SECTION III.

PHYSIOGRAPHY.

§ 1. General Description of Australia.

1. **Geographical Position.**—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.[1]

Tropical and Temperate Regions. Of the total area of Australia the lesser portion lies within the tropics. Assuming, as is usual, that the latitude of the Tropic of Capricorn is 23° 30′ S.,[2] the areas within the tropical and temperate zones are approximately as follows:—

AREAS OF TROPICAL AND TEMPERATE REGIONS

OF STATES AND TERRITORY WITHIN TROPICS.

Areas.	Queensland.	Western Australia.	Northern Territory.	Total.
	Sq. miles.	*Sq. miles.*	*Sq. miles.*	*Sq. miles.*
Within Tropical Zone	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 Commonwealth (0.386). See hereafter Meteorology—page 53.

2. **Area of Australia compared with that of other Countries.**—That the area of Australia is greater than that of the United States of America, that it is four-fifths of that of Canada, that it is nearly one-fourth of the area of the whole of the British Empire, that it is more than three-fourths of the whole area of Europe, that it is more than 25 times as large as any one of the following, viz., the United Kingdom, Hungary, Italy, the Transvaal, and Ecuador, are facts which are not always adequately realised. It is this great size, taken together with the fact of the limited population, that gives to the problems of Australian development their unique character, and its clear comprehension is essential in any attempt to understand those problems.

The relative magnitudes may be appreciated by a reference to the following table, which shows how large Australia is compared with the countries referred to, or *vice versa*. Thus, to take line 1, we see that Europe is about $1\frac{3}{10}$ times (1·29828) as large as Australia, or that Australia is about three-quarters (more accurately 0·77) of the area of Europe.

1. 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." The limits, according to the 1903–4 edition of "A Statistical Account of Australia and New Zealand," p. 2, and, according to Volume XXV. of the Encyclopædia Britannica, tenth edition, p. 787, are respectively 113° 5′ E., 153° 16′ E., 10° 39′ S., and 39° 11½′ S., but these figures are obviously defective. A similar inaccuracy appears in the XI. edition of the Encyclopædia.

2. Its correct value for 1920 is 23° 26′ 58.89″, and it decreases about 0.47″ per annum.

SIZE OF AUSTRALIA IN COMPARISON WITH THAT OF OTHER COUNTRIES.

Commonwealth of Australia .. .. 2,974,581 square miles.

Country.	Area.	Australian Commonwealth in comparison with—	In comparison with Australian C'wealth.
	Sq. miles.		
Continents—			
Europe	3,861,992	0.77	1.29833
Asia	16,742,231	0.18	5.62843
Africa	12,313,717	0.24	4.13965
North and Central America and West Indies..	8,547,598	0.35	2.87355
South America	7,355,087	0.40	2.47265
Australasia and Polynesia	3,457,472	0.86	1.16234
Total, exclusive of Arctic and Antarctic Conts.	52,278,097	0.06	17.57495
Europe—			
Russia (inclusive of Poland, Ciscaucasia & Finland)	2,122,998	1.40	0.71371
Austria-Hungary (inclusive of Bosnia & Herzegovina)	261,259	11.39	0.08783
Germany	208,780	14.25	0.07019
France	207,054	14.37	0.06961
Spain	194,778	15.27	0.06548
Sweden	173,035	17.19	0.05817
Norway	124,643	23.86	0.04190
United Kingdom	121,633	24.46	0.04089
Italy	110,632	26.89	0.03719
Denmark (inclusive of Iceland)	55,291	53.80	0.01859
Rumania	53,489	55.61	0.01798
Bulgaria	47,750	62.29	0.01605
Greece	41,933	70.94	0.01410
Portugal	35,490	83.81	0.01193
Serbia	33,891	87.77	0.01139
Switzerland	15,976	186.19	0.00537
Netherlands	12,582	236.42	0.00423
Albania	11,500	258.66	0.00387
Belgium	11,373	261.55	0.00382
Turkey	10,882	273.35	0.00366
Montenegro	5,603	530.89	0.00188
Luxemburg	998	2980.54	0.00034
Andorra	191	15573.72	0.00006
Malta	118	25208.31	0.00004
Liechtenstein	65	45762.78	0.00002
San Marino	38	78278.45	0.00001
Monaco	8	371822.63	..
Gibraltar	2	1487290.50	..
Total, Europe	3,861,992	0.77	1.29833
Asia—			
Russia (inclusive of Transcaucasia, Siberia, Steppes, Transcaspia, Turkestan and inland waters)	6,641,587	0.45	2.23278
China and Dependencies	3,913,560	0.76	1.31567
British India	1,093,074	2.72	0.36747
Independent Arabia	1,000,000	2.97	0.33618
Feudatory Indian States	709,555	4.19	0.23854
Persia	628,000	4.74	0.21112
Turkey	602,842	4.93	0.20266
Dutch East Indies	583,210	5.10	0.19606
Japan (and Dependencies)..	261,276	11.38	0.08784

SIZE OF AUSTRALIA IN COMPARISON WITH OTHER COUNTRIES—*continued*.

Country.	Area.	Australian Commonwealth in comparison with—	In comparison with Australian C'wealth.
	Sq. miles.		
ASIA—*continued*—			
Afghanistan	245,000	12.14	0.08236
Siam	195,000	15.25	0.06556
Philippine Islands (inclsv. of Sulu Archipelago)	114,400	26.00	0.03846
Laos	111,940	26.57	0.03763
Bokhara	83,000	35.84	0.02790
Omán	82,000	36.28	0.02757
British Borneo and Sarawak	73,106	40.69	0.02458
Cambodia	67,724	43.92	0.02277
Annam	61,718	48.20	0.02075
Nepál	54,000	55.08	0.01815
Tonking	46,223	64.35	0.01554
Federated Malay States	27,506	108.14	0.00925
Ceylon	25,481	116.74	0.00857
Khiva	24,000	123.94	0.00807
Malay Protectorate (including Johore)	23,486	126.65	0.00790
Cochin China	21,988	135.28	0.00739
Bhután	20,000	148.73	0.00672
Aden and Dependencies	9,005	330.33	0.00303
Timor, &c. (Portuguese Indian Archipelago)	7,330	405.81	0.00246
Brunei	4,000	743.64	0.00134
Cyprus	3,584	829.96	0.00120
Kiauchau (Neutral Zone)	2,500	1189.83	0.00084
Goa, Damaõ, and Diu	1,638	1815.98	0.00055
Straits Settlements	1,600	1859.11	0.00054
Sokotra	1,382	2152.37	0.00046
Hong Kong and Dependencies	391	7607.62	0.00013
Wei-hai-wei	285	10437.13	0.00010
Bahrein Islands	250	11898.32	0.00008
Kiauchau (German)	200	14872.91	0.00007
French India (Pondicherry, &c)	196	15176.43	0.00007
Kwang Chau Wan	190	15655.67	0.00006
Macao, &c.	4	743645.25	..
Total, Asia	16,742,231	0.18	5.62843
Africa—			
French Sahara	1,544,000	1.93	0.51906
Sudan	1,014,400	2.93	0.34102
Belgian Congo	909,654	3.27	0.30581
French Equatorial Africa	669,000	4.45	0.22491
Senegambia and Niger	568,273	5.23	0.19104
Angola	517,000	5.75	0.17381
French Military District of the Niger	502,000	5.93	0.16876
Union of South Africa	473,096	6.29	0.15905
Rhodesia	440,000	6.76	0.14792
Portuguese East Africa	428,132	6.95	0.14393
Tripoli and Benghazi	406,000	7.33	0.13649
Abyssinia	400,000	7.44	0.13447
German East Africa	384,180	7.74	0.12915
Egypt	350,000	8.50	0.11766
Mauretania	344,967	8.62	0.11597
Algeria (including Algerian Sahara)	343,500	8.66	0.11548
Nigeria and Protectorate	336,000	8.85	0.11296
German South-west Africa	322,200	9.23	0.10832
Bechuanaland Protectorate	275,000	10.82	0.09245
British East Africa Protectorate	246,822	12.05	0.08298
Morocco	231,500	12.85	0.07783
Madagascar	228,000	13.05	0.07665
Kamerun	191,130	15.56	0.06425

SIZE OF AUSTRALIA IN COMPARISON WITH OTHER COUNTRIES—*continued*.

Country.	Area.	Australian Commonwealth in comparison with—	In comparison with Australian C'wealth.
	Sq. miles.		
AFRICA—*continued*—			
Italian Somaliland	139,430	21.33	0.04687
Ivory Coast	125,000	23.80	0.04202
Rio de Oro, &c.	109,200	27.24	0.03671
Uganda Protectorate	109,119	27.26	0.03668
French Guinea	95,000	31.31	0.03194
Gold Coast Protectorate (with Nth. Territories)	80,000	37.18	0.02689
Senegal	74,012	40.19	0.02488
British Somaliland	68,000	43.74	0.02286
Tunis	50,000	59.49	0.01681
French Somali Coast	46,000	64.66	0.01546
Eritrea	45,800	64.95	0.01540
Liberia	40,000	74.36	0.01345
Nyassaland Protectorate	39,573	75.17	0.01330
Dahomey	39,000	76.27	0.01311
Togoland	33,700	88.27	0.01133
Sierra Leone and Protectorate	31,000	95.95	0.01042
Portuguese Guinea	25,000	118.98	0.00840
Basutoland	11,716	253.89	0.00394
Spanish Guinea (Rio Muni, &c.)	9,470	314.11	0.00318
Swaziland	6,678	445.43	0.00225
Gambia and Protectorate	4,504	660.43	0.00151
Cape Verde Islands	1,480	2009.85	0.00050
Zanzibar	1,020	2916.26	0.00034
Réunion	970	3066.58	0.00033
Fernando Po, &c.	814	3654.28	0.00027
Mauritius and Dependencies	809	3676.86	0.00027
Comoro Islands	650	4576.25	0.00022
St. Thomas and Principe Islands	454	6551.94	0.00015
Seychelles	156	19067.83	0.00005
Mayotte, &c.	140	21247.01	0.00005
Spanish North and West Africa	87	34190.59	0.00003
St. Helena	47	63288.96	0.00002
Ascension	34	87487.68	0.00001
Total, Africa	12,313,717	0.24	4.13965
North and Central America and West Indies—			
Canada	3,729,665	0.80	1.25385
United States (exclusive of Alaska, &c.)	2,973,890	1.00	0.99977
Mexico	767,198	3.88	0.25792
Alaska	590,884	5.03	0.19864
Newfoundland and Labrador	162,734	18.28	0.05471
Nicaragua	49,200	60.46	0.01654
Guatemala	48,290	61.60	0.01623
*Greenland	46,740	63.64	0.01571
Honduras	44,275	67.18	0.01488
Cuba	44,164	67.35	0.01485
Costa Rica	23,000	129.33	0.00773
San Domingo	18,045	164.84	0.00607
Salvador	13,176	225.76	0.00443
Haiti	10,204	291.51	0.00343
British Honduras	8,598	345.96	0.00289
Bahamas	4,404	675.43	0.00148
Jamaica	4,207	707.05	0.00141
Porto Rico	3,606	824.90	0.00121
Trinidad and Tobago	1,974	1506.88	0.00066
Leeward Islands	715	4160.25	0.00024
Guadeloupe and Dependencies	680	4374.38	0.00023
Windward Islands	527	5644.37	0.00018

* Danish colony only. Total area has been estimated as between 827,000 and 850,000 square miles.

SIZE OF AUSTRALIA IN COMPARISON WITH OTHER COUNTRIES—*continued.*

Country.	Area.	Australian Commonwealth in comparison with—	In comparison with Australian C'wealth.
N. & C. AMERICA & W. INDIES—*continued*—	Sq. miles.		
Curaçao and Dependencies	403	7381.09	0.00014
Martinique	385	7726.18	0.00013
Turks and Caicos Islands	224	13279.38	0.00008
Barbados	166	17919.16	0.00006
Virgin Islands of U.S.A., late Danish West Indies	132	22534.70	0.00004
St. Pierre and Miquelon	93	31984.74	0.00003
Bermudas	19	156556.89	..
Total, N. and C. America and W. Indies	8,547,598	0.35	2.87355
South America—			
Brazil	3,275,510	0.91	1.10117
Argentine Republic	1,153,119	2.58	0.38766
Peru	722,461	4.12	0.24288
Bolivia	514,155	5.79	0.17285
Colombia (exclusive of Panama)	440,846	6.75	0.14820
Venezuela	398,594	7.46	0.13400
Chile	289,829	10.26	0.09744
Paraguay	165,000	18.03	0.05547
Ecuador	116,000	25.64	0.03900
British Guiana	89,480	33.24	0.03008
Uruguay	72,153	41.23	0.02426
Dutch Guiana	46,060	64.58	0.01548
Panama	32,380	91.86	0.01089
French Guiana	32,000	92.96	0.01076
Falkland Islands	6,500	457.63	0.00219
South Georgia	1,000	2974.58	0.00034
Total, South America	7,355,087	0.40	2.47265
Australasia and Polynesia—			
Commonwealth of Australia	2,974,581	1.00	1.00000
Dutch New Guinea	151,789	19.60	0.05103
New Zealand and Dependencies	104,751	28.40	0.03522
Papua	90,540	32.85	0.03044
Kaiser Wilhelm Land	70,000	42.49	0.02353
Bismarck Archipelago	15,570	191.05	0.00523
British Solomon Islands	14,586	203.93	0.00490
New Caledonia and Dependencies	8,548	347.99	0.00287
Fiji	7,083	419.96	0.00238
Hawaii	6,449	461.25	0.00217
German Solomon Islands, &c.	5,160	576.47	0.00173
New Hebrides	5,100	583.25	0.00171
French Establishments in Oceania	1,520	1956.96	0.00051
German Samoa	1,000	2974.58	0.00034
Tonga	250	11898.32	0.00008
Guam	225	13220.36	0.00008
Gilbert and Ellice Islands	208	14300.87	0.00007
Samoa (U.S.A. part)	102	29162.56	0.00003
Norfolk Island	10	297458.10	..
Total, Australasia and Polynesia	3,457,472	0.86	1.16234
British Empire	12,780,381	0·23	4·29653

It should be noted that in the table above the figures quoted for areas refer to conditions prevailing prior to the outbreak of war.

3. **Relative Size of Political Subdivisions.**—As already stated, Australia consists of six States and the Northern and Federal Territories. The areas of these, in relation to one another and to the total of Australia, are shewn in the following table :—

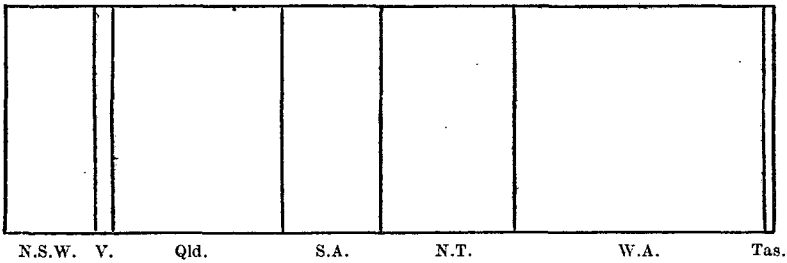
RELATIVE SIZE OF STATES, TERRITORIES, AND COMMONWEALTH.

State or Territory.	Area.	Ratio which the Area of each State and Territory bears to that of other States, Territories, and Commonwealth.							
		N.S.W.	Vic.	Q'land.	S.A.	W.A.	Tas.	N. Ter.	C'wlth.
	Sq. miles.								
New South Wales	309,432	1.000	3.521	0.461	0.814	0.317	11.804	0.591	0.104
Victoria ..	87,884	0.284	1.000	0.131	0.231	0.090	3.352	0.168	0.030
Queensland ..	670,500	2.167	7.629	1.000	1.764	0.687	25.577	1.280	0.225
South Australia	380,070	1.228	4.325	0.567	1.000	0.389	14.498	0.726	0.128
West. Australia	975,920	3.154	11.105	1.456	2.568	1.000	37.228	1.864	0.328
Tasmania ..	26,215	0.085	0.298	0.039	0.069	0.027	1.000	0.050	0.009
North. Territory	523,620	1.692	5.958	0.781	1.378	0.537	19.974	1.000	0.176
Federal Territory	940	0.003	0.011	0.001	0.002	0.001	0.036	0.002	0.000[1]
Commonwealth	2,974,581	9.613	33.847	4.436	7.826	3.048	113.469	5.681	1.000

1. The correct decimal is 0.0003.

Thus, looking at the top line, New South Wales is seen to be over three-and-a-half times as large as Victoria (3.521) and less than one-half the size of Queensland (0.461); or again, looking at the bottom line, the Commonwealth is shewn to be more than nine-and-a-half times as large as New South Wales (9.613), and nearly thirty-four times as large as Victoria (33.847).

These relative magnitudes are shewn in the small diagram below. It may be added that Papua (or British New Guinea), with its area of 90,540 square miles, is 0.030 of the area of the Commonwealth. The comparatively small size of the Federal Territory prevents its being shewn in this diagram.



% on total ..	N.S.W.	V.	Qld.	S.A.	N.T.	W.A.	Tas.
	10	3	22	13	18	33	1

4. **Coastal Configuration.**—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 Year Book No. 1, an enumeration of the features of the coast-line of Australia was given (see pp. 60 to 68).

(i) *Coast-line.* The lengths of coast-line, exclusive of minor indentations, both of each State and of the whole continent, are shewn in the following table :—

SQUARE MILES OF TERRITORY PER MILE OF COAST LINE.

STATES, TERRITORY, AND CONTINENT.

State.	Coast-line.	Area ÷ Coast-line.	State.	Coast-line.	Area ÷ Coast-line.
	Miles.	Sq. miles.		Miles.	Sq. miles.
New South Wales[1]	700	443	South Australia	1,540	247
Victoria ..	680	129	Western Australia	4,350	224
Queensland ..	3,000	223	Continent[2] ..	11,310	261
Northern Territory	1,040	503	Tasmania ..	900	29

1. Including Federal Territory. 2. Area 2,948,366 square miles.

For the entire Commonwealth 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, viz., 25 square miles.

(ii) *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 Nuyt's 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 recognised 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 this Year Book fairly complete information has been given concerning some special geographical element. Thus No. 1 Year Book, pp. 60–68, contains an enumeration of Coastal features ; No. 2, pp. 66–67, deals with Hydrology ; No. 3, pp. 59–72, with Orography ; No. 4, pp. 59–82, with the Lakes of Australia ; No. 5, pp. 51–80, with the Islands of Australia ; No. 6, pp. 55–66, with the Mineral Springs of Australia ; No. 7, pp. 56–58, with the Salient Features in the Geological History of Australia, with special reference to changes of climate. A special article dealing with the plains and peneplains of Australia appeared in No. 12 Year Book, pp. 82–88. This practically completes the description of the ordinary physical features.

§ 2. The Fauna of Australia.

An authoritative article describing in some detail the principal features of the Fauna of Australia was given in Year Books No. 1 (see pp. 103 to 109) and No. 2 (see pp. 111 to 117), while a synoptical statement appeared in No. 3 (see pp. 73 to 76). Considerations of space, however, preclude the inclusion in this issue of more than a passing reference to the subject.

