858	0.23 1854	4.35 12/58	8.1
September ..	0.252	67	85	58	2.07	16	7.14 1844	0.39 1847	2.75 18/44	5.2
October	0.271	63	73	51	2.32	15	6.67 1906	0.26 1850	2.58 4/06	2.8
November	0.292	60	72	50	2.44	14	8.94 1849	0.16 1868	3.07 7/49	1.1
December ..	0.316	57	67	45	2.09	12	9.00 1875	0.11 1842	2.82 21/29	0.8
Year Totals ..	—	—	—	—	24.08	154	—	—	—	64.5
Year Averages ..	0.285	69	—	—	—	—	—	—	—	—
Year Extremes ..	—	—	94	45	—	—	10.16 8/1858	0.02 3/1843	5.02 20/4/09	—

(a) 4.18 on 28/54 also.

§ 3. Standard Times in Australia.

Prior to 1895 the official time adopted in the several colonies was for most purposes the mean solar time of the capital city of each.

In November, 1892, an intercolonial conference of surveyors was held in Melbourne to consider, among other things, the advantages of introducing the system of standard time. In this system it was proposed to make the initial meridian that of Greenwich, and to change local standard time by whole hours according to the longitude east or west of that of Greenwich. Thus for every difference of 15° in longitude a change of one hour would be required. The minutes and seconds would then be identical everywhere.

To give effect to this proposal it was suggested that Australia should be divided into three zones, the standard times for which should be respectively the mean solar times of the meridians of 120°, 135° and 150° E. longitude, thus giving standard times 8, 9 and 10 hours respectively, ahead of Greenwich time. It was proposed that the 120° zone should comprise Western Australia, that the 135° zone should comprise South Australia and the Northern Territory, and that the 150° zone should comprise Queensland, New South Wales, Victoria and Tasmania.

The matter was also considered by several intercolonial postal conferences, and eventually in 1894 and 1895 legislation was enacted by each of the colonies in accord with the recommendations of the surveyors' conference of 1892.

In 1898 the South Australian legislature amended its earlier provision, and adopted the mean solar time of the meridian 142° 30′ E. longitude as the standard time for that colony, thus reducing the difference between the standard time of Adelaide and that of the capitals of the eastern colonies from an hour to half-an-hour, and forfeiting the great advantage of the system, namely, that the minutes and seconds should be identical throughout the world.

Particulars concerning these enactments are as follows:—

STANDARD TIMES IN AUSTRALIA.

State.	Date when Act came into Operation.	Meridian Selected.	Time Ahead of Greenwich. Hours.
New South Wales ..	1st February, 1895 ..	150° E.	10
Victoria	1st February, 1895 ..	150° E.	10
Queensland	1st January, 1895 ..	150° E.	10
South Australia ..	1st February, 1895 ..	135° E.	9
South Australia ..	1st May, 1899	142° 30′ E.	9½
Western Australia ..	1st December, 1895 ..	120° E.	8
Tasmania	1st September, 1895 ..	150° E.	10

The standard time in the Australian Capital Territory is the same as in New South Wales.

Consequent upon the opening of the Trans-Australian Railway an arrangement has been made by which the change of time between South Australia and Western Australia (namely, 1½ hours) is divided into two changes of 45 minutes each. Going east from Kalgoorlie the first change is made at Rawlinna, 235.18 miles out, where the time is put forward by 45 minutes. The second change of the same amount is made at Tarcoola, 794.05 miles out. Thenceforward South Australian standard time is kept. The advantage of standard time has thus been still further sacrificed, as there is not now even a whole half-hour difference; the essential idea of standard zone time has to this extent, therefore, been abandoned. The State Observatories at Sydney, Melbourne, Adelaide and Perth derive time by astronomical observation. By arrangement with the Australian Broadcasting Commission observatory time-signals are broadcast in the several States at intervals during the day. In addition, the Amalgamated Wireless (Australasia) Ltd. re-broadcasts the daily time-signals of certain oversea stations.