§ 3. The Flora of Australia.

In Year Books No. 1 (see pp. 109 to 114) and No. 2 (see pp. 117 to 122) a fairly complete though brief account was given of the Flora of Australia, and in Year Book No. 3 similar information in a greatly condensed form will be found on pp. 76 to 78. Space in this issue will not permit of more than a mere reference to preceding volumes.

A special article dealing with Australian fodder plants, contributed by J. H. Maiden, Esq., F.L.S., Government Botanist of New South Wales, and Director of the Botanic Gardens, Sydney, appeared in Official Year Book No. 6, pp. 1190–6. A special article on the grasses and saltbushes of Australia, contributed by E. Breakwell, B.A., B.Sc., Agrostologist at the Botanic Gardens, Sydney, appeared in Year Book No. 9,

pp. 84–90. Year Book No. 10 contained two special articles; one dealing with Australian eucalyptus timbers, contributed by R. T. Baker, F.L.S., appeared on pp. 85 to 92, and one by H. G. Smith, F.C.S., dealing with the chemical products of Australian eucalypts, appeared on pp. 92–8.

§ 4. Seismology in Australia.

A brief statement regarding the position of seismology and seismological record in Australia appeared in Year Book No. 4, pp. 82 and 83.

§ 5. The Geology of Australia.

1. **General.**—Independent and authoritative sketches of the geology of each State were given in Year Books No. 1 (see pp. 73 to 103) and No. 2 (see pp. 78 to 111). Want of space has precluded the insertion of these sketches in the present issue of the Year Book, and it has not been considered possible to give anything like a sufficient account of the geology of Australia by presenting here a mere condensation of these sketches. Reference must, therefore, be made to either Year Book No. 1 or No. 2, *ut supra*.

2. **Geological Map of Australia.**—The map shewing the geographical distribution of the more important geological systems and formations, which appeared on page 51 of Year Book No. 12 and in preceding issues, has been discontinued pending the preparation of a new map embodying later information.

3. **The Plains and Peneplains of Australia.**—A special article dealing with this subject appears on pp. 82–88 of Year Book No. 12.

4. **The Building Stones of Australia.**—Independent and authoritative descriptions of the building stones of each State (with the exception of Queensland) will be found in Official Year Book No. 9, pp. 446–466.

A special article dealing with "The Building Stones of Queensland" will be found on pp. 89–95 of Year Book No. 12.

5. **Past Glacial Action in Australia.**—A special article on this subject will be found in Section XXXIV. (Miscellaneous) hereinafter.

§ 6. Climate and Meteorology of Australia.[1]

1. **Introductory.**—In preceding Year Books some account was given of the history of Australian meteorology, including reference to the development of magnetic observations and the equipment for the determination of various climatological records. (See Year Book No. 3, pp. 79, 80.) In Year Book No. 4, pp. 84 and 87, will be found a short sketch of the creation and organisation of the Commonwealth Bureau of Meteorology and a résumé of the subjects dealt with at the Meteorological Conference of 1907. Space will not permit of the inclusion of this matter in the present issue.

2. **Meteorological Publications.**—The following publications are issued daily from the Central Meteorological Bureau, viz.:—(i) Weather charts. (ii) Rainfall maps. (iii) Bulletins, Victorian and Interstate, shewing pressure, temperature, wind, rain, cloud extent, and weather. Similar publications are also issued from the divisional offices in each of the State Capitals.

The Bulletins of Climatology are as follow:—No. 1.—A general discussion of the climate and meteorology of Australia, illustrated by one map and diagrams. No. 2.—A discussion of the rainfall over Australia during the ten years 1897–1906 compared with the normal, illustrated by one map. No. 3.—Notes and statistics of the remarkable flood rains over south-eastern Australia during the winter of 1909, illustrated by five maps and diagrams. No. 4.—A discussion of the monthly and seasonal rainfall over Australia, illustrated by one map and diagram. No. 5.—An investigation into the possibility of forecasting the approximate winter rainfall for Northern Victoria, illustrated by two diagrams. No. 6.—The physiography of the Federal Territory at Canberra, illustrated by a relief map and 21 plates. No. 7.—On the climate of the Yass-Canberra district, illustrated by one map. No. 8.—Physiography of Eastern

1. Prepared from data supplied by the Commonwealth Meteorologist, H. A. Hunt, Esquire, F.R. Met. Soc.

Australia, with 28 text illustrations. No. 9.—The climate of Australia, with charts and diagrams, prepared for the Federal Handbook of Australia. No. 10.—Relation between cirrus directions as observed in Melbourne and the approach of the various storm systems affecting Victoria, illustrated by a number of charts. No. 11.—The climatic control of Australian production, with 43 illustrations. No. 12.—A graphical method of shewing the daily weather, and especially cloud types, with two graphs. No. 13.—Initial investigations in the upper air of Australia, with 35 illustrations. No. 14.—The control of settlement by humidity and temperature, with 21 charts and diagrams. No. 15.—Tropical Control of Australian Rainfall, illustrated by maps and diagrams.

Commencing with January, 1910, the "Australian Monthly Weather Report," containing statistical records from representative selected stations, with rain maps and diagrams, &c., is being published. Complete rainfall and other climatological data are published in annual volumes of meteorological statistics for each State separately.

The first text book of Australian meteorology, "Climate and Weather of Australia," was published in 1913.

3. General Description of Australia.—In the general description of Australia, page 45, it is pointed out that a considerable portion (0.530) of three divisions of the Australian Commonwealth 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[1] square miles belong to the tropical zone, and 1,020,720 to the temperate zone. The whole area of the Commonwealth within the temperate zone, however, is 1,825,261[2] 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 1.591). 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.

While on the coast the rainfall is often abundant and the atmosphere moist, in some portions of the interior the rainfall is very limited, and the atmosphere dry. The distribution of forest, as might be expected, and its climatic influence, is consequently very variable. In the interior there are on the one hand fine belts of trees, on the other there are large areas which are treeless, and where the air is hot and parched in summer. Again, on the coast, even as far south as latitude 35°, the vegetation is tropical in its luxuriance, and also somewhat so in character. Climatologically, therefore, Australia may be said to present a great variety of features. The various climatological characteristics will be referred to in detail.

4. Meteorological Divisions.—The Commonwealth Meteorologist has divided Australia, for climatological and meteorological purposes, into five divisions. The boundaries between these may be thus defined:—(*a*) Between divisions I. and II., the boundary between South and Western Australia, viz., the 129th meridian of east longitude; (*b*) between divisions II. and III., starting at the Gulf of Carpentaria, along the Norman River to Normanton, thence a straight line to Wilcannia on the Darling River, New South Wales; (*c*) between divisions II. and IV., from Wilcannia along the Darling River to its junction with the Murray; (*d*) between divisions II. and V., from the junction of the Darling and Murray Rivers, along the latter to Encounter Bay; (*e*) between divisions III. and IV., starting at Wilcannia, along the Darling, Barwon, and Dumaresq Rivers to the Great Dividing Range, and along that range and along the watershed between the Clarence and Richmond Rivers to Evans Head on the east coast of Australia; (*f*) between divisions IV. and V., from the junction of the Darling and Murray Rivers along the latter to its junction with the Murrumbidgee, along the Murrumbidgee to the Tumut River, and along the Tumut River to Tumut, thence a straight line to Cape Howe; (*g*) division V. includes Tasmania.

1. In the article "Australia" in the Encyclopædia Britannica, Vol. II., p. 946 (XI. edition), this area is given as 1,145,000 square miles.

2. Given as 1,801,700 square miles in the work above quoted, where, however, the statistics are said "to refer only to the continental States of the Federation, not to Tasmania."

The population included within these boundaries at the Census of the 3rd April, 1911, was approximately as follows :—

Division	I.	II.	III.	IV.	V.
Population	282,000	429,000	607,000	1,540,000	1,597,000

In these divisions the order in which the capitals occur is as follows :—(i) Perth, (ii) Adelaide, (iii) Brisbane, (iv) Sydney, (v) Melbourne and Hobart; and for that reason the climatological and meteorological statistics will be set forth in the indicated order in this publication.

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.

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	Darwin ..	97	12 28	130 51
Adelaide ..	140	34 56	138 35	Daly Waters	691	16 16	133 23
Brisbane ..	137	27 28	153 2	Alice Springs	1,926	23 38	133 37
Sydney ..	133	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

5. **Temperatures.**—In respect of Australian temperatures generally it may be pointed out that the 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 shewing that, on the whole, Australia has a more temperate climate when compared latitude for latitude with other places in the Southern Hemisphere.

The comparison is even more favourable when the Northern Hemisphere is included therein, for in the United States 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 isothermal value than 70°.

The extreme range of shade temperatures in summer and winter in a very large part of Australia amounts to probably only 81°. In Siberia, in Asia, the similar range is no less than 171°, and in North America 153°, or approximately double the Australian range.

Along the northern shores of the Australian continent the temperatures are very equable. At Darwin, for example, the difference in the means for the hottest and coldest months is only 8.3°, and the extreme readings for the year, that is, the highest maximum in the hottest month and the lowest reading in the coldest month, shew a difference of under 50°.

Coming southward the extreme range of temperature increases gradually on the coast, and in a more pronounced way inland.

The detailed temperature results for the several capitals of the States of Australia are shewn in the Climatological Tables hereinafter.

(i) *Hottest and Coldest Parts.* A comparison of the temperatures recorded at coast and inland stations shews 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. An exact knowledge of temperature disposition cannot be determined until the interior becomes more settled, but from data procurable it would appear that the hottest area of the continent is situated in the northern part of Western Australia about the Marble Bar and Nullagine goldfields, where the maximum shade temperature during the summer sometimes exceeds 100° for days, and even weeks, continuously. The coldest part of the Commonwealth is the extreme south-east of New South Wales and extreme east of Victoria, namely, the region of the Australian Alps. Here the temperature seldom, if ever, reaches 100°, even in the hottest of seasons.

Tasmania, although occasionally hot winds may cross the Straits and cause the temperature to rise to 100° in the low-lying parts, as a whole enjoys a most moderate and equable range of temperature throughout the year.

(ii) *Monthly Maximum and Minimum Temperatures.* The mean monthly maximum and minimum temperatures can be best shewn by means of graphs, which exhibit the nature of the fluctuation of each for the entire year. In the diagram (on page 65) for nine representative places in Australia, the upper heavy curves shew the mean maximum, the lower heavy curves the mean minimum temperatures based upon daily observations. On the same diagram the thin curves shew the relative humidities (see next paragraph).

6. **Relative Humidity.**—Next after temperature the degree of humidity may be regarded as of great importance as an element of climate; and the characteristic differences of relative humidity between the various capitals of Australia call for special remark. For six representative places the variations of humidity are shewn on the graph on page 65, which gives results based upon daily observations of the dry and wet bulb thermometers. Hitherto difficulties have been experienced in many parts of Australia in obtaining satisfactory observations for a continuous period of any length. For this reason it has been thought expedient to refer to the record of humidity at first order stations only, where the results are thoroughly reliable. Throughout, the degree of humidity given will be what is known as *relative humidity*, that is, the percentage of aqueous vapour actually existing to the total possible if the atmosphere were saturated.

The detailed humidity results for the several State capitals are given in the Climatological Tables hereinafter. From these, it is seen that, in respect of relative humidity, Sydney and Hobart have the first place, while Brisbane, Melbourne, Perth, and Adelaide follow in the order stated, Adelaide being the driest. The graphs on page 65 shew the annual variations in humidity. It will be observed that the *relative* humidity is ordinarily but not invariably great when the temperature is low.

7. **Evaporation.**—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"[1] and dams. The magnitude of the economic loss by evaporation will be appreciated from the records on pages 67 and 75 to 80, which shew that the yearly amount varies from about 32 inches at Hobart to 95 inches at Alice Springs in the centre of the Continent.

(i) *Monthly Evaporation Curves.* The curves shewing the mean monthly evaporation in various parts of the Commonwealth will disclose how characteristically different

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

are the amounts for the several months in different localities. The evaporation for characteristic places is shewn on the diagram shewing also rainfalls (see page 66).

(ii) *Loss by Evaporation.* In the interior of Australia the possible evaporation is greater than the actual rainfall. Since, therefore, the loss by evaporation depends largely on the exposed area, tanks and dams so designed that the surface shall be a minimum are advantageous. Similarly, 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 of more than ordinary concern in the drier districts of Australia.

8. **Rainfall.**—As even a casual reference to climatological maps, indicating the distribution of rainfall and prevailing direction of wind, would clearly shew, 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 the physiographical features generally.

Australia lies within the zone of the south-east trade 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, upon which the rain-laden winds blow, from the New South Wales northern border to Thursday Island. 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 very reliable, although generally light to moderate, rains enjoyed by the south-western portion of Western Australia, by the south-eastern agricultural areas of South Australia, by a great part of Victoria, and by the whole of Tasmania.

(i) *Factors determining Distribution and Intensity of Rainfall.*

(ii) *Time of Rainfall.*

In Year Book No. 6 (see pp. 72 to 74) some notes were given of the various factors governing the distribution, intensity and period of Australian rainfall.

(iii) *Wettest and Driest Regions.* The wettest known part of Australia is on the north-east coast of Queensland, between Port Douglas and Cardwell, where three stations situated on, or adjacent to, the Johnstone and Russell Rivers have an average annual rainfall of between 148 and 166 inches. The maximum and minimum falls there are:—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's Creek, 238.45 in 1901 and 80.47 inches in 1902, or a range of 157.98 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 33 years.

Harvey's Creek in the shorter period of 20 years has twice exceeded 200 inches, the total for 1910 being 201.28 inches.

The driest known part of the continent is about the Lake Eyre district in South Australia (the only part of the continent below sea level), where the annual average is but 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 the settled districts in the east of that State shew that the annual average is from 10 to 12 inches.

(iv) *Quantities and Distribution of Rainfall generally.* The departure from the normal rainfall increases greatly and progressively from the southern to the northern shores of the continent, and similarly also at all parts of the continent subject to capricious

monsoonal rains, as the comparisons hereunder will shew. The general distribution is best seen from the map on page 72, shewing 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 shewn in the following table:—

DISTRIBUTION OF AVERAGE RAINFALL.

Average Annual Rainfall.	N.S.W.	Victoria.	Queensland.	South Australia.	Northern Territory	Western Australia.	Tasmania. *	Commonwealth. *
	sqr. mls.	sqr. mls.	sqr. mls.	sqr. mls.	sqr. mls.	sqr. mls.	sqr. mls.	sqr. mls.
Under 10 inches	44,997	nil	91,012	317,600	138,190	513,653	nil	1,105,452
10—15 ,,	77,268	19,912	87,489	33,405	141,570	232,815	nil	592,459
15—20 ,,	57,639	12,626	112,738	14,190	62,920	89,922	937	350,972
20—30 ,,	77,202	29,317	213,779	13,827	93,470	95,404	7,559	530,558
30—40 ,,	30,700	14,029	69,880	984	40,690	40,750	4,588	201,621
Over 40 ,,	22,566	12,000	95,602	64	46,780	3,376	10,101	190,489
Total area ..	310,372	87,884	670,500	380,070	523,620	975,920	26,215	2,974,581

* Over an area of 3,030 square miles no records are available.

Referring first to the capital cities, the complete records of which are given on the following page, it is seen that Sydney with a normal rainfall of 48.40 inches occupies the chief place, Brisbane, Perth, Melbourne, Hobart and Adelaide following in that order, Adelaide with 21.01 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 shew how the rainfall is distributed throughout the year in various parts of the continent, the figures of representative towns have been selected. (See map on page 71.) Darwin, typical of the Northern Territory, shews that in that region nearly the whole of the rainfall occurs 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 in the former, and in November in the latter. The records at Alice Springs and Daly Waters indicate that in the central parts of Australia the wettest months are in the summer and autumn. In Queensland, as in the Northern Territory, the heaviest rains fall in the summer months, but good averages are also maintained during the other seasons.

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. In general it may be said that 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 receiving generally from about 10 to 20 inches.

(v) *Curves of Rainfall and Evaporation.* The relative amounts of rainfall and evaporation at different times through the year are best seen by referring to the graphs for a number of characteristic places. (See page 66.) It will be recognised at once how large is the evaporation when water is fully exposed to the direct rays of the sun, and to wind.

(vi) *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 AT THE AUSTRALIAN CAPITALS, 1840 TO 1919.

Year.	PERTH.			ADELAIDE.			BRISBANE.			SYDNEY.			MELBOURNE.			HOBART.		
	Amount.	No. of Days.	10 Years' Means.	Amount.	No. of Days.	10 Years' Means.	Amount.	No. of Days.	10 Years' Means.	Amount.	No. of Days.	10 Years' Means.	Amount.	No. of Days.	10 Years' Means.	Amount.	No. of Days.	10 Years' Means.
	in.		in.	in.		in.	in.		in.	in.		in.	in.		in.	in		in.
1840	..	..	..	24.23	99	..	29.32	..	..	58.52	150	..	22.57	..	..	..	..	..
1	..	..	..	17.96	93	..	49.31	..	..	76.31	142	..	30.18	..	..	13.95	74	..
2	..	..	..	20.32	122	..	28.81	..	..	48.32	138	..	31.16	..	..	23.60	88	..
3	..	..	..	17.19	104	..	51.67	..	..	62.78	168	..	21.54	..	..	13.43	87	..
4	..	..	..	16.88	136	..	63.20	..	..	70.66	156	..	30.74	..	..	26.25	94	..
5	..	..	..	18.83	125	..	39.09	..	..	62.01	133	..	23.93	..	..	16.68	76	..
6	..	..	..	26.89	114	..	31.41	..	41.83	43.83	139	..	30.53	..	..	21.96	99	..
7	..	..	..	27.61	109	..	..	..	(7 yr.)	42.81	142	..	30.18	..	..	13.86	89	..
8	..	..	..	19.74	114	21.07	42.59	..	..	59.17	155	58.27	33.15	..	28.22	23.62	115	19.24
9	..	..	..	25.44	110	(9 yr.)	..	..	..	21.49	140	(9 yr.)	44.25	..	(9 yr.)	33.52	103	(8 yr.)
1850	..	..	..	19.56	84	..	..	..	..	44.88	157	..	26.98	..	..	14.51	70	..
1	..	..	..	30.86	128	..	..	..	..	35.14	142	..	..	..	..	17.98	107	..
2	..	..	..	27.44	118	..	..	..	..	43.79	143	..	..	..	..	23.62	119	..
3	..	..	..	27.08	128	..	..	..	..	46.12	130	..	..	..	..	14.52	113	..
4	..	..	..	15.35	105	..	..	..	..	29.29	136	..	..	..	..	30.54	109	..
5	..	..	..	23.15	124	..	..	..	..	52.86	138	..	28.21	..	..	18.25	131	..
6	..	..	..	24.93	118	..	..	..	..	43.31	116	..	29.76	134	..	22.73	152	..
7	..	..	..	22.15	105	..	..	..	..	50.95	135	..	28.90	138	..	17.14	113	..
8	..	..	..	21.55	107	23.75	43.00	..	..	39.60	129	40.75	26.01	158	..	33.07	129	22.59
9	..	..	..	14.85	95	..	35.00	..	..	42.01	137	..	21.82	156	..	23.31	159	..
1860	..	..	..	19.67	119	..	54.63	144	..	82.76	180	..	25.38	133	..	21.05	142	..
1	..	..	..	24.04	147	..	69.45	155	..	59.36	157	..	29.16	159	..	28.19	167	..
2	..	..	..	21.85	119	..	28.27	98	..	23.99	108	..	22.08	139	..	21.72	148	..
3	..	..	..	23.68	145	..	68.83	146	..	47.08	152	..	36.42	165	..	40.67	163	..
4	..	..	..	19.75	121	..	47.00	114	..	69.12	185	..	27.40	144	..	28.11	142	..
5	..	..	..	15.51	108	..	24.11	52	..	36.15	140	..	15.94	119	..	23.07	146	..
6	..	..	..	20.11	116	..	51.18	142	..	36.91	156	..	22.41	107	..	23.55	127	..
7	..	..	..	19.05	112	..	61.04	112	..	59.56	140	..	25.79	133	..	22.27	139	..
8	..	..	..	19.99	113	19.85	35.98	110	47.55	42.98	161	49.99	18.27	120	24.47	18.08	112	25.00
9	..	..	..	14.74	117	..	54.39	114	..	48.00	150	..	24.58	129	..	23.87	131	..
1870	..	..	..	23.84	119	..	79.06	154	..	64.47	179	..	33.77	129	..	27.53	123	..
1	..	..	..	23.25	137	..	45.45	119	..	52.27	141	..	30.17	125	..	18.25	131	..
2	..	..	..	22.66	146	..	49.22	131	..	37.12	161	..	32.52	136	..	31.76	160	..
3	..	..	..	21.00	139	..	62.02	138	..	73.40	176	..	25.61	134	..	23.43	157	..
4	..	..	..	17.23	127	..	38.71	135	..	63.60	173	..	28.10	134	..	24.09	138	..
5	..	..	..	29.21	157	..	67.03	162	..	46.25	153	..	32.87	158	..	29.25	182	..
6	28.73	100	..	13.43	110	..	53.42	130	..	45.69	156	..	24.04	134	..	23.63	173	..
7	20.48	103	..	24.95	135	..	30.28	119	..	59.66	147	..	24.10	124	..	20.82	165	..
8	39.72	143	29.64	22.08	112	21.24	56.33	134	53.59	49.77	129	54.03	25.36	116	28.11	29.76	183	25.24
9	41.34	106	(3 yr.)	20.69	130	..	67.30	157	..	63.19	167	..	19.28	127	..	21.07	210	..
1880	31.79	116	..	22.48	142	..	49.12	134	..	29.51	142	..	28.48	147	..	..	..	..
1	24.78	101	..	18.02	135	..	29.39	117	..	40.99	163	..	24.08	134	..	..	..	..
2	35.68	109	..	15.70	134	..	42.62	121	..	42.28	112	..	22.40	131	..	30.69	..	..
3	39.65	122	..	26.76	161	..	32.22	114	..	46.92	157	..	23.71	130	..	24.05	161	..
4	31.96	92	..	18.74	138	..	43.49	136	..	44.04	159	..	25.85	128	..	21.55	171	..
5	33.44	110	..	15.89	133	..	26.85	112	..	39.91	145	..	26.94	123	..	28.29	176	..
6	28.90	89	..	14.42	141	..	53.66	152	..	39.43	152	..	24.00	128	..	21.39	189	..
7	37.52	105	..	25.70	164	..	81.54	242	..	60.16	190	..	32.39	153	..	24.21	174	..
8	27.83	117	33.29	14.55	131	19.30	33.08	143	45.93	23.01	132	42.94	19.42	123	24.66	18.45	151	23.71
9	39.96	123	..	30.87	143	..	49.36	155	..	57.16	186	..	27.14	125	..	30.80	180	(8 yr.)
1890	46.73	126	..	25.78	139	..	73.02	162	..	81.42	184	..	24.24	140	..	27.51	173	..
1	30.33	93	..	14.01	113	..	41.68	143	..	55.30	200	..	26.73	126	..	23.25	160	..
2	31.23	122	..	21.53	137	..	64.98	146	..	69.26	189	..	24.96	124	..	18.62	120	..
3	40.12	145	..	21.49	129	..	88.26	147	..	49.90	209	..	26.80	140	..	27.46	146	..
4	23.72	103	..	20.78	134	..	44.02	143	..	38.22	188	..	22.60	138	..	27.39	141	..
5	33.01	123	..	21.28	130	..	59.11	105	..	31.86	170	..	17.04	131	..	25.40	121	..
6	31.50	103	..	15.17	121	..	44.97	121	..	42.40	157	..	25.16	124	..	21.61	135	..
7	27.17	106	..	15.42	119	..	42.53	115	..	42.52	136	..	25.85	117	..	20.45	153	..
8	31.76	118	33.55	20.75	116	20.71	60.06	131	56.80	43.17	143	51.12	15.61	102	23.61	20.40	164	24.29
9	32.40	107	..	18.84	119	..	38.85	141	..	55.90	174	..	28.87	116	..	20.68	170	..
1900	36.61	124	..	21.68	133	..	34.41	110	..	66.54	170	..	28.09	139	..	19.14	135	..
1	36.75	122	..	18.01	124	..	38.48	110	..	40.10	149	..	27.45	113	..	25.11	149	..
2	27.06	93	..	16.02	123	..	16.17	87	..	43.07	180	..	23.08	102	..	21.85	150	..
3	35.69	140	..	25.47	134	..	49.27	136	..	38.62	173	..	28.43	130	..	25.86	139	..
4	34.35	125	..	20.31	117	..	33.23	124	..	45.93	158	..	29.72	128	..	22.41	139	..
5	34.61	116	..	22.28	131	..	36.76	108	..	35.03	145	..	25.64	129	..	32.09	168	..
6	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	34.05	24.56	125	21.15	44.01	125	36.55	45.65	167	43.41	17.72	130	25.36	16.50	148	23.20
9	39.11	107	..	27.69	138	..	34.06	111	..	32.45	177	..	25.86	171	..	27.29	170	..

RAINFALL AT THE AUSTRALIAN CAPITALS—*continued.*

Year.	PERTH.			ADELAIDE.			BRISBANE.			SYDNEY.			MELBOURNE.			HOBART.		
	Amount.	No. of Days.	10 Years' Means.	Amount.	No. of Days.	10 Years' Means.	Amount.	No. of Days.	10 Years' Means.	Amount.	No. of Days.	10 Years' Means.	Amount.	No. of Days.	10 Years' Means.	Amount.	No. of Days.	10 Years' Means.
	in.		in.	in.		in.	in.		in.	in.		in.	in.		in.	in.		in.
1910	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	27.85	123	..	19.57	116	..	41.30	114	..	47.51	172	..	20.37	157	..	23.14	181	..
13	38.28	141	..	18.16	102	..	40.81	115	..	57.70	141	..	21.17	157	..	19.36	165	..
14	20.21	128	..	11.39	91	..	33.99	141	..	56.42	149	..	18.57	129	..	15.42	154	..
15	43.61	164	..	19.38	117	..	25.66	93	..	34.83	117	..	20.95	167	..	20.91	196	..
16	35.16	128	..	28.16	142	..	52.80	136	..	44.91	161	..	38.04	170	..	43.39	203	..
17	45.64	146	..	28.90	153	..	40.92	127	..	52.40	151	..	30.57	171	..	30.62	214	..
18	39.58	138	34.98	17.41	107	21.13	24.95	121	37.87	42.99	149	46.64	27.13	160	26.39	26.04	179	25.82
19	30.66	120	..	17.21	108	..	19.36	96	..	58.71	152	..	24.89	141	..	22.48	153	..
Aver.	..	..	33.60	..	..	20.96	..	..	45.42	..	..	48.40	..	..	26.17	..	..	23.74
No.of Yrs.			(44)			(81)			(70)			(80)			(76)			(77)

NOTE.—The above average Rainfall figures for Brisbane, Sydney, and Melbourne differ slightly from the mean annual falls given in the Climatological Tables on pp. 75-80, which are for a less number of years.

9. **Remarkable Falls of Rain.**—The following are the more remarkable falls of rain in the States of New South Wales, Queensland, Western Australia, Victoria, and Tasmania, and in the Northern Territory, which have occurred within a period of twenty-four hours:—

HEAVY RAINFALLS, NEW SOUTH WALES, UP TO 1919, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Anthony ..	28 Mar., 1887	17.14	Maitland W. ..	9 Mar., 1893	14.79
,, ...	15 Jan., 1890	13.13	Major's Creek ..	14 Feb., 1898	12.32
Araluen	15 Feb., 1898	13.36	Marrickville ..	9 Mar., 1913	10.40
Bega	27 ,, 1919	17.88	Morpeth	9 ,, 1893	21.52
Bellingen ..	4 Mar., ,,	13.16	Mount Kembla ..	13 Jan., 1911	18.25
Berry	13 Jan., 1911	12.05	Mt. Pleasant ..	24 Mar., 1914	10.30
Billambil	14 Mar., 1894	12.94	Murwillumbah ..	29 May, 1919	10.10
Bomaderry ..	13 Jan., 1911	13.03	Nepean Tunnel ..	14 Feb., 1898	12.30
Broger's Creek ..	14 Feb., 1898	20.05	Nethercote ..	27 ,, 1919	14.39
,, ,, ..	19 July, 1910	12.22	Nowra	13 Jan., 1911	13.00
,, ,, ..	13 Jan., 1911	20.83	Numbugga ..	27 Feb., 1919	17.87
,, ,, ..	24 July, 1918	10.30	Orara Upper ..	4 Mar., 1919	14.00
,, ,, ..	26 Feb., 1919	11.01	Padstow Park ..	9 ,, 1913	10.64
Bulli Mountain ..	13 ,, 1898	17.14	Prospect	28 May, 1889	12.37
Burragate ..	27 ,, 1919	16.38	Raleigh Central ..	10 Nov., 1917	13.20
Camden Haven ..	22 Jan., 1895	12.23	Richmond	28 May, 1889	12.18
Candelo	27 Feb., 1919	18.58	Rosemount	23 Mar., 1914	12.62
Castle Hill ..	28 May, 1889	13.49	Rooty Hill	27 May, 1889	11.85
Colombo Lyttleton	5 Mar., 1893	12.17	Taree	28 Feb., 1892	12.24
Comboyne ..	18 May, 1914	10.68	Terara	26 ,, 1873	12.57
Condong ..	27 Mar., 1887	18.66	The Hill(Shell Harb.)	24 Mar., 1914	12.00
Cordeaux River ..	14 Feb., 1898	22.58	Tomago	9 ,, 1893	13.76
,, ,, ..	13 Jan., 1911	14.52	Tongarra Farm ..	14 Feb., 1898	15.12
Dapto West ..	14 Feb., 1898	12.05	Toothdale ..	27 ,, 1919	13.51
Dunheved ..	28 May, 1889	12.40	Towamba	5 Mar., 1893	20.00
Dunoon	9 Nov., 1917	10.02	Tweed River Heads	9 Nov., 1917	13.50
Eden	27 Feb., 1919	11.05	Sherwood	17 June, 1914	10.00
Holy Flat ..	12 Mar., 1887	12.00	Stockyard Mt. ..	24 Mar., ,,	10.72
,, ,, ..	28 Feb., 1892	12.24	South Head (near Sydney) ..	29 Apr., 1841	20.12
Jamberoo ..	23 Mar., 1914	10.22	,, ,, ..	16 Oct., 1844	20.41
,, ..	24 ,, ,,	11.28	Unanderra	24 Mar., 1914	11.68
Katoomba ..	7 Apr., 1913	10.50	Urunga	9 Nov., 1917	10.29
Kembla Heights ..	13 Jan., 1911	17.46	Verona	27 Feb., 1919	10.91
Kingswood ..	26 Feb., 1919	13.55	Wollongong ..	24 Mar., 1914	12.50
Leconfield ..	9 Mar., 1893	14.53			
Madden's Creek ..	13 Jan., 1911	18.68			

HEAVY RAINFALLS, QUEENSLAND, UP TO 1919, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Adelaide Park ..	23 Jan., 1918	12.00	Collaroy ..	23 Jan., 1918	18.06
Allomba (Cairns) ..	30 ,, 1913	13.50	Cooktown ..	22 ,, 1903	12.49
Anglesey	26 Dec., 1909	18.20	,, ..	23 ,, 1914	13.98
,, ...	10 Feb., 1915	12.00	Cooran	1 Feb., 1893	13.62
Atherton (Cairns) ..	31 Jan., 1913	16.69	,, ...	26 Dec., 1908	14.08
Ayr	20 Sep., 1890	14.58	Cooroy	9 June, 1893	13.60
Babinda (Cairns) ..	31 Jan., 1913	12.79	,, ...	10 Jan., 1898	13.50
,, ,, ..	1 Feb., ..	20.51	Crohamhurst		
,, ,, ..	24 Jan., 1916	22.30	(Blackall Range)	2 Feb., 1893	35.71
,, ,, ..	25 ,, ,,	13.45	,, ,, ..	9 June, ,,	13.31
,, ,, ..	19 ,, 1918	13.53	,, ,, ..	9 Jan., 1898	19.55
Banyan (Cardwell)	31 ,, 1913	13.79	,, ,, ..	6 Mar., ,,	16.01
Barrine (Cairns) ..	31 ,, ,,	13.34	,, ,, ..	26 Dec., 1909	13.85
Batheaston ..	27 Dec., 1916	10.00	,, ,, ..	10 Feb., 1915	12.98
Bloomsbury ..	14 Feb., 1893	17.40	Crow's Nest ..	2 Aug., 1908	11.17
,, ..	10 Jan., 1901	16.62	Croydon	29 Jan., ,,	15.00
Blue Mountain ..	22 ,, 1918	13.00	Cryna (Beaudesert)	21 ,, 1887	14.00
,, ,, ..	23 ,, ,,	13.00	Dungeness ..	16 Mar., 1893	22.17
Bowen	13 Feb., 1893	14.65	,, ..	17 Apr., 1894	14.00
Boynedale ..	9 ,, 1915	11.20	Dunira	9 Jan., 1898	18.45
Bracewell ..	9 ,, ,,	11.59	,, ...	6 Mar., ,,	15.95
Brisbane ..	21 Jan., 1887	18.31	Eddington (Clonc'ry)	23 Jan., 1891	10.33
Bromby Park(Bowen)	14 Feb., 1893	13.28	Emscote Farm ..	10 Feb., 1915	13.22
Brookfield ..	14 Mar., 1908	14.95	Emu Park ..	18 Jan., 1913	12.75
Buderim Mountain	11 Jan., 1898	26.20	Enoggera Railway	14 Mar., 1908	12.14
Bundaberg ..	16 ,, 1913	16.94	Ernest Junction ..	14 ,, ,,	13.00
Burketown ..	15 ,, 1891	13.58	Fairymead Planta-		
,, ..	12 Mar., 1903	14.52	tion (Bundaberg)	16 Jan., 1913	15.32
Burnett Head			Finch Hatton ..	23 ,, 1918	11.06
(Bundaberg) ..	16 Jan., 1913	15.22	,, ,, ..	11 Mar., ,,	11.31
Burpengary ..	10 Feb., 1915	11.11	Flat Top Island ..	22 Dec., 1909	12.96
Bustard Head ..	17 Jan., 1913	14.93	Floraville ..	6 Jan., 1897	10.79
Cairns	11 Feb., 1889	14.74	,, ..	11 Mar., 1903	12.86
,, ...	21 Apr., ,,	12.40	Flying Fish Point ..	7 Apr., 1912	16.06
,, ...	5 ,, 1891	14.08	,, ,, ..	31 Jan., 1913	16.10
,, ...	11 Feb., 1911	15.17	Gatcombe Head		
,, ...	2 Apr., ,,	20.16	(Gladstone) ..	18 ,, ..	12.88
,, ...	31 Jan., 1913	13.94	Gin Gin	16 ,, 1905	13.61
,, ...	24 ,, 1916	12.28	,, ...	16 ,, 1913	12.27
Calliope ..	9 Feb., 1915	12.09	Gladstone ..	18 Feb., 1888	12.37
Cape Grafton ..	5 Mar., 1896	13.37	,, ..	31 Jan., 1893	14.62
Carbrook ..	11 Jan., 1918	14.03	,, ..	4 Feb., 1911	18.83
,, ..	23 ,, ,,	22.66	,, ..	9 ,, 1915	10.10
,, ..	24 ,, ,,	15.77	Glen Boughton ..	5 Apr., 1894	18.50
Cardwell ..	30 Dec., 1889	12.00	,, ,, ..	31 Jan., 1913	14.92
,, ..	23 Mar., 1890	12.00	,, ,, ..	24 ,, 1916	14.02
,, ..	18 ,, 1904	18.24	Glen Prairie ..	18 Apr., 1904	12.18
,, ..	3 Apr., 1911	12.84	Gold Creek Reservoir	14 Mar., 1908	12.50
Carmilla	22 Jan., 1918	13.92	Goldsbor'ugh(Cairns)	31 Jan., 1913	19.92
,, ...	23 ,, ,,	15.92	,, ,,	1 Feb., ,,	12.22
,, ...	24 ,, ,,	13.73	Goodwood(Bund'b'g)	16 Jan., ..	13.07
Clare	26 ,, 1896	15.30	Goondi Mill(Innisfail)	6 Apr., 1894	15.69
Clermont ..	28 Dec., 1916	12.28	,, ,,	18 ,, 1899	14.78
Coen	17 Feb., 1914	12.03	,, ,,	24 Jan., 1900	13.30
Collaroy ..	30 Jan., 1896	14.25	,, ,,	29 Dec., 1903	17.83
,, ..	28 Dec., 1916	12.79	,, ,,	10 Feb., 1911	17.68
,, ..	22 Jan., 1918	11.17	,, ,,	31 Mar., ,,	12.38

HEAVY RAINFALLS, QUEENSLAND—*continued.*

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		Ins.			Ins.
Goondi Mill(Innisfail)	1 Apr., 1911	13.60	Innisfail (formerly		
,, ,,	6 ,, 1912	15.55	Geraldton) ..	11 Feb., 1911	14.48
Goondi	30 Jan., 1913	24.10	,, ,, ..	1 Apr., ,,	12.35
Goorganga ..	23 ,, 1918	18.17	,, ,, ..	2 ,, ,,	15.00
Granada (formerly			,, ,, ..	7 ,, 1912	20.50
Donaldson) ..	27 ,, 1891	11.29	,, ,, ..	8 ,, ,,	12.15
,, ,, ..	8 ,, 1911	13.50	,, ,, ..	31 Jan., 1913	20.91
,, ,, ..	9 ,, ,,	14.30	Invicta (Kolan R.)	16 ,, ,,	14.58
Halifax	5 Feb., 1899	15.37	Isis Junction ..	6 Mar., 1898	13.60
,, ...	6 Jan., 1901	15.68	Kabra	23 Jan., 1918	10.28
,, ...	8 Apr., 1912	12.75	Kamerunga (Cairns)	20 ,, 1892	13.61
Hambledon Mill ..	13 Jan., 1909	13.80	,, ,,	6 Apr., 1894	14.04
,, ,, ..	2 ,, 1911	18.61	,, ,,	5 ,, 1895	12.31
,, ,, ..	10 Feb., ,,	13.97	,, ,,	11 Feb., 1911	13.07
,, ,, ..	30 Mar., ,,	13.04	,, ,,	1 Apr., ,,	14.20
,, ,, ..	31 ,, ,,	14.95	,, ,,	2 ,, ,,	21.00
,, ,, ..	1 Apr., ,,	19.62	,, ,,	31 Jan., 1913	16.00
,, ,, ..	30 Jan., 1913	17.32	Koumala ..	23 ,, 1918	22.31
Hampden ..	23 ,, 1918	17.30	,, ..	24 ,, ,,	20.65
,, ..	24 ,, ,,	17.19	Kulara (Cairns) ..	31 ,, 1913	12.69
Harvey Creek ..	8 Mar., 1899	17.72	Kuranda (Cairns) ..	6 Mar., 1899	14.12
,, ,, ..	25 Jan., 1900	12.53	,, ,, ..	20 Apr., 1903	14.16
,, ,, ..	25 May, 1901	14.00	,, ,, ..	14 Jan., 1909	12.37
,, ,, ..	14 Mar., 1903	12.10	,, ,, ..	11 Feb., 1911	16.30
,, ,, ..	11 Jan., 1905	16.96	,, ,, ..	17 Mar., ,,	15.10
,, ,, ..	28 ,, 1906	12.29	,, ,, ..	31 ,, ,,	18.60
,, ,, ..	14 ,, 1909	14.40	,, ,, ..	1 Apr., ,,	24.30
,, ,, ..	3 ,, 1911	27.75	,, ,, ..	2 ,, ,,	28.80
,, ,, ..	11 Feb., ,,	12.88	,, ,, ..	31 Jan., 1913	16.34
,, ,, ..	1 Apr., ,,	13.61	Lake Nash ..	10 ,, 1895	10.25
,, ,, ..	2 ,, ,,	16.46	,, ..	20 Mar., 1901	10.02
,, ,, ..	31 Jan., 1913	24.72	Landsborough ..	2 Feb., 1893	15.15
,, ,, ..	24 ,, 1916	13.17	,, ..	9 June, ,,	12.80
Haughton Valley	26 ,, 1896	18.10	,, ..	26 Dec., 1909	14.00
Herberton ..	31 ,, 1913	14.00	Low Island ..	10 Mar., 1904	15.07
Hillcrest (Mooloolah)	26 Dec., 1909	13.35	,, ..	31 ,, 1911	14.70
Holmwood(Woodf'd)	2 Feb., 1893	16.19	,, ..	1 Apr., ,,	15.30
,, ,,	10 Jan., 1898	12.40	Lucinda	17 Feb., 1906	13.35
Homebush ..	3 Feb., ,,	12.04	,, ...	10 Mar., 1906	14.60
Howard ..	15 Jan., 1905	19.55	Lyndon(*via* Brixton)	3 ,, 1917	17.00*
Huntley ..	27 Dec., 1916	18.94	Lytton	21 Jan., 1887	12.85
Ingham	18 Jan., 1894	12.60	Mackay	23 Dec., 1909	13.96
,, ...	6 ,, 1901	13.59	,, ...	21 Jan., 1918	24.70†
,, ...	25 Dec., 1903	12.30	,, ...	22 ,, ,,	17.25‡
,, ...	11 Mar., 1918	12.68	,, ...	23 ,, ,,	13.61
Inkerman ..	21 Sep., 1890	12.93	Sugar Experimental		
,, ..	24 Jan., 1918	12.70	Farm, Mackay ..	23 Dec., 1909	12.00
Inneshowen			,, ..	21 Jan., 1918	16.80
(Johnstone River)	30 Dec., 1889	14.01	,, ..	22 ,, ,,	17.20
Innisfail (formerly			,, ..	23 ,, ,,	13.61
Geraldton) ..	11 Feb., ,,	17.13	Macnade Mill ..	18 ,, 1894	12.56
,, ,, ..	31 Dec., ,,	12.45	,, ..	17 Apr., ,,	14.26
,, ,, ..	6 Apr., 1894	16.02	,, ..	5 Feb., 1899	15.20
,, ,, ..	18 ,, 1899	13.20	,, ..	6 Jan., 1901	23.33
,, ,, ..	24 Jan., 1900	15.22	,, ..	7 Mar., 1914	12.44
,, ,, ..	29 Dec., 1903	21.22	,, ..	4 ,, 1915	22.00

* Mr. Jas. Laidlaw, of Lyndon, states that this fell in 4 hours. † 37½ hours. ‡ 22½ hours.

HEAVY RAINFALLS, QUEENSLAND—*continued.*

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Maleny	26 Dec., 1909	14.76	Port Douglas ..	17 Mar., 1911	16.10
Mapleton ..	14 Mar., 1908	14.29	,, ,, ..	1 Apr., ,,	31.53
,, ..	26 Dec., 1909	15.72	Princhester ..	23 Jan., 1918	10.00
,, ..	10 Feb., 1915	12.75	Proserpine ..	23 ,, ,,	18.17
Marlborough ..	17 ,, 1888	14.24	Ravenswood ..	24 Mar., 1890	17.00
,, ..	22 Jan., 1918	13.70	Redcliffe ..	21 Jan., 1887	14.00
Milton	14 Mar., 1908	12.24	,, ..	16 Feb., 1893	17.35
,, ...	9 Feb., 1915	10.15	Reid River ..	2 ,, 1917	11.15
Mirani	12 Jan., 1901	16.59	Rosedale ..	6 Mar., 1898	12.60
,, ...	23 ,, 1918	13.50	,, ..	16 Jan., 1913	18.90
,, ...	24 ,, ,,	12.25	Sandgate ..	16 Feb., 1893	14.03
Miriam Vale (B'berg)	17 ,, 1913	15.80	Sarina	23 Jan., 1918	22.60
,, ,,	9 Feb., 1915	10.22	Somerset ..	28 ,, 1903	12.02
Mooloolah ..	13 Mar., 1892	21.53	Spill Creek ..	21 ,, 1918	11.07
,, ..	2 Feb., 1893	19.11	Stanwell ..	22 ,, ,,	11.70
,, ..	6 Mar., 1898	14.43	,, ...	23 ,, ,,	11.05
Mornington Island	18 Jan., 1919	14.85	St. Helens (Mackay)	24 Feb., 1888	12.00
Mount Crosby ..	14 Mar., 1908	14.00	St. Lawrence ..	17 ,, ,,	12.10
Mount Cuthbert ..	8 Jan., 1911	18.00	,, ..	30 Jan., 1896	15.00
Mount Molloy ..	31 Mar., ,,	20.00	Tewantin ..	30 Mar., 1904	12.30
,, ..	1 Apr., ,,	20.00	The Caves ..	23 Jan., 1918	12.60
,, ..	2 ,, ,,	20.00	The Hollow(Mackay)	23 Feb., 1888	15.12
Mount Mee ..	10 Feb., 1915	12.00	Thornborough ..	20 Apr., 1903	18.07
Mourilyan ..	14 Jan., 1909	13.00	Townsville ..	24 Jan., 1892	19.20
,, ..	3 ,, 1911	12.70	,, ..	28 Dec., 1903	15.00
,, ..	11 Feb., ,,	17.40	Victoria Mill ..	6 Jan., 1901	16.67
,, ..	1 Apr., ,,	13.20	Walsh River ..	1 Apr., 1911	13.70
,, ..	7 ,, 1912	18.97	Warren State Farm	22 Jan., 1918	11.42
,, ..	31 Jan., 1913	15.05	Woodford ..	2 Feb.,.1893	14.93
Mundoolun ..	21 ,, 1887	17.95	Woodlands (Yepp'n)	25 Mar., 1890	14.25
Musgrave ..	6 Apr., 1894	13.71	,, ,,	31 Jan., 1893	23.07
Nambour ..	9 Jan., 1898	21.00	,, ,,	9 Feb., 1896	13.97
,, ..	7 Mar., ,,	13.28	,, ,,	7 Jan., 1898	14.50
,, ..	27 Dec., 1909	16.80	Woody Island ..	16 ,, 1913	12.66
Nerang	15 June, 1892	12.35	Woombye ..	26 Dec., 1909	13.42
Netherdale ..	22 Jan., 1918	19.50	Wootha	10 Feb., 1915	15.93
,, ..	11 Mar., ,,	12.25	Wycarbah ..	21 Jan., 1918	10.80
North Kolan (Bundaberg) ..	6 Jan., 1913	12.90	,, ..	22 ,, ,,	10.64
North Pine ..	16 Feb., 1893	14.97	Yandina ..	1 Feb., 1893	20.08
Nundah ..	14 Mar., 1908	12.00	,, ..	9 June, ,,	12.70
Oxenford ..	14 ,, ,,	15.65	,, ..	9 Jan., 1898	19.25
Palmwoods ..	4 Feb., 1893	12.30	,, ..	7 Mar., ,,	13.52
,, ..	10 Jan., 1898	15.85	,, ..	28 Dec., 1909	15.80
,, ..	7 Mar., ,,	13.02	Yarrabah ..	11 Feb., 1911	12.00
,, ..	25 Dec., 1909	17.75	,, ..	2 Apr., ,,	30.65
Peachester ..	26 ,, ,,	14.91	,, ..	24 Jan., 1916	27.20
Pialba(Marybor'gh)	16 Jan., 1913	17.22	,, ..	25 ,, ,,	18.60
Pittsworth ..	11 Mar., 1890	14.68	Yeppoon ..	31 ,, 1893	20.05
Plane Creek (Mackay)	26 Feb., 1913	27.73	,, ..	8 ,, 1898	18.05
Point Archer ..	23 Jan., 1914	13.47	,, ..	3 Feb., 1906	14.90
Port Douglas ..	5 Mar., 1887	13.00	,, ..	3 ,, 1911	14.92
,, ,, ..	10 ,, 1904	16.34	,, ..	18 Jan., 1913	13.00
,, ,, ..	11 Jan., 1905	14.68	,, ..	8 Oct., 1914	21.70

NOTE.—In Queensland falls of 12 or more inches within 20 miles of the coast or 10 or more inches inland are taken.

HEAVY RAINFALLS, WESTERN AUSTRALIA, UP TO 1919, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Ascot	8 Feb., 1912	8.85	Point Torment ..	17 Dec., 1906	11.86
,, ...	9 ,, ,,	5.85	Port George IV. ..	17 Jan., 1915	11.24
Balla Balla ..	21 Mar., 1899	14.40	Roebourne ..	3 Apr., 1898	11.44
Bamboo Creek ..	22 ,, ,,	10.10	Roebuck Plains ..	5 Jan., 1917	14.01
Boodarie.. ..	21 ,, ,,	14.53	,, ,, ..	6 ,, 1917	22.36
Broome	6 Jan., 1917	14.00	Tambray ..	6 Mar., 1900	10.00
,, ...	7 ,, ,,	6.20	,, ..	3 ,, 1903	10.47
Carlton	11 ,, 1906	10.64	Thangoo ..	17-19 Feb.'96	24.18
Cossack	3 Apr., 1898	12.82	,, ..	28 Dec., 1898	11.55
,, ...	16 ,, 1900	13.23	Whim Creek ..	2 Apr., 1898	7.08
Croydon	3 Mar., 1903	12.00	,, ,, ..	3 ,, ,,	29.41
Derby	29 Dec., 1898	13.09	,, ,, ..	6 Mar., 1900	10.03
,, ...	30 ,, ,,	7.14	,, ,, ..	3 ,, 1903	10.44
,, ...	6 Jan., 1917	5.97	Woodbrook ..	2 Apr., 1898	3.80
,, ...	7 ,, ,,	16.47	,, ,, ..	3 ,, 1898	8.78
Exmouth Gulf ..	2 Feb., 1918	12.50	Woodstock ..	21 Mar., 1912	13.00
Fortescue ..	3 May, 1890	23.36	Wyndham ..	27 Jan., 1890	11.60
Frazier Downs ..	3 Mar., 1916	12.25	,, ..	4 Mar., 1919	12.50
Kerdiadary ..	7 Feb., 1901	12.00	,, ..	11 Jan., 1903	9.98
Meda	2 Mar., 1916	10.55	,, ..	12 ,, ,,	6.64
Millstream ..	5 ,, 1900	10.00	Yardil Creek ..	3 Feb., 1918	10.00
Obagama ..	28 Feb., 1910	12.00	Yeeda	2 Mar., 1916	10.70
Pilbarra	2 Apr., 1898	14.04	,, ...	6 Jan., 1917	10.20
Point Cloates ..	20 Jan., 1909	10.87	,, ...	7 ,, ,,	11.75

HEAVY RAINFALLS, NORTHERN TERRITORY, UP TO 1919, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Bonrook	24 Dec., 1915	10.60	Cosmopolitan Gold Mine ..	24 Dec., 1915	10.60
Borroloola ..	14 Mar., 1899	14.00	Lake Nash ..	21 Mar., 1901	10.25
Brock's Creek ..	4 Jan., 1914	10.68	Pine Creek ..	8 Jan., 1897	10.35
,, ,, ..	24 Dec., 1915	14.33	Darwin	7 ,, 1897	11.67
Burrundie ..	4 Jan., 1914	11.61			

HEAVY RAINFALLS, VICTORIA, UP TO 1919, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Balook	26 Sept.,1917	5.32	Mt. Buffalo ..	6 June, 1917	8.53
,, ...	27 ,, ,,	7.23	,, ..	7 ,, ,,	6.56
,, ...	28 ,, ,,	2.08			

HEAVY RAINFALLS, TASMANIA, UP TO 1919, INCLUSIVE.

Name of Town or Locality.	Date.	Amnt.	Name of Town or Locality.	Date.	Amnt.
		ins.			ins.
Gould's Country ..	8-10 Mar., '11	15.33	Mathinna ..	8-10 Mar.,'11	15.79
Lottah	8-10 ,, ,,	18.10	The Springs ..	30-31 Jan.,'16	10.75

10. **Snowfall.**—Light snow has been known to fall even as far north, occasionally, 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 snow covers the ground to a great extent on the Australian Alps for several months, where also the temperature falls below zero Fahrenheit during the night, and in the ravines around Kosciusko and similar localities the snow never entirely disappears.

The antarctic "V"-shaped disturbances are always associated with our most pronounced and extensive snowfalls. The depressions on such occasions are very steep in the vertical area, and the apexes are unusually sharp-pointed and protrude into very low latitudes, sometimes even to the tropics.

11. **Hail.**—Hail falls throughout Australia most frequently along the southern shores of the continent in the winter, and over south-eastern Australia during the summer months. The size of the hailstones generally increases with distance from the coast, a fact which lends strong support to the theory that hail is brought about by ascending currents. Rarely does a summer pass without some station experiencing a fall of stones exceeding in size an ordinary hen-egg, and many riddled sheets of light-gauge galvanised iron bear evidence of the weight and penetrating power of the stones.

Hail storms occur most frequently in Australia when the barometric readings indicate a flat and unstable condition of pressure. They are almost invariably associated with tornadoes or tornadic tendencies, and on the east coast the clouds from which the stones fall are generally of a remarkable sepia-coloured tint.

12. **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 29.76 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 30.12 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 30.77 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 annual fluctuations of barometric pressure for the capitals of Australia are shewn on page 67.

13. **Wind.**—Notes on the distinctive wind currents in Australia were given in preceding Year Books (see No. 6, page 83) and are here omitted to save space.

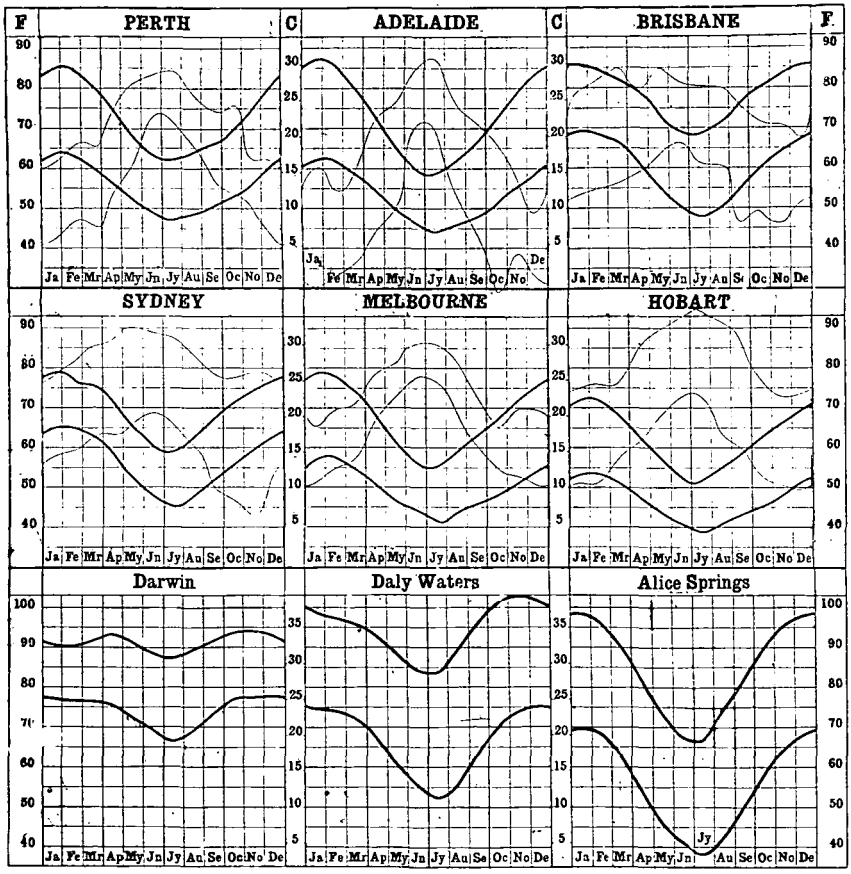
14. **Cyclones and Storms.**—The "elements" in Australia are ordinarily peaceful, and although severe cyclones have visited various parts, more especially coastal areas, such visitations are rare, and may be properly described as erratic.

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 Straits, 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, that is, in that part of them which has a north westerly to a south-westerly circulation.

Occasionally the north-east coast of Queensland is 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 of south-westerly direction. Only a small percentage, however, reach Australia, the majority recurving in their path to the east of New Caledonia.

Very severe cyclones, popularly 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,

GRAPHS SHEWING ANNUAL FLUCTUATIONS OF MEAN MAXIMUM AND MINIMUM TEMPERATURE AND HUMIDITY IN SEVERAL PARTS OF THE COMMONWEALTH OF AUSTRALIA.



EXPLANATION OF THE GRAPHS OF TEMPERATURE AND HUMIDITY.—In the above graphs in which the heavy lines denote "temperature" and the thin lines "humidity," the fluctuations of mean temperature and mean humidity are shewn throughout the year. These curves are plotted from the data given in the Climatological Tables hereinafter. The temperatures are shewn in degrees Fahrenheit, the inner columns giving the corresponding values in Centigrade degrees. Humidities have not been obtained for Darwin, Daly Waters, and Alice Springs.

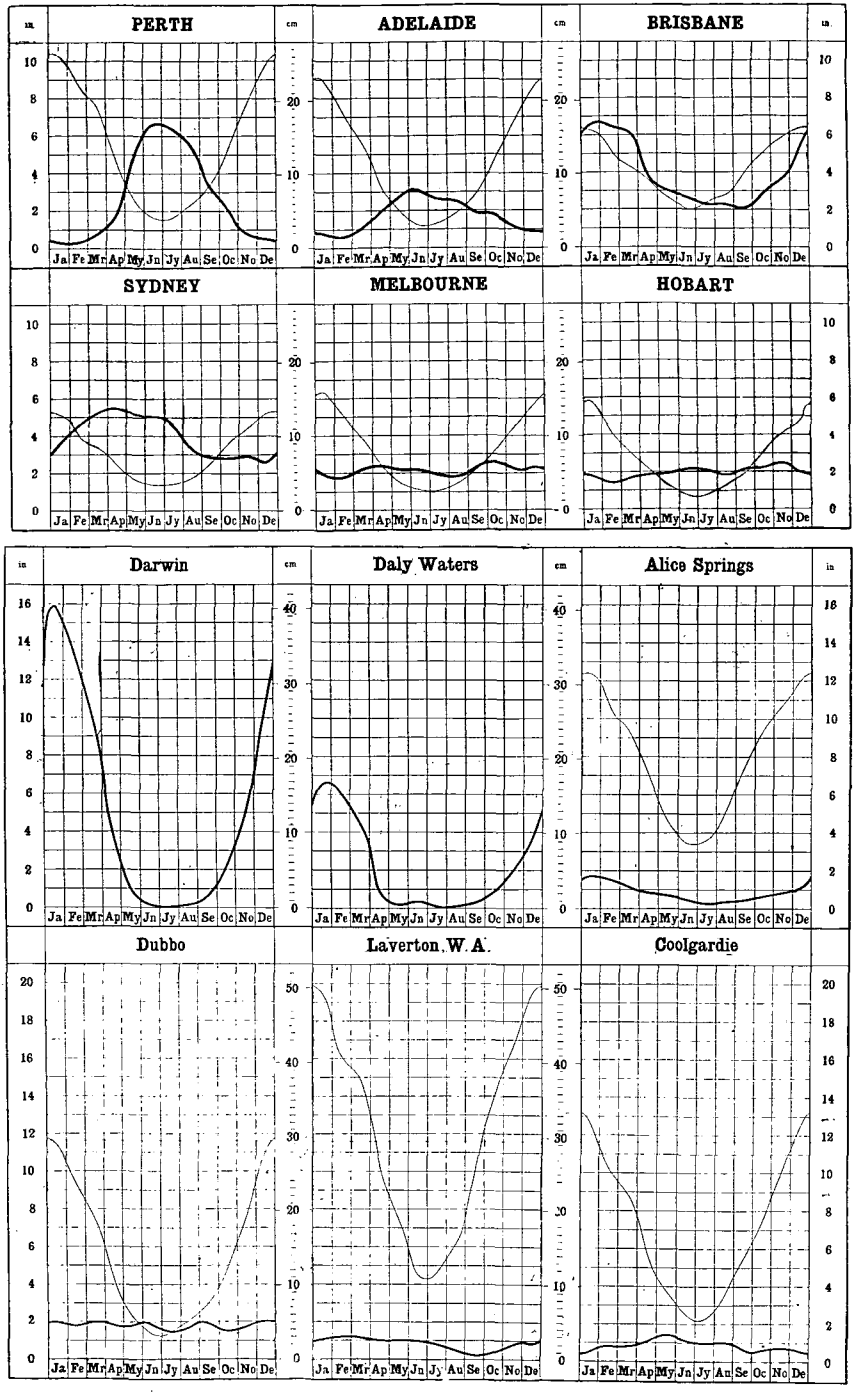
For the thin lines the degree numbers represent relative humidities, or the percentages of actual saturation (absolute saturation = 100).

The upper temperature line represents the mean of the maximum, and the lower line the mean of the minimum results; thus the curves also shew the progression of the range between maximum and minimum temperatures throughout the year. The humidity curves shew the highest and lowest values of the mean monthly humidity at 9 a.m. recorded during a series of years.

INTERPRETATION OF THE GRAPHS.—The curves denote mean monthly values. Thus, taking for example, *the temperature graphs for Perth, the mean readings of the maximum and minimum temperatures* for a number of years on 1st January would give respectively about 83° Fahr. and 62° Fahr. Thus the mean range of temperature on that date is the difference, viz., 21°. Similarly, observations about 1st June would give respectively about 66° Fahr. and 51° Fahr., or a range of 15°.

In a similar manner it will be seen that the greatest mean humidity, say for March, is about 66° and the least mean humidity for the month 46°; in other words, at Perth the degree of saturation of the atmosphere by aqueous vapour for the month of March ranges between 66% and 46%.

GRAPHS SHEWING ANNUAL FLUCTUATIONS OF MEAN RAINFALL AND MEAN EVAPORATION IN SEVERAL PARTS OF THE COMMONWEALTH OF AUSTRALIA.



EXPLANATION OF THE GRAPHS OF RAINFALL AND EVAPORATION.—On the preceding graphs thick lines denote rainfall and thin lines evaporation, and shew the fluctuation of the mean rate of fall *per month* throughout the year. The results, plotted from the Climatological Tables hereinafter, are shewn in inches (see the outer columns), and the corresponding metric scale (centimetres) is shewn in the two inner columns. The evaporation is not given for Darwin and Daly Waters.

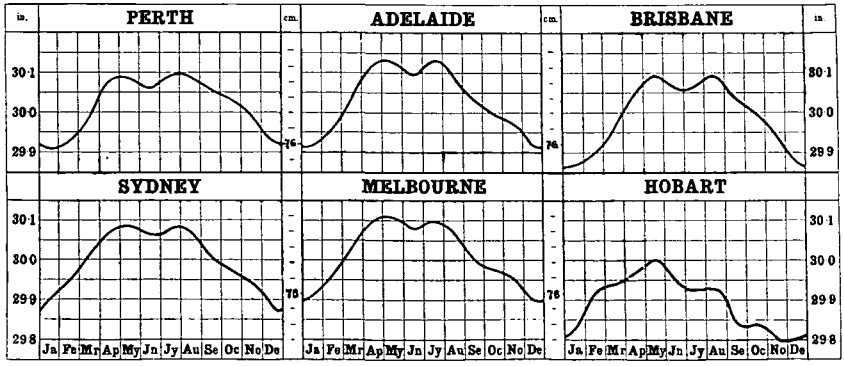
At Perth, Adelaide, Brisbane, Melbourne, Hobart, Alice Springs, and Coolgardie the results have been obtained from jacketed tanks sunk in the ground. At Sydney and Dubbo sunken tanks without water jackets are used, whilst at Laverton (W.A.) the records are taken from a small portable jacketed evaporation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

INTERPRETATION OF THE GRAPHS.—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 curves for Adelaide, on the 1st January the rain falls on the average at the rate of about four-fifths of an inch per month, or, say, at the rate of about 9½ inches per year. In the middle of June it falls at the rate of nearly 3 inches per month, or, say, at the rate of about 36 inches per year. At Dubbo the evaporation is at the rate of nearly 11¼ inches per month about the middle of January, and only about 1½ inches at the middle of June.

TABLE SHEWING MEAN ANNUAL RAINFALL AND EVAPORATION IN INCHES AT THE PLACES SHEWN ON PRECEDING PAGE, AND REPRESENTED BY THE GRAPHS.

—	Rainfall.	Evaporation.	—	Rainfall.	Evaporation.
Perth ..	33.60	65.86	Darwin ..	61.73	—
Adelaide ..	20.96	54.47	Daly Waters ..	26.22	—
Brisbane ..	45.60	51.20	Alice Springs ..	10.61	95.42
Sydney ..	48.19	37.86	Dubbo ..	22.20	66.37
Melbourne ..	25.55	38.74	Laverton, W.A.	9.90	141.42
Hobart ..	23.74	32.37	Coolgardie ..	10.16	87.72

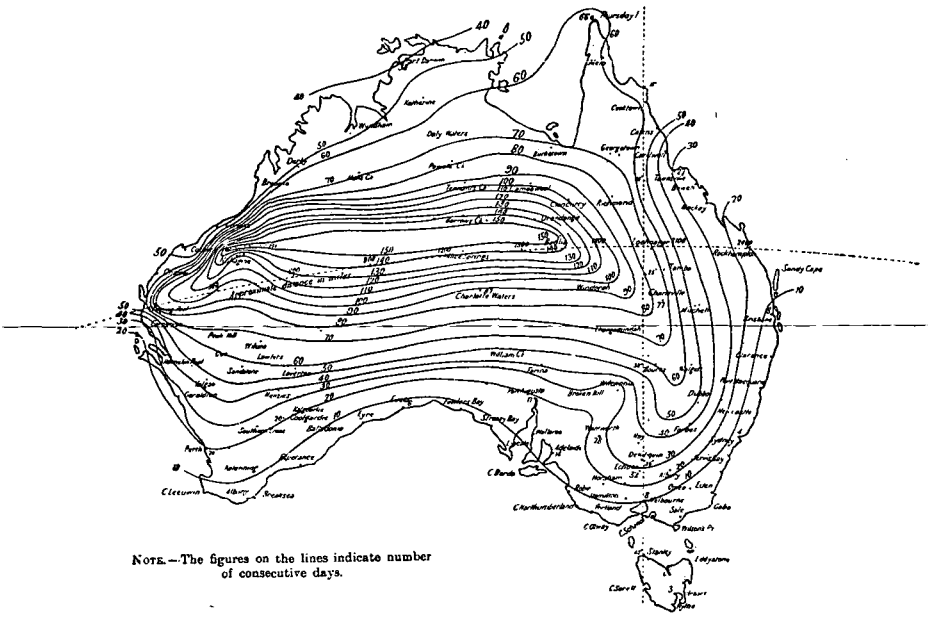
GRAPHS SHEWING ANNUAL FLUCTUATIONS OF MEAN BAROMETRIC PRESSURE FOR THE CAPITALS OF THE SEVERAL STATES OF THE COMMONWEALTH OF AUSTRALIA.



EXPLANATION OF THE GRAPHS OF BAROMETRIC PRESSURE.—On the above graphs the lines representing the yearly fluctuation of barometric pressure at the State capital cities are means for long periods, and are plotted from the Climatological Tables given hereinafter. The pressures are shewn in inches on about 2½ times the natural scale, and the corresponding pressures in centimetres are also shewn in the two inner columns, in which each division represents one millimetre.

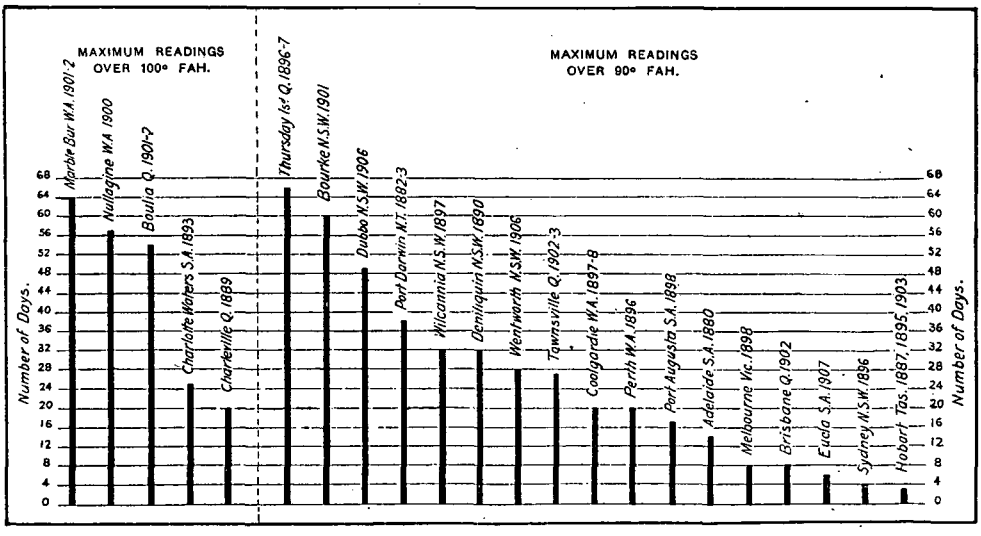
INTERPRETATION OF THE BAROMETRIC GRAPHS.—Taking the Brisbane graph for purposes of illustration, it will be seen that the mean pressure on 1st January is about 29·87 inches, and there are maxima in the middle of May and August of about 30·09 inches.

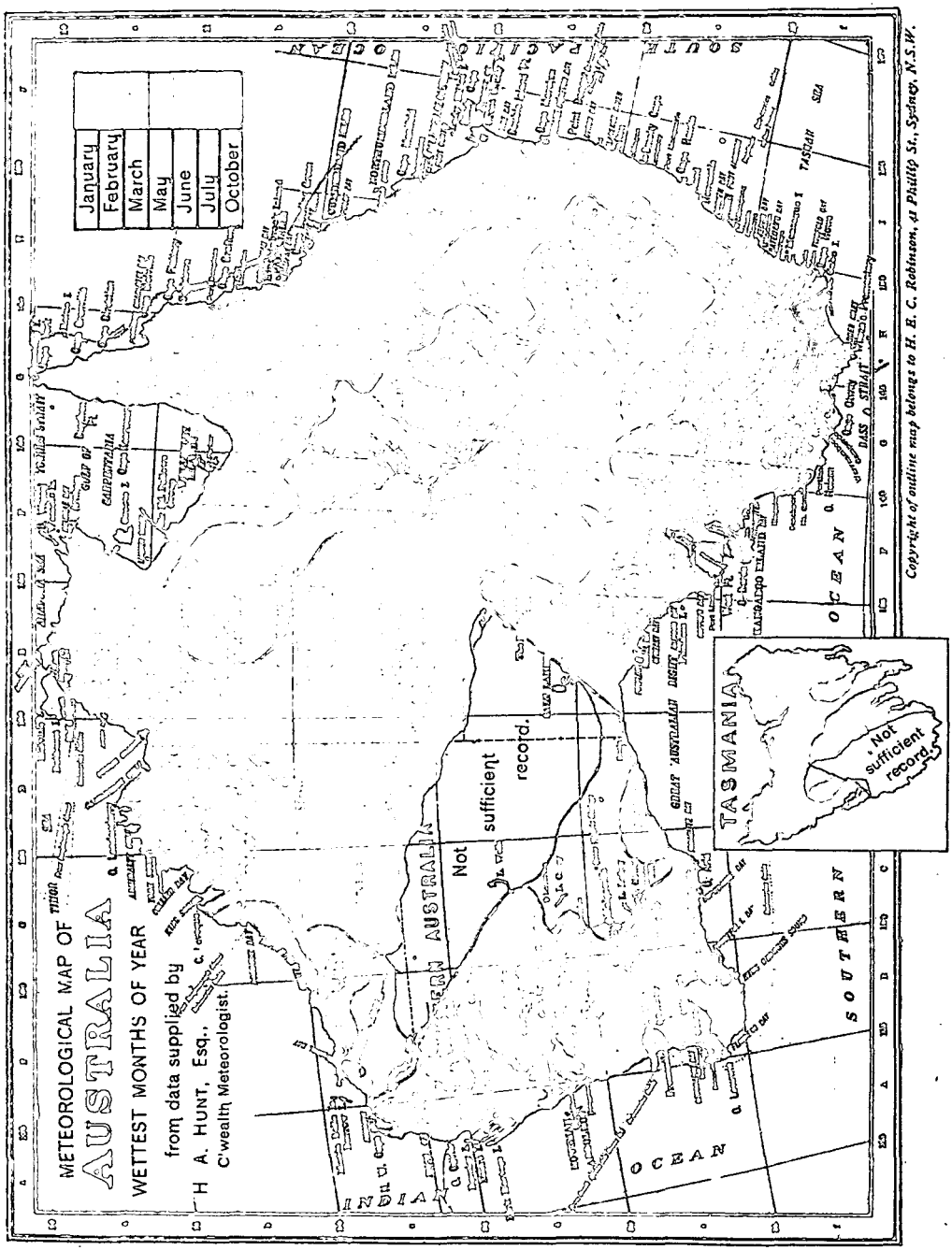
Chart indicating the area affected and period of duration of the Longest Heat Waves when the Maximum Temperature for consecutive 24 hours reached or exceeded 90° Fah.



NOTE.—The figures on the lines indicate number of consecutive days.

Diagram showing the greatest number of consecutive days on which the Temperature in the shade was over 100° and also over 90° at the places indicated.





METEOROLOGICAL SUB-DIVISIONS.

WEST AUSTRALIA.

No.
1. East Kimberley.
2. West Kimberley.
3. North-West.
. Gascoyne.
. South-West.
Eucla.
Eastern.

SOUTH AUSTRALIA.

. Northern Territory.
9. Far North and N.W.
10. West.

No.
11. Upper North.
12. North-East.
13. Lower North.
14. Central.
15. Murray Valley.
16. South-East.

QUEENSLAND.

17. Peninsular.
18. Gulf.
19. Far West.
20. Central.
21. Nth-East Coast.

No.
22. Central Coast.
23. South-East Coast.
24. Darling Downs.
25. Maranoa.
26. South-West.

NEW SOUTH WALES.

27. Western.
28. North-West Plain.
29. North-West Slope.
30. Northern Tableland
31. North Coast.
32. Hunter & Manning.

No.
33. Central Tableland.
33a. Metropolitan.
34. Cent. Westn. Slope.
35. Cent. Westn. Plain.
36. Riverine.
37. South-West Slope.
38. Southern Tableland
39. South Coast.

VICTORIA.

40. Gippsland.
41. North-East.
42. Central.

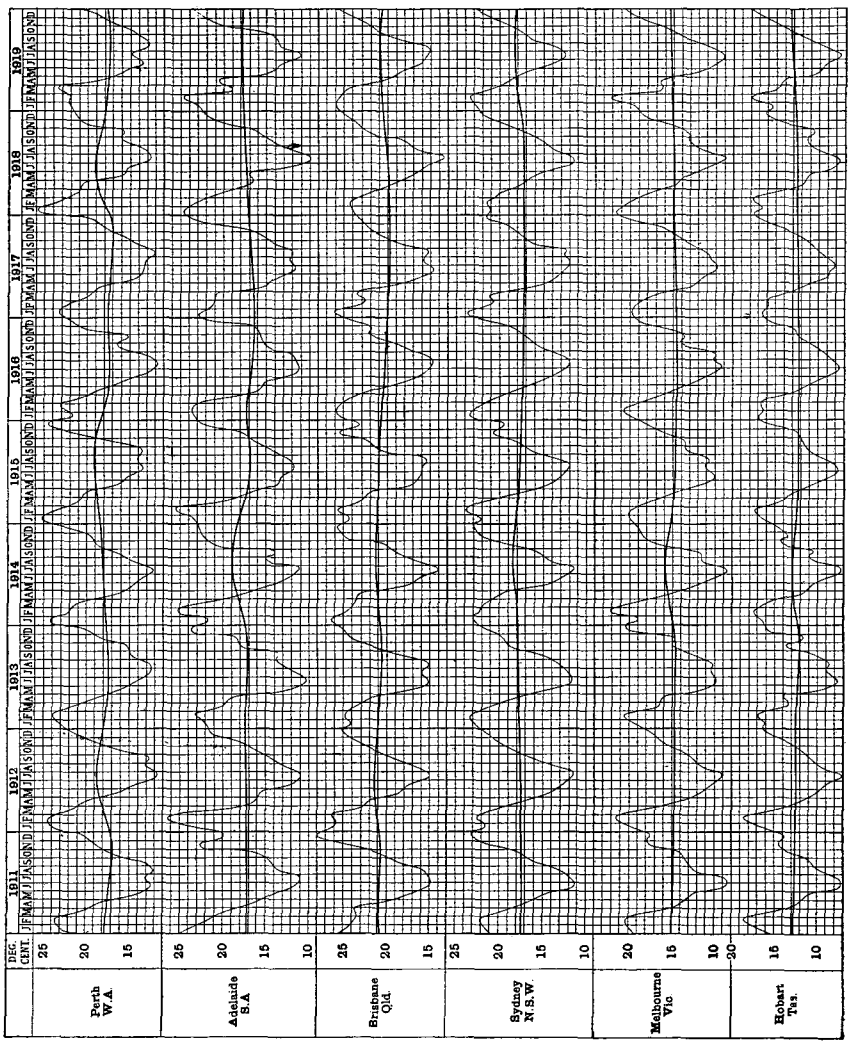
No.
43. North Central.
44. Northern Country.
45. Mallee.
46. Wimmera.
47. Western.

TASMANIA.

48. Northern.
49. W. Coast Mt. Region
50. Central Plateau.
51. Midland.
52. East Coast.
53. Derwent.
54. South-Eastern.

The above are the

DIAGRAM SHEWING THE MEAN MONTHLY, AND MEAN ANNUAL TEMPERATURES OF THE PRINCIPAL AUSTRALIAN CITIES FROM 1911 TO 1919.

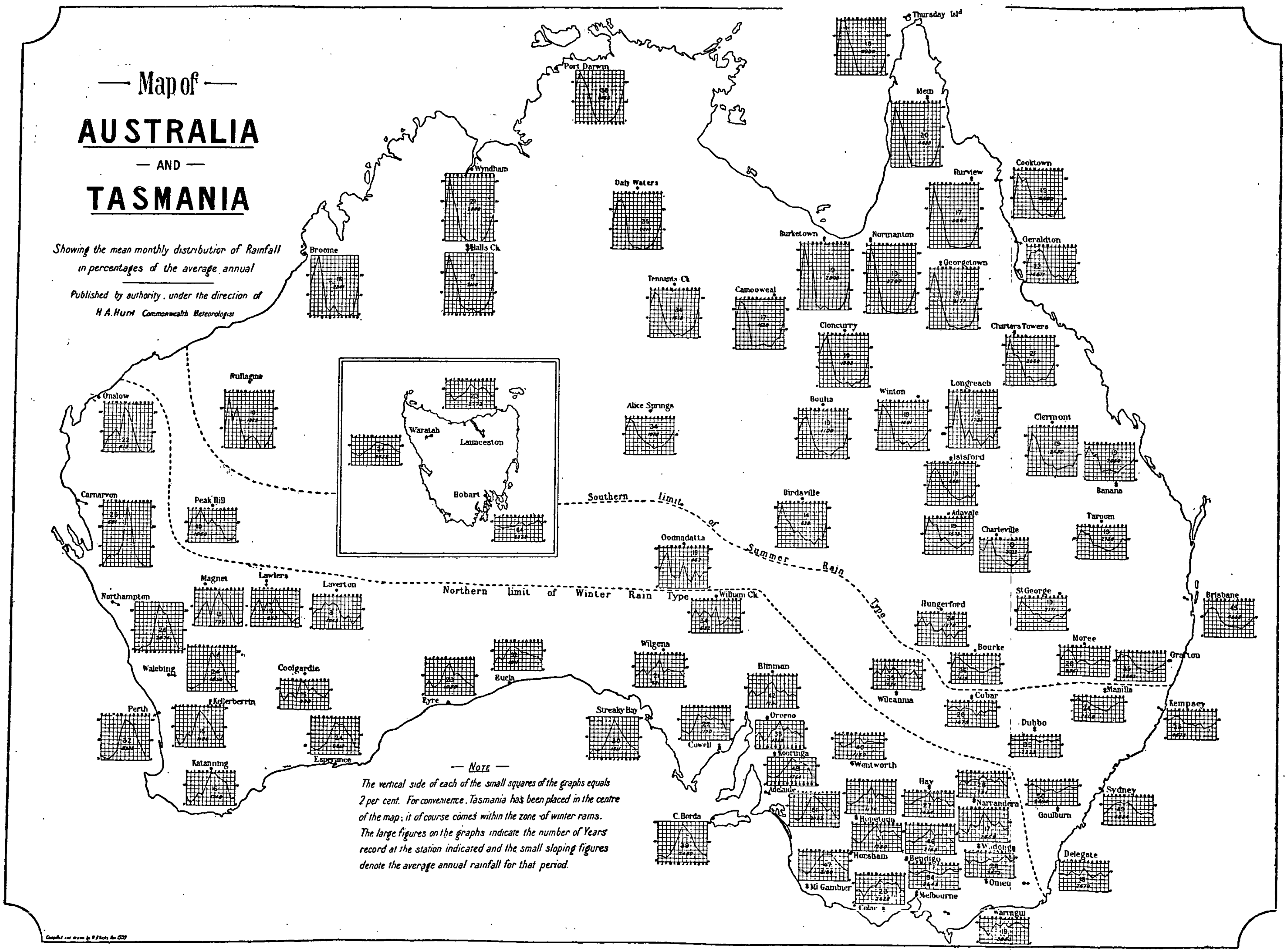


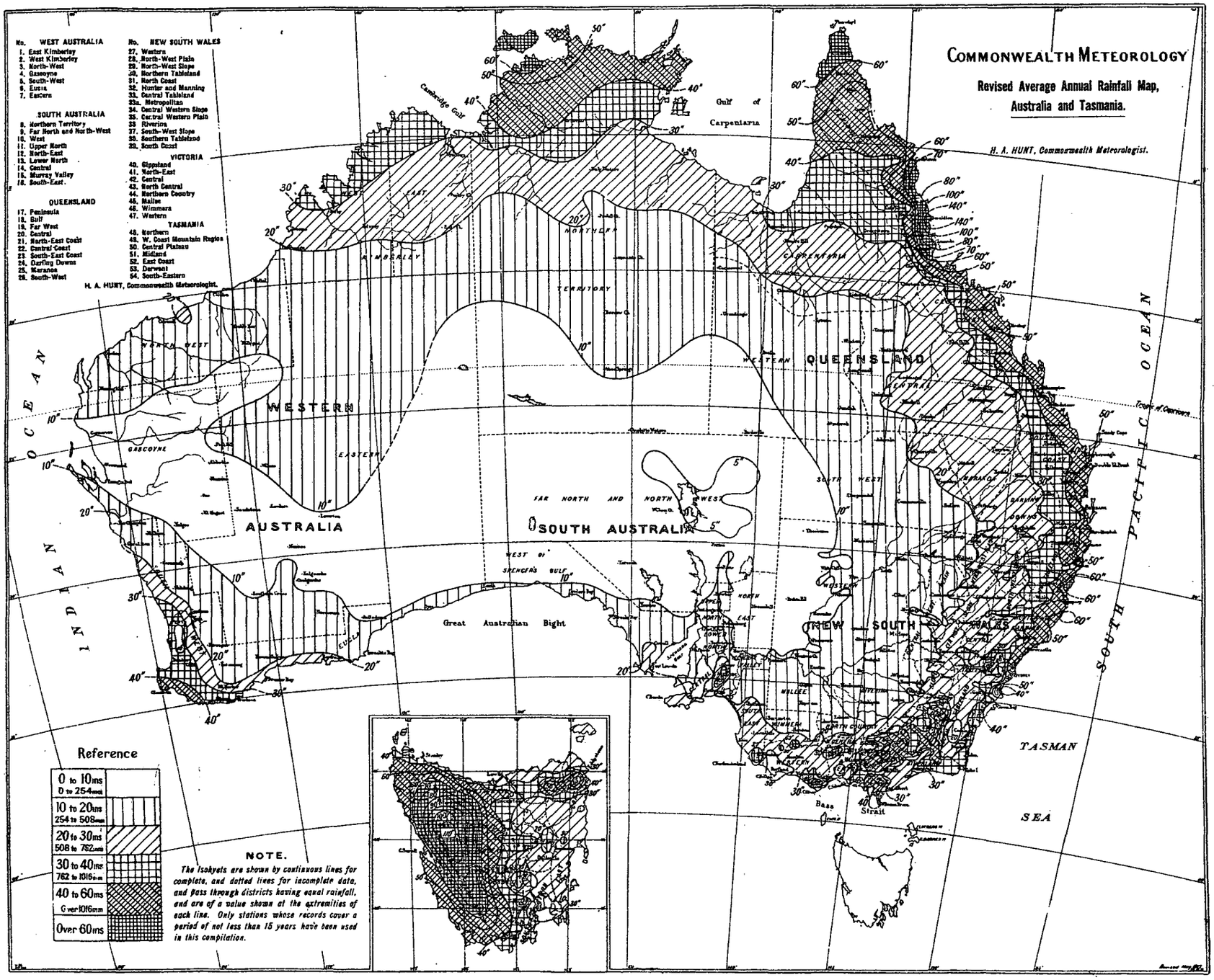
EXPLANATION OF GRAPH.

The six light continuous curves shew the fluctuations of mean monthly temperatures of the Australian capitals from 1911 to 1919.

The six heavy curves similarly shew the fluctuations of the mean annual temperatures of the Australian capitals from 1911 to 1919.

The base of each small square denotes one month, and the vertical side 2° Centigrade or 3·6° Fahrenheit.


Map of
AUSTRALIA
AND
TASMANIA
Showing the mean monthly distribution of Rainfall in percentages of the average annual
Published by authority, under the direction of H. A. Hunt 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.
Southern limit of Summer Rain Type
Northern limit of Winter Rain Type
Thursday Isl^d
Port Darwin
Wyndham
Halls Ck
Daly Waters
Broome
Tennants Ck
Camooweal
Burketown
Normanton
Georgetown
Mein
Burview
Cooktown
Geraldton
Cloncurry
Charters Towers
Winton
Longreach
Boulia
Clermont
Banana
Isisford
Adavale
Charleville
Taroom
Birdsville
Alice Springs
Oodnadatta
William Ck
Hungerford
St George
Brisbane
Bourke
Moree
Grafton
Manilla
Wilcannia
Cobar
Dubbo
Kempsey
Onslow
Nullagine
Carnarvon
Peak Hill
Northampton
Magnet
Lawlers
Laverton
Waratah
Launceston
Hobart
Walebing
Coolgardie
Perth
Kellerberrin
Katanning
Esperance
Eucla
Eyre
Wilgena
Blinman
Streaky Bay
Cowell
Ororoo
Kooringa
Adelaide
Wentworth
Hay
Narrandera
Goulburn
Sydney
C. Borda
Hopetoun
Horsham
Bendigo
Wodonga
Omeo
Delegate
Mt Gambier
Colac
Melbourne
Warragul


COMMONWEALTH METEOROLOGY
Revised Average Annual Rainfall Map, Australia and Tasmania.
H. A. HUNT, Commonwealth Meteorologist.
No. WEST AUSTRALIA
1. East Kimberley
2. West Kimberley
3. North-West
4. Gascoyne
5. South-West
6. Eucla
7. Eastern
SOUTH AUSTRALIA
8. Northern Territory
9. Far North and North-West
10. West
11. Upper North
12. North-East
13. Lower North
14. Central
15. Murray Valley
16. South-East.
QUEENSLAND
17. Peninsula
18. Gulf
19. Far West
20. Central
21. North-East Coast
22. Central Coast
23. South-East Coast
24. Darling Downs
25. Maranoa
26. South-West
No. NEW SOUTH WALES
27. Western
28. North-West Plain
29. North-West Slope
30. Northern Tableland
31. North Coast
32. Hunter and Manning
33. Central Tableland
33a. Metropolitan
34. Central Western Slope
35. Central Western Plain
36 Riverina
37. South-West Slope
38. Southern Tableland
39. South Coast
VICTORIA
40. Gippsland
41. North-East
42. Central
43. North Central
44. Northern Country
45. Mallee
46. Wimmera
47. Western
TASMANIA
48. Northern
49. W. Coast Mountain Region
50. Central Plateau
51. Midland
52. East Coast
53. Derwent
54. South-Eastern
H. A. HUNT, Commonwealth Meteorologist.
Gulf of Carpentaria
Cambridge Gulf
Great Australian Bight
INDIAN OCEAN
SOUTH PACIFIC OCEAN
TASMAN SEA
Bass Strait
WESTERN AUSTRALIA
SOUTH AUSTRALIA
WESTERN QUEENSLAND
NEW SOUTH WALES
NORTHERN TERRITORY
Reference
0 to 10ins 0 to 254mm
10 to 20ins 254 to 508mm
20 to 30ins 508 to 762mm
30 to 40ins 762 to 1016mm
40 to 60ins
Over 1016mm
Over 60ins
NOTE.
The Isohyets are shown by continuous lines for complete, and dotted lines for incomplete data, and pass through districts having equal rainfall, and are of a value shown at the extremities of each line. Only stations whose records cover a period of not less than 15 years have been used in this compilation.

causing 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 Year Book (see No. 6, pp. 84, 85, 86).

15. **Influences affecting Australian Climate.**—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 therein, however, have 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 growth of residential and manufacturing buildings within the city and in the surrounding suburbs during that period. Again, low-lying lands on the north coast of New South Wales, that 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 high lands now flows, unchecked and untempered, down the sides of the hills to the valleys and lower lands.

(i) *Influences 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 equalising 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. 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. Thus, 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 alternate periods of flooding and dryness. This is borne out in the inland rivers. Thus, the River Murray, which has never been known to run dry, derives its steadiness of flow mainly through the causes above indicated.

(ii) *Direct Influences 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 contend the opposite.

Sufficient evidence exists, however, to establish that, even if the rainfall has not increased, the beneficial effect of forest lands in tempering the effects of the climate is more than sufficient to disclose the importance of their protection and extension.

It is the rapid rate of evaporation, induced by both hot and cold winds, which injures crops and makes life uncomfortable on the plains. Whether the forest aids in increasing precipitation there may be doubt, but nobody can say that it does not check the winds and the rapid evaporation due to them.

Trees as wind-breaks have been successfully planted in central parts of the United States, and there is no reason why similar experiments should not be successful in many parts of our treeless interior. 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 Year Book No. 6, pp. 86 and 95).

16. **Comparison of Rainfalls and Temperatures.**—For the purpose of comparison the following lists of rainfalls and temperatures are given for various important cities throughout the world, for the site of the Federal capital, and for the capitals of the Australian States.

COMPARISONS OF RAINFALLS AND TEMPERATURES

OF CITIES OF THE WORLD WITH THOSE OF AUSTRALIA.

Place.	Height above M.S.L.	Annual Rainfall.			Temperature.					
		Average.	Highest.	Lowest.	*Mean Summer.	†Mean Winter.	Highest on Record.	Lowest on Record.	Average Hottest Month.	Average Coldest Month.
	Ft.	Ins.	Ins.	Ins.	Fahr.	Fahr.	Fahr.	Fahr.	Fahr.	Fahr.
Amsterdam ..	6	27.29	40.59	17.60	63.2	36.8	90.0	4.1	64.4	35.4
Auckland ..	125	43.31	63.72	26.32	66.1	52.5	91.0	31.9	67.2	51.8
Athens	351	15.48	33.32	4.55	79.2	49.1	106.5	19.6	81.1	47.5
Bergen	146	89.10	102.80	73.50	56.8	34.5	88.5	4.8	57.9	33.6
Berlin	115	22.95	30.01	14.25	64.7	32.2	98.6	−13.0	66.0	30.0
Berne	1,877	36.30	58.23	24.69	62.2	30.1	91.4	− 3.6	64.4	28.0
Bombay ..	37	71.15	114.89	33.41	83.5	75.1	100.0	55.9	84.8	74.2
Breslau	482	22.00	28.01	16.45	63.9	30.0	100.0	−23.4	65.5	29.3
Brussels ..	328	28.35	41.18	17.73	62.6	36.0	95.5	− 4.4	63.7	34.5
Budapest ..	500	25.20	35.28	16.79	68.6	30.2	98.6	− 5.1	70.4	28.2
Buenos Ayres ..	72	36.82	80.73	21.53	73.2	51·5	103.1	25.9	74.2	50.5
Calcutta ..	21	61.98	89.32	39.38	84.9	67.1	108.2	44.2	85.4	65.5
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	33.54	45.86	24.52	69.2	25.4	103.0	−23.0	72.3	24.0
Christchurch ..	25	25.45	35.30	13.54	61.1	43.4	95.7	21.3	61.6	42.4
Christiania ..	82	22.52	31.73	16.26	61.0	24.4	95.0	−21.1	62.6	23.9
Colombo.. ..	40	83.83	139.70	51.60	81.5	79.9	95.8	65.0	82.6	79.1
Constantinople ..	245	28.75	42.74	14.78	74.0	43.5	103.6	13.0	75.7	42.0
Copenhagen ..	46	22.33	28.78	13.94	60.7	32.1	90.5	−13.0	62.2	31.4
Dresden ..	115	26.80	34.49	17.72	62.9	32.4	93.4	−15.3	64.4	31.6
Dublin	47	27.66	35.56	16.60	59.4	42.0	87.2	13.3	60.5	41.7
Dunedin ..	300	37.06	53.90	22.15	57.3	43.1	94.0	23.0	57.9	42.0
Durban	260	40.79	71.27	27.24	75.6	64.4	110.6	41.1	76.7	63.8
Edinburgh ..	441	25.21	32.05	16.44	55.8	38.8	87.7	5.0	57.2	38.3
Geneva	1,328	33.48	46.89	21.14	64.4	33.7	..	..	66.2	32.2
Genoa	157	51.29	108.22	28.21	73.8	46.8	94.5	16.7	75.4	45.5
Glasgow ..	184	38.49	56.18	29.05	52.7	41.0	84.9	6.6	58.0	38.4
Greenwich ..	159	24.12	35.54	16.38	61.3	39.3	100.0	4.0	62.7	38.6
Hong Kong ..	110	84.10	119.72	45.83	81.3	60.3	97.0	32.0	81.8	58.1
Johannesburg ..	5,750	31.63	50.00	21.66	65.4	54.4	94.0	23.3	68.2	48.9
Leipzig	384	24.69	31.37	17.10	63.1	31.5	97.3	−14.8	64.8	30.6
Lisbon	312	29.18	52.79	17.32	69.6	51.3	94.1	32.5	70.2	49.3
London	18	24.04	38.20	18.23	61.2	39.3	100.0	9.4	62.8	38.7
Madras	22	49.06	88.41	18.45	86.7	76.0	113.0	57.5	87.6	75.3
Madrid	2,149	16.23	27.48	9.13	73.0	41.2	107.1	10.5	75.7	39.7
Marseilles ..	246	21.88	43.04	12.28	70.3	45.3	100.4	11.5	72.1	43.3
Moscow	526	18.94	29.28	12.07	63.4	14.7	99.5	−44.5	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	42.47	59.68	28.78	72.1	31.7	100.0	− 6.0	74.5	30.3
Ottawa	294	33.40	44.44	26.36	67.2	14.1	98.5	−33.0	69.7	12.0
Paris	165	21.92	29.56	16.44	63.5	37.1	101.1	−14.1	65.8	36.1
Pekin	143	24.40	36.00	18.00	77.7	26·6	114.0	− 5.0	79.2	23.6
Quebec	296	40.46	47.57	32.12	63.5	12.4	95.5	−34.3	66.3	10.1
Rome	166	32.57	57.89	12.72	74.3	46.0	104.2	17.2	76.1	44.6
San Francisco ..	155	22.83	38.82	9.31	59.0	51.0	101.0	29.0	61.0	50.0
Shanghai ..	14	44.13	62.52	27.91	77.4	39.4	102.9	10.2	79.7	37.4
Singapore ..	8	91.99	158.68	32.71	81.2	78.6	94.2	63.4	81.5	78.3
Stockholm ..	146	18.31	25.46	11.78	59.7	27.0	91·8	−22.0	62.1	25.7
Petrograd ..	16	21.30	29.52	13.75	61.1	17.4	97.0	−38.2	63.7	15.2
Tokio	70	59.17	77.10	45.72	73.9	38.9	97.9	15.4	77.7	37.1
Trieste	85	42.94	63.14	26.57	73.9	41.3	99.5	14.0	76.3	39.9
Vienna	663	24.50	33.90	16.50	65.7	30.4	97.7	− 8.0	67.1	28.0
Vladivostock ..	55	19.54	33.60	9.39	63.9	11.0	95.7	−21.8	69.4	6.1
Washington ..	75	43.80	61.33	18.79	74.7	34.5	104.0	−15.0	76.8	32.9
Wellington (N.Z.)	110	49.70	67.68	30.02	61.7	48.4	88.0	30.0	62.4	47.5
Zürich	1,542	45.15	78.27	29.02	63.3	31.3	94.1	−0.8	65.1	29.5
FEDERAL CAPITAL SITE.										
Canberra (Dist.) Queanbeyan	2,000 to 2,900	22.27	41.29	10.45	68.5*	44.2†	101.0	20.0	69.5	43.0
THE STATE CAPITALS.										
Perth	197	33.60	46.73	20.21	72.9*	55.9†	107.9	34.2	74.0	55.1
Adelaide.. ..	140	20.96	30.87	11.39	73.1	53.0	116.3	32.0	74.1	51.6
Brisbane ..	137	45.60	88.26	16.17	76.7	59.7	108.9	36.1	77.2	58.3
Sydney	133	48.19	82.76	21.49	71.0	53.6	108.5	35.9	71.7	52.5
Melbourne ..	115	25.55	44.25	15.61	66.6	50.0	111.2	27.0	67.5	48.6
Hobart	177	23.74	43.39	13.43	61.7	46.7	105.2	27.0	62.4	45.4

* Mean of the three hottest months. † Mean of the three coldest months.

17. Climatological Tables.—The means, averages, extremes, totals, &c., for a number of climatological elements have been determined from long series of observations at the Australian capitals up to and including the year 1919. These are given in the tables following.

CLIMATOLOGICAL DATA FOR PERTH, W.A.

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.				Mean Amount of Evaporation. (inches.)	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m. 3 p.m. & 9 p.m.	No. of Clear Days.
		Greatest Number of Miles in one day.	Mean Hourly Pressure. (lbs.)	Total Miles.	Prevailing Direction.				
No. of yrs. over which observation extends	35	22	22	22	22	21	22	23	23
January	29.906	797 27/98	0.69	11,323	S S E	10.45	1.7	2.6	14.2
February	29.926	650 6/08	0.63	9,883	S S E	8.58	1.4	2.9	11.2
March	29.989	651 6/13	0.54	10,075	S S E	7.60	1.3	3.2	11.5
April	30.073	955 25/00	0.42	8,510	S E	4.70	1.2	4.3	7.3
May	30.085	768 5/12	0.36	8,082	E N E	2.77	1.9	5.1	5.4
June	30.061	861 27/10	0.38	8,036	N	1.75	2.0	5.8	3.2
July	30.092	949 11/99	0.39	8,447	N	1.69	2.5	5.4	5.0
August	30.084	966 15/03	0.42	8,884	W	2.37	1.6	5.3	4.8
September	30.060	864 11/05	0.49	9,203	S W	3.32	1.5	4.9	5.6
October	30.032	809 6/16	0.54	9,949	S S W	5.22	1.1	4.8	5.8
November	29.989	777 18/97	0.60	10,224	S	7.63	1.4	3.8	7.9
December	29.929	672 31/98	0.65	10,952	S	9.78	1.5	2.9	12.2
Year Totals	—	—	—	113,568	—	65.86	19.1	—	94.1
Year Averages	30.019	—	0.51	9,464	S	—	—	4.2	—
Year Extremes	—	966 15/8/03	—	—	—	—	—	—	—

TEMPERATURE AND SUNSHINE.

Month.	Mean Temperature (Fahr.).			Extreme Shade Temperature (Fahr.).		Extreme Range.	Extreme Temperature (Fahr.).		Mean Hours of Sunshine.
	Mean Max.	Mean Min.	Mean.	Highest.	Lowest.		Highest in Sun.	Lowest on Grass.	
No. of yrs. over which observation extends	23	23	23	23	23	23	22	21	22
January	84.3	63.2	73.8	107.0 16/97 & 9/18	50.6 25/01	56.4	177.3 22/14	42.4 25/02	324.5
February	84.6	63.3	74.0	107.3 12/15	47.7 1/02	59.6	169.0 4/99	39.8 1/13	273.0
March	81.1	60.7	70.9	106.1 6/14	45.8 8/03	60.3	167.0 19/18	36.7 8/03	267.8
April	75.8	57.0	66.4	99.7 9/10	39.3 20/14	60.4	157.0 8/16	31.0 20/14	215.6
May	68.6	52.3	60.4	90.4 2/07	34.3 11/14	56.1	139.1 7/14	25.3 11/14	181.4
June	63.8	49.4	56.6	81.7 2/14	36.3 29/14	45.4	135.5 9/14	29.0 20/16	144.2
July	62.6	47.6	55.1	74.1 17/19	34.2 7/16	39.9	133.2 13/15	25.2 6,7/16	169.3
August	63.8	48.1	56.0	81.0 12/14	35.3 31/08	45.7	143.2 23/18	27.9 10/11	186.3
September	66.0	50.3	58.1	90.9 30/18	38.9 17/13	52.0	153.6 29/16	29.2 21/16	203.3
October	69.1	52.7	60.9	93.4 17/06	40.9 4/17	52.5	154.0 29/14	30.5 4/17	236.0
November	75.2	56.5	65.8	104.6 24/13	42.0 1/04	62.6	166.6 23/15	35.5 *	289.6
December	80.6	60.5	70.6	107.9 20/04	48.0 2/10	59.9	168.7 25/15	39.1 2/10	326.8
Year Averages	73.0	55.1	64.0	—	—	—	—	—	2818.0†
Year Extremes	—	—	—	107.9 20/12/04	34.2 7/7/16	73.7	177.3 22/1/14	25.2 6, 7/7/16	—

* 6/1910 and 14/1912. † Total for Year.

HUMIDITY, RAINFALL, AND DEW.

Month.	Rel. Hum. (%)			Rainfall (inches).					Dew (inches).	
	Mean 9 a.m.	Highest Mean.	Lowest Mean.	Mean Monthly.	Mean No. of Days Rain.	Greatest Monthly.	Least Monthly.	Greatest in One Day.	Mean Amount of Dew.	Mean No. Days Dew.
No. of yrs. over which observation extends	23	23	23	44	44	44	44	44	—	23
January	53	61	42	0.34	3	2.17 1879	nil *	1.74 28/79	—	2.7
February	54	65	46	0.46	2	2.98 1915	nil †	1.63 26/15	—	3.1
March	57	66	46	0.72	4	4.50 1896	nil ‡	1.53 17/76	—	5.7
April	64	72	53	1.63	7	4.97 1882	0.05 ‖	2.62 30/04	—	9.2
May	72	81	61	4.70	14	12.13 1879	0.98 1903	2.80 20/79	—	12.5
June	78	83	72	6.76	17	12.11 1890	2.16 1877	2.65 16/00	—	11.8
July	78	84	72	6.52	17	11.29 1917	2.42 1876	3.00 4/91	—	13.3
August	74	79	67	5.64	18	10.33 1882	0.46 1902	2.79 7/03	—	11.3
September	68	75	58	3.33	14	7.72 1903	0.34 1916	1.73 23/09	—	9.1
October	62	75	54	2.13	12	7.87 1890	0.49 1892	1.38 15/10	—	5.6
November	55	63	50	0.79	6	2.78 1916	nil 1891	1.11 30/03	—	4.1
December	52	62	44	0.58	4	3.05 1888	nil 1886	1.72 1/88	—	3.0
Year Totals	—	—	—	33.60	118	—	—	—	—	91.4
Year Averages	62	—	—	—	—	—	—	—	—	—
Year Extremes	—	84	42	—	—	12.13 5/79	nil. §	3.00 4/7/91	—	—

* 1888, 1894, 1897, and 1911. † 1885, 1891, 1896, 1903, and 1913. ‡ 1877, 1884, and 1886. ‖ 1890 and 1894.
§ January, February, March, November, and December, various years.

CLIMATOLOGICAL DATA FOR ADELAIDE, S.A.

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. (lbs.)	Wind. Total Miles.	Wind. Prevailing Direction.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m. 3 p.m. & 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends	63	42		42	42	42	50	48	52	38
January	29.916	758	19/99	0.34	7,914	S	8.98	2.3	3.5	8.2
February	29.952	691	22/96	0.30	6,821	S S E	7.31	2.0	3.4	7.0
March	30.036	628	9/12	0.25	6,761	S	5.80	2.2	4.0	6.7
April	30.120	773	10/96	0.22	6,177	S x W	3.39	1.7	5.0	3.9
May	30.126	760	9/80	0.21	6,227	N	2.01	1.8	5.8	1.7
June	30.099	750	12/78	0.25	6,638	N	1.24	2.1	6.1	1.4
July	30.131	674	25/82	0.25	6,793	N	1.30	1.7	5.8	1.7
August	30.098	773	31/97	0.28	7,196	N N W	1.87	2.2	5.6	2.3
September	30.040	720	2/87	0.31	7,378	W	2.84	2.4	5.2	3.1
October	29.999	768	28/98	0.34	7,971	S W x W	4.76	3.4	4.9	3.9
November	29.975	677	2/04	0.33	7,600	S S W	6.52	3.7	4.6	5.1
December	29.920	675	12/91	0.34	7,968	S S W	8.45	2.7	3.8	7.3
Year Totals	—		—	—	—	—	54.47	28.2	—	52.3
Year Averages	30.034		—	0.28	7,120	S W x S	—	—	4.8	—
Year Extremes	--	773*		—	—	—	—	—	—	—

* 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.		No. of Hours of Sunshine.
No. of yrs. over which observation extends	63	63	63	63		63		63	42		59		38
January	86.5	61.6	74.1	116.3	26/58	45.1	21/84	71.2	180.0	18/82	36.5	14/79	309.6
February	86.1	62.1	74.1	113.6	12/99	45.5	23/18	68.1	170.5	10/00	36.7	‡	263.2
March	80.7	58.9	69.8	108.0	12/61	44.8	–/57	63.2	174.0	17/83	33.8	27/80	237.4
April	73.2	54.6	63.9	98.0	10/66	39.6	15/59	58.4	155.0	1/83	30.2	16/17	177.4
May	65.5	50.1	57.8	88.3	5/66	36.9	*	51.4	148.2	12/79	25.9	10/91	148.6
June	60.3	46.7	53.5	76.0	23/65	32.5	27/76	43.5	138.8	18/79	22.9	12/13	121.2
July	58.8	44.5	51.6	74.0	11/06	32.0	24/08	42.0	134.5	26/90	23.3	25/11	137.8
August	62.0	45.9	54.0	85.0	31/11	32.3	17/59	52.7	140.0	31/92	23.5	7/88	162.4
September	66.3	47.8	57.0	90.7	23/82	32.7	4/58	58.0	160.5	23/82	26.2	15/08	184.3
October	72.5	51.4	61.9	102.8	30/19	36.0	–/57	66.8	158.8	19/82	27.8	2/18	227.9
November	78.6	55.3	67.0	113.5	21/65	40.8	2/09	72.7	166.9	20/78	31.5	2/09	262.0
December	83.5	58.9	71.2	114.2	14/76	43.0	†	71.2	175.7	7/99	32.5	4/84	304.0
Year Averages	72.8	53.2	63.0	—		—		—	—		—		2,535.8§
Year Extremes	—	—	—	116.3	26/1/58	32.0	24/7/08	84.3	180.0	18/1/82	22.9	12/6/13	—

* 26/1895 and 24/1904. † 16/1861 and 4/1906. ‡ 24/78 and 23/18. § Total for year.

HUMIDITY, RAINFALL, AND DEW.

Month.	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 (inches). Mean Amount of Dew.	Mean No. days Dew.
No. of yrs. over which observation extends	52	52	52	81	81	81		81		81		—	48
January	38	59	30	0.71	4	4.00	1850	nil	*	2.30	2/89	—	4
February	41	56	33	0.65	4	2.89	1919	nil	†	2.24	14/13	—	6
March	47	58	36	1.04	6	4.60	1878	nil	‡	3.50	5/78	—	11
April	56	72	44	1.81	9	6.78	1853	0.06	1910	3.15	5/60	—	14
May	68	76	49	2.72	14	7.75	1875	0.20	1891	2.75	1/53	—	16
June	77	84	69	3.08	15	8.58	1916	0.42	1886	1.97	26/16	—	16
July	76	87	69	2.63	17	5.38	1865	0.37	1899	1.75	10/65	—	17
August	69	77	54	2.51	16	6.24	1852	0.35	1914	2.23	19/51	—	16
September	61	72	44	1.98	14	4.64	1840	0.45	1896	1.42	25/93	—	16
October	51	67	29	1.72	11	3.83	1870	0.17	1914	2.24	16/08	—	12
November	43	57	37	1.15	8	3.55	1851	0.04	1885	1.88	28/58	—	7
December	39	50	33	0.96	6	3.98	1861	nil	1904	2.42	23/13	—	5
Year Totals	—	—	—	20.96	124	—		—		—		—	140
Year Averages	53	—	—	—	—	—		—		—		—	—
Year Extremes	—	87	29	—	—	8.58	6/16	nil	§	3.50	5/3/78	—	—

* 1848, 1849, 1878, and 1906. † 1848, 1860, &c. ‡ 1859, &c.
§ January, February, March, and December, various years.

CLIMATOLOGICAL DATA FOR BRISBANE, QUEENSLAND.

LAT. 27° 28′ S., LONG. 153° 2′ E. HEIGHT ABOVE M.S.L. 137 FT.

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

Month.	Bar. corrected to 32° F. Min. 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. (lbs.)	Wind. Total Miles.	Wind. Prevailing Direction.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m. 3 p.m. & 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends	33	9	9	9	33	11	33	28	11
January	29.869	315 24/14	0.09	4,154	E	6.588	5.4	5.7	3.1
February	29.894	340 10/15	0.13	4,412	S E	5.149	5.2	5.8	1.9
March	29.948	305 29/16	0.08	3.966	S E & S	4.622	4.3	5.3	4.4
April	30.043	252 13/19	0.08	3,566	S	3.659	3.2	4.6	8.1
May	30.086	245 29/19	0.07	3,632	S	2.779	2.8	4.4	8.2
June	30.061	307 23/16	0.07	3,452	S	2.100	2.1	4.1	8.6
July	30.068	279 19/17	0.07	3,506	S—W	2.312	2.4	3.7	12.0
August	30.090	250 22/17	0.08	3,794	S	2.765	3.5	3.5	11.4
September	30.028	239 25/17	0.08	3,575	S	3.688	5.7	3.5	12.2
October	29.998	325 25/18	0.09	4,134	N—E	5.108	6.8	4.0	7.9
November	29.950	265 27/14	0.11	4,277	N & N E	5.906	8.1	4.8	5.9
December	29.886	295 21/13	0.14	4,980	N E & E	6.522	8.3	5.2	2.8
Year Totals	—	—	—	—	S to E	51.198	57.8	—	86.5
Year Averages	29.993	—	0.09	3,954	and N E	—	—	4.6	—
Year Extremes	—	340 10/2/15	—	—	—	—	—	—	—

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 observation extends	33	33	33	33	33	33	33	33	11
January	85.5	68.8	77.2	108.9 14/02	58.8 4/93	50.1	166.4 10/17	49.9 4/93	218.9
February	84.6	68.3	76.5	101.9 11/04	58.7 *	43.2	165.2 6/10	49.3 9/89	199.9
March	82.4	66.4	74.4	99.4 5/19	52.4 29/13	47.0	160.0 1/87	45.4 29/13	198.3
April	79.1	61.6	70.4	95.2 †	48.6 17/00	46.6	153.8 11/16	37.0 17/00	204.7
May	73.4	55.3	64.4	88.8 18/97	41.3 24/99	47.5	147.0 1/10	29.8 8/97	189.7
June	69.3	50.8	60.1	88.9 19/18	36.3 29/08	52.6	136.0 3/18	25.4 23/88	159.8
July	68.4	48.2	58.3	83.4 28/98	36.1 ‡	47.3	146.1 20/15	23.9 11/90	190.5
August	71.3	49.8	60.6	87.5 28/07	37.4 6/87	50.1	141.9 20/17	27.1 9/99	217.2
September	75.9	54.7	65.3	95.2 16/12	40.7 1/96	54.5	155.5 26/03	30.4 1/89	231.0
October	79.9	59.9	69.9	101.4 18/93	43.3 3/99	58.1	157.4 31/18	34.9 8/89	247.3
November	83.0	64.1	73.6	106.1 18/13	48.5 2/05	57.6	162.3 7/89	38.8 1/05	236.5
December	85.3	67.4	76.4	105.9 26/93	56.4 13/12	49.5	160.4 7/14	49.1 3/94	241.2
Year Averages	78.2	59.6	68.9	—	—	—	—	—	2535.0
Year Extremes	—	—	—	108.9 14/1/02	36.1 ‡	72.8	166.4 10/1/17	23.9 11/7/90	—

* 10 and 11/04. † 9/96 and 5/03. ‡ 12/94 and 2/96.

HUMIDITY, RAINFALL, AND DEW.

Month.	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 (inches). Mean Amount of Dew.	Mean No. Days Dew.
No. of yrs. over which observation extends	33	33	33	68	60	68	68	—	—	33
January	67	79	53	6.42	14	27.72 1895	0.32 1919	18.31 21/87	—	4.2
February	70	82	55	6.48	14	40.39 1893	0.58 1849	8.36 16/93	—	4.7
March	73	85	56	5.92	16	34.04 1870	nil 1849	11.18 14/08	—	7.7
April	73	79	60	3.60	12	15.28 1867	0.04 1897	4.47 13/16	—	10.9
May	74	85	64	2.94	10	13.85 1876	nil 1846	5.62 9/79	—	11.5
June	73	82	67	2.56	8	14.03 1873	nil 1847	6.01 9/93	—	9.5
July	74	81	61	2.22	8	8.46 1889	nil 1841	3.54 †	—	11.0
August	70	80	61	2.21	8	14.67 1879	nil *	4.89 12/87	—	8.7
September	65	76	47	2.06	8	5.43 1886	0.10 1907	2.46 2/94	—	8.5
October	61	72	49	2.65	9	9.99 1882	0.14 1900	1.95 20/89	—	6.6
November	60	72	46	3.63	10	12.40 1917	nil 1842	4.46 16/86	—	3.3
December	63	67	52	4.91	12	13.99 1910	0.35 1865	6.60 28/71	—	2.7
Year Totals	—	—	—	45.60	129	—	—	—	—	89.3
Year Averages	69	—	—	—	—	—	—	—	—	—
Year Extremes	—	85	46	—	—	40.39 2/1893	nil ‡	18.31 21/1/87	—	—

* 1862, 1869, 1880. † 15/76, 16/89. ‡ March, May, June, July, August, and November, various years.

CLIMATOLOGICAL DATA FOR SYDNEY, N.S.W.

LAT. 33° 52′ S., LONG. 151° 12′ E. HEIGHT ABOVE M.S.L. 133 FT.

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

Month.	Bar. corrected to 32° F. Mn. Sea Level and Standard Gravity from 24 hourly readings.	Wind. Greatest Number of Miles in one day.	Wind. Mean Hourly Pressure. (lbs.)	Wind. Total Miles.	Wind. Prevailing Direction.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m. 3 p.m., & 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends	61	53	53	53	53	40	60	58	56
January	29.902	721 1/71	0.36	8,172	N E	5.238	4.7	5.8	2.0
February	29.946	871 12/69	0.32	7,097	N E	4.056	4.3	6.1	1.3
March	30.011	943 20/70	0.25	6,777	N E	3.477	4.2	5.6	1.9
April	30.075	803 6/82	0.22	6,146	N E	2.489	4.0	5.0	2.6
May	30.084	758 6/98	0.22	6,374	W	1.702	3.4	4.8	3.2
June	30.061	712 7/00	0.28	6,976	W	1.389	2.2	4.8	3.5
July	30.080	930 17/79	0.28	7,130	W	1.487	2.5	4.4	4.4
August	30.076	756 22/72	0.25	6,862	W	1.812	3.2	4.1	4.5
September	30.012	964 6/74	0.29	7,132	W	2.621	4.1	4.3	4.2
October	29.972	926 4/72	0.32	7,755	N E	3.755	4.9	5.0	2.5
November	29.930	720 13/68	0.33	7,619	N E	4.511	5.5	5.6	1.6
December	29.886	938 3/84	0.36	8,047	N E	5.321	5.7	5.6	1.9
Year Totals	—	—	—	—	—	37.858	48.7	—	33.6
Year Averages	30.003	—	0.28	7,166	N E	—	—	5.1	—
Year Extremes	—	964 6/9/74	—	—	—	—	—	—	—

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 observation extends	61	61	61	61	61	61	61	61	9
January	78.5	64.9	71.7	108.5 13/96	51.2 14/65	57.3	164.3 26/16	44.2 18/97	198.9
February	77.4	64.9	71.2	101.0 19/66	49.3 28/63	51.7	162.1 16/98	43.4 25/91	172.4
March	75.5	63.0	69.3	102.6 3/69	48.8 14/86	53.8	150.3 4/89	39.9 17/13	186.9
April	71.1	58.1	64.6	89.0 4/09	44.6 27/64	44.4	144.1 10/77	33.3 24/09	141.4
May	65.1	52.1	58.6	86.0 1/19	40.2 22/59	43.3	129.7 1/96	29.3 25/17	118.7
June	60.6	48.2	54.4	74.7 24/72	38.1 29/62	36.6	123.0 14/78	28.1 24/11	105.3
July	59.1	45.8	52.5	74.9 17/71	35.9 12/90	39.0	124.7 19/77	24.0 4/93	120.5
August	62.4	47.6	54.0	82.0 31/84	36.8 3/72	45.2	149.0 30/78	26.1 4/09	165.8
September	66.7	51.4	59.1	92.3 27/19	40.8 18/64	50.3	142.2 12/78	30.1 17/05	179.1
October	71.1	55.8	63.5	99.7 19/98	43.3 2/99	56.4	151.9 *	32.7 9/05	195.2
November	74.4	59.6	67.0	102.7 21/78	45.8 1/05	56.9	158.5 28/99	36.0 6/06	183.5
December	77.3	62.9	70.1	107.5 21/04	49.3 2/59	58.2	171.5 4/88	41.5 6/09	191.8
Year Averages	69.9	56.2	63.0	—	—	—	—	—	1959.5†
Year Extremes	—	—	—	108.5 13/1/96	35.9 12/7/90	72.6	171.5 4/12/88	24.0 4/7/93	

* 30 and 31/14. † Total for year.

HUMIDITY, RAINFALL, AND DEW.

Month.	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 (inches). Mean Amount of Dew.	Mean No. Days Dew.
No. of yrs. over which observation extends	61	61	61	61	61	61	61	61	60	60
January	69	78	58	3.56	14.0	15.26 1911	0.42 1888	7.08 13/11	0.002	1.2
February	72	81	59	4.55	14.2	18.56 1873	0.34 1902	8.90 25/73	0.004	2.0
March	74	85	63	5.11	15.0	18.70 1870	0.42 1876	6.52 9/13	0.008	3.3
April	77	87	63	5.43	13.4	24.49 1861	0.06 1868	7.52 29/60	0.016	5.5
May	76	90	66	5.21	15.1	23.03 1919	0.18 1860	8.36 28/89	0.022	6.3
June	78	89	68	5.00	12.7	16.30 1885	0.19 1902	5.17 16/84	0.018	5.3
July	77	88	65	4.83	12.5	13.21 1900	0.12 1862	5.72 28/08	0.016	5.3
August	73	84	56	3.09	11.4	14.89 1899	0.04 1885	5.33 2/60	0.014	4.9
September	69	79	49	2.93	12.0	14.05 1879	0.08 1882	5.69 10/79	0.008	3.4
October	67	77	47	2.97	12.7	11.14 1916	0.21 1867	6.37 13/02	0.007	3.1
November	66	79	42	2.89	12.5	9.88 1865	0.07 1915	4.23 19/00	0.004	2.1
December	67	77	52	2.62	12.9	8.47 1910	0.23 1913	4.75 13/10	0.003	1.5
Year Totals	—	—	—	48.19	158.4	—	—	—	0.122	43.9
Year Averages	72	—	—	—	—	—	—	—	—	—
Year Extremes	—	90	42	—	—	24.49 April/61	0.04 Aug./85	8.90 25/2/73	—	—

CLIMATOLOGICAL DATA FOR 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 9 a.m. & 9 p.m. readings.	Wind. Greatest Number of Miles in One Day.	Wind. Mean Hourly Pressure. (lbs.)	Wind. Total Miles.	Wind. Prevailing Direction.	Mean Amount of Evaporation (inches.)	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m. 3 p.m. & 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends	62	48	48	48	48	47	12	62	12
January	29.913	583 10/97	0.29	7,301	S W, S E	6.404	1.9	5.0	8.1
February	29.961	566 8/68	0.27	6,347	S W, S E	5.019	2.4	5.0	7.2
March	30.032	677 9/81	0.22	6,313	S W, S E	3.936	1.9	5.5	* 5.0
April	30.103	597 7/68	0.19	5,697	S W, N W	2.346	0.8	5.8	4.2
May	30.106	693 12/65	0.19	5,894	N W, N E	1. 67	0.5	6.5	3.0
June	30.077	761 13/76	0.24	6,387	N W, N E	1.103	1.1	6.7	2.0
July	30.096	755 8/74	0.22	6,350	N W, N E	1.058	0.8	6.3	3.0
August	30.066	637 14/75	0.25	6,813	N W, N E	1.476	0.8	6.3	2.6
September	29.997	617 11/72	0.28	6,993	N W, S W	2.307	2.1	6.1	3.5
October	29.967	899 5/66	0.29	7,277	S W, N W	3.334	2.1	6.0	4.4
November	29.950	734 13/66	0.28	7,000	S W, S E	4.536	2.3	5.9	3.6
December	29.898	655 1/75	0.30	7,439	S W, S E	5.757	2.0	5.5	4.7
Year Totals	—	—	—	—	—	38.743	18.7	—	51.3
Year Averages	30.014	—	0.25	6,651	S W, N W	—	—	5.9	—
Year Extremes	—	899 5/10/66	—	—	—	—	—	—	—

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 observation extends	64	64	64	64	64	64	60	60	38
January	78.2	56.7	67.5	111.2 14/62	42.0 28/85	69.2	178.5 14/62	30.2 28/85	246.0
February	77.9	57.0	67.4	109.5 7/01	40.3 9/65	69.2	167.5 15/70	30.9 6/91	206.6
March	74.4	54.7	64.5	105.5 2/93	37.1 17/84	68.4	164.5 1/68	28.9 *	171.8
April	68.4	50.7	59.5	94.0 6/65	34.8 24/88	59.2	152.0 8/61	25.0 23/97	135.5
May	61.5	46.7	54.1	83.7 7/05	29.9 29/16	53.8	142.6 2/59	21.1 26/16	107.7
June	56.8	44.0	50.4	72.2 1/07	28.0 11/66	44.2	129.0 11/61	20.4 17/95	83.3
July	55.5	41.7	48.6	68.4 24/78	27.0 21/69	41.4	125.8 27/80	20.5 12/03	98.9
August	58.8	43.4	51.1	77.0 20/85	28.3 11/63	48.7	137.4 29/69	21.3 14/02	123.8
September	62.6	45.6	54.1	85.0 19/19	31.1 16/08	53.9	142.1 20/67	22.8 8/18	145.1
October	67.0	48.1	57.6	98.4 24/14	32.1 3/71	66.3	154.3 28/68	24.8 22/18	175.7
November	71.4	51.2	61.3	105.7 27/94	36.5 2/96	69.2	159.6 29/65	24.6 2/96	207.3
December	75.4	54.1	64.8	110.7 15/76	40.0 4/70	70.7	170.3 20/69	33.2 1/04	232.1
Year Averages	67.3	49.5	58.4	—	—	—	—	—	1933.8†
Year Extremes	—	—	—	111.2 14/1/62	27.0 21/7/69	84.2	178.5 14/1/62	20.4 17/6/95	—

* 17/1884 and 20/1897. † Total for year.

HUMIDITY, RAINFALL, AND DEW.

Month.	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 (inches). Mean Amount of Dew.	Mean No. Days Dew.
No. of yrs. over which observation extends	12	12	12	64	64	64	64	61	—	12
January	57	65	50	1.85	7	5.68 1904	0.04 1878	2.97 9/97	—	2.5
February	61	69	53	1.72	7	6.24 1904	0.03 1870	3.37 18/19	—	3.3
March	65	71	57	2.26	9	7.50 1911	0.18 1859	3.55 5/19	—	7.9
April	71	78	66	2.25	11	6.71 1901	0.33 1908	2.28 22/01	—	9.4
May	78	84	73	2.18	13	4.31 1862	0.45 1901	1.85 7/91	—	8.3
June	83	87	77	2.09	14	4.51 1859	0.73 1877	1.74 21/04	—	9.1
July	82	86	76	1.83	14	7.02 1891	0.57 1902	2.71 12/91	—	11.1
August	76	82	70	1.81	14	3.59 1909	0.48 1903	1.87 17/81	—	8.4
September	63	73	60	2.41	14	7.93 1916	0.52 1907	2.62 12/80	—	7.2
October	62	65	56	2.59	13	7.61 1869	0.29 1914	3.00 17/69	—	7.2
November	59	69	52	2.22	11	6.71 1916	0.25 1895	2.57 16/76	—	2.0
December	57	69	51	2.34	9	7.18 1863	0.11 1904	2.62 28/07	—	1.7
Year Totals	—	—	—	25.55	136	—	—	—	—	78.1
Year Averages	68	—	—	—	—	—	—	—	—	—
Year Extremes	—	87	50	—	—	7.93 9/16	0.03 2/70	3.55 5/3/19	—	—

CLIMATOLOGICAL DATA FOR 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. (lbs.)	Wind. Total Miles.	Wind. Prevailing Direction.	Mean Amount of Evaporation (inches).	No. of Days Lightning.	Mean Amount of Clouds, 9 a.m. 3 p.m., & 9 p.m.	No. of Clear Days.
No. of yrs. over which observation extends	35	9		9	9	15	9	12	57	13
January	29.828	500	30/16	0.20	5,984	N W & S E	5.54	0.6	5.9	3.1
February	29.924	393	19/13	0.12	4,365	S E & N	3.90	1.3	5.9	2.7
March	29.938	406	8/15	0.12	4,780	N & S E	3.02	1.3	5.9	1.9
April	29.956	432	7/17	0.13	4,750	N W & S E	1.98	0.9	6.0	1.7
May	29.990	411	3/16	0.12	4,677	N & N W	1.34	0.6	6.0	1.8
June	29.948	415	17/12	0.12	4,632	N & N W	0.83	0.8	6.0	1.6
July	29.932	396	17/11	0.12	4,628	N & N W	0.87	0.4	5.7	2.6
August	29.930	459	30/11	0.13	4,905	N & N W	1.22	0.8	5.9	2.2
September	29.842	516	26/15	0.19	5,768	N & N W	2.01	1.0	6.1	1.8
October	29.838	461	8/12	0.19	5,847	N W & S E	3.10	0.9	6.3	1.5
November	29.801	508	18/15	0.19	5,745	N W & S E	3.92	0.9	6.3	1.8
December	29.809	375	21/16	0.19	5,738	N W & S E	4.64	1.5	6.2	1.3
Year Totals	—	—		—	61,827	—	32.37	11.0	—	24.0
Year Averages	29.895	—		0.15	—	N	—	—	6.0	—
Year Extremes	—	516	26/9/15	—	—	—	—	—	—	—

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 observation extends	49	49	49	73		73		73	32		52		25
January	71.5	53.0	62.2	105.0	1/00	40.3	*	64.7	160.0	†	30.6	19/97	209.6
February	71.5	53.2	62.4	104.4	12/99	39.0	20/87	65.4	165.0	24/98	28.3	–/87	177.1
March	68.0	50.8	59.4	98.8	5/46	36.0	31/05	62.8	150.0	3/05	27.5	30/02	166.8
April	62.6	47.6	55.1	90.0	2/56	30.0	25/56	60.0	142.0	18/93	25.0	–/86	135.3
May	57.3	43.6	50.4	77.5	1/41	29.2	20/02	48.3	128.0	‡	20.0	19/02	127.2
June	52.7	40.9	46.8	75.0	7/74	28.0	22/79	47.0	122.0	12/94	21.0	6/87	98.6
July	51.8	39.1	45.4	72.0	22/77	27.0	18/66	45.0	118.7	19/96	18.7	16/86	121.1
August	54.9	41.0	48.0	77.0	3/76	30.0	10/73	47.0	129.0	–/87	20.1	7/09	139.2
September	58.7	43.0	50.8	80.0	9/72	30.0	12/41	50.0	138.0	23/93	22.7	–/86	139.8
October	62.7	45.3	54.0	92.0	24/14	32.0	12/89	60.0	156.0	9/93	23.8	§	163.2
November	66.2	48.2	57.2	98.0	20/88	35.2	5/13	62.8	156.0	16/19	26.0	1/08	191.8
December	69.5	51.2	60.4	105.2	30/97	38.0	13/06	67.2	157.0	30/18	27.2	–/86	189.9
Year Averages	62.3	46.4	54.3	—		—		—	—		—		1,859.5‖
Year Extremes	—	—	—	105.2	30/12/97	27.0	18/7/66	78.2	165.0	24/2/98	18.7	16/7/86	

* 3/72 and 2/06. † 5/86 and 13/05. ‡ –/88 and –/92. § 1/86 and –/99. ‖ Total for year.

HUMIDITY, RAINFALL, AND DEW.

Month.	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 (inches). Mean Amount of Dew.	Mean No. days Dew.
No. of yrs. over which observation extends	39	39	39	77	76	77		77		53		—	10
January	64	75	51	1.79	9	5.91	1893	0.03	1841	2.96	30/16	—	1.1
February	65	76	51	1.45	8	9.15	1854	0.07	1847	4.50*	25/54	—	2.5
March	70	76	59	1.70	10	7.60	1854	0.02	1843	2.79	5/19	—	4.5
April	74	85	60	1.89	11	6.50	1909	0.07	1904	5.02	20/09	—	10.2
May	79	90	68	1.86	13	6.37	1905	0.10	1843	3.22	14/58	—	13.2
June	83	94	73	2.20	14	8.15	1889	0.22	1852	4.11	14/89	—	7.3
July	81	97	74	2.14	14	5.98	1849	0.30	1850	2.00	27/78	—	8.4
August	78	92	64	1.84	14	10.16	1858	0.23	1854	4.35	12/58	—	7.6
September	72	87	60	2.13	14	7.14	1844	0.39	1847	3.50	29/44	—	4.0
October	67	75	51	2.26	15	6.67	1906	0.26	1850	2.58	4/06	—	3.3
November	64	73	51	2.52	14	8.92	1849	0.16	1868	3.97	6/49	—	1.5
December	62	73	49	1.96	11	9.00	1875	0.11	1842	2.48	13/16	—	1.1
Year Totals	—	—	—	23.74	147	—		—		—		—	64.7
Year Averages	72	—	—	—	—	—		—		—		—	—
Year Extremes	—	97	49	—	—	10.16	8/1858	0.02	3/1843	5.02	20/4/09	—	—

* 4.18, 26/54 also.