Rainfall data for March, 1903.

Stations.	Elevation.	Amount.
HAWAII.		
HILO, e. and ne.	*Feet.*	*Inches.*
Waiakea	50	3.55
Hilo (town)	100	.....
Kaumana	1,250	6.49
Pepeekeo	100	7.71
Hakalau	200	.....
Honohina	300	.....
Puuohua	1,050	15.93
Laupahoehoe	500	10.81
Ookala	400	8.37
HAMAKUA, ne.		
Kukaiau	250	11.60
Pauuilo	300	9.31
Pauuhau	300	9.05
Honokaa (Mill)	425	9.42
Honokaa (Meinicke)	1,100	.....
Kukuihaele	700	8.70
KOHALA, n.		
Awini Ranch	1,100	11.17
Niulii	200	4.61
Kohala (Mission)	521	5.21
Kohala (Sugar Co.)	270	3.66
Hawi, Mill	700	4.70
Puakea Ranch	600	2.98
Puuhue Ranch	1,847	2.78
Waimea	2,720	2.91
KONA, w.		
Holualoa	1,350	2.95
Kealakekua	1,580	4.13
Napoopoo	25	0.56
Hoopuloa	1,650	2.54
KAU, se.		
Kahuku Ranch	1,680	.....
Honuapo	15	4.23
Naalehu	650	4.42
Hilea	310	6.00
Pahala	850	.....
Moaula	.....	.....
Volcano House	4,000	6.14
PUNA, e.		
Olaa, Mountain View (Russel)	1,690	6.17
Kapoho	110	7.78
Pahoa	600	8.72
MAUI.		
Lahaina	40	.....
Waiopae Ranch	700	3.05
Kaupo (Mokulau), s.	285	2.45
Kipahulu, s	308	.....
Nahiku, ne	800	10.20
Nahiku	1,600	.....
Haiku, n	700	4.50
Kula (Erehwon), n	4,500	2.08
Kula (Waiakoa), n	2,700	1.45
Puuomalei, n	1,400	4.61
Paia	180	2.92
Haleakala Ranch	2,000	3.59
Wailuku, ne	250	1.69

Stations.	Elevation.	Amount.
OAHU.	*Feet.*	*Inches.*
Punahou (W. B.), sw	47	1.03
Kulaokahua (Castle), sw	50	0.38
Makiki Reservoir	120	0.44
U. S. Naval Station, sw	6	0.44
Kaplolani Park, sw	10	0.35
College Hills	175	0.98
Manoa (Woodlawn Dairy), c.	285	1.54
Manoa (Rhodes Gardens)	360	2.73
School street (Bishop), sw	.....	.....
Insane Asylum, sw	30	0.64
Kamehameha School	75	.....
Kalihi-Uka, sw	485	2.43
Nuuanu (W. W. Hall), sw	50	0.67
Nuuanu (Wyllie street)	250	0.81
Nuuanu (Elec. Station), sw	405	0.87
Nuuanu (Luakaha), c	850	2.55
U. S. Experiment Station	350	0.60
Laniakea (Nahuina)	1,150	0.95
Tantalus Heights	1,360	2.05
Waimanalo, ne	300	0.80
Maunawili, ne	300	1.95
Kaneohe	100	1.55
Ahuimanu, ne	350	2.87
Kahuku, n	25	1.13
Waialua	37	0.98
Wahiawa	900	0.74
Ewa Plantation, s	60	0.51
U. S. Magnetic Station	45	0.34
Waipahu	200	.....
Moanalua	15	0.60
KAUAI.		
Lihue (Grove Farm), e	200	2.02
Lihue (Molokoa), e	300	1.65
Lihue (Kukaua), e	1,000	1.68
Kealia, e	15	0.38
Kilauea, ne	325	1.66
Hanalei, n	10	2.52
Waioli	10	1.64
Haena	15	2.63
Waiawa	32	0.62
Eleele	150	.....
Wahiawa (Mountain)	3,000	1.40
McBryde (Residence)	850	1.26
Lawai (Gov. Road)	450	1.24
Lawai, w	225	1.68
Lawai, e	800	1.20
Koloa	100	2.06
Delayed February reports.		
Hoopuloa	.....	1.80
Pahala	.....	2.64
Moaula	.....	3.83
Puuomalei	.....	10.58
Wyllie Street	.....	5.87

NOTE.—The letters n, s, e, w, and c show the exposure of the station relative to the winds.

GENERAL SUMMARY FOR MARCH, 1903.

Honolulu.—Temperature mean for the month, 67.3°; normal, 70.9°; average daily maximum, 74.5°; average daily minimum, 61.3°; mean daily range, 13.2°; greatest daily range, 21.0°; highest temperature, 78°; lowest, 56°.

Barometer average, 29.970; normal, 30.017; highest, 30.17, 31st; lowest, 29.77, 15th; greatest 24-hour change, that is, from any given hour on one day to the same hour on the next, 0.17; lows passed this point on the 15th and 22d; highs on the 10th and 31st.

Relative humidity average, 72.3 per cent; normal, 72.0 per cent; mean dew-point, 57.5°; normal, 61.5°; mean absolute moisture, 5.32 grains per cubic foot; normal, 6.05 grains; dew on grass, 17 mornings.

Rainfall, 1.03 inches; normal, 3.76; rain record days, 9; normal, 18; greatest rainfall in one day, 0.54, on the 15th; total at Luakaha, 2.55; normal, 14.26; at Kapiolani Park, 0.35; normal, 3.19.

The artesian well water fell during the month from 35.25 to 34.85 feet above mean sea level. March 31, 1902, it stood at 34.05. The average daily mean sea level for the month was 9.59, the assumed annual mean being 10.00 feet above datum. For March, 1902, it was 9.85.

Trade wind days, 15, (4 NNE.); normal, 18; average force of wind during daylight, 1.8, Beaufort scale. Average cloudiness, tenths of sky, 4.2; normal, 4.6.

Approximate percentages of district rainfall as compared with normal: South Hilo, 25; North Hilo, 62; Hamakua, 100; Kohala, 80; Waimea, 57; Kona, 130; Kau, 95; Puna, 90; Maui, 60; Oahu, 20; Kauai, 30.

Kohala dew point average, 59.3°; relative humidity, 75 per cent; Magnetic Station, 58° and 70 per cent.

The month has been on the whole a remarkable one, being marked by low barometer, low dew-point, and low temperature, being as cold as February which was the coldest month on record for twenty-five years. Also by unusually light winds for March, and with the exception of March, 1889, the lightest rainfall on record for the station.

Moderately heavy surf, 7th, 18th, and 31st. Lightning, none. Earthquakes, Hilo, 13th, 6 p. m., 23d, 11:25 p. m.; Waimea, 13th, 6:15 p. m.; Kohala, 15th, 6:15 a. m. Snow very much diminished on Mauna Kea and Mauna Loa. Solar haze.

MARCH WINDS.

By B. C. WEBBER, Acting Director Meteorological Service of Canada, dated Toronto, April 20, 1903.

As the impression appears to be somewhat general in Canada that March is a month of excessive wind mileage and at the same time of very cold winds, a review of what has actually occurred during the past thirty years in regard to these matters in Ontario, Quebec, and the Maritime Provinces will perhaps be of some interest. Thirty years is not a very long period, but is probably of sufficient length to give approximately the prevailing characteristics of the month.

From March, 1874, to 1903, both inclusive, we find that the number of gales[1] occurring in Ontario was 48 less than in the corresponding series for December, 38 less than in January, and 25 less than in February. In the Province of Quebec the numbers for the same period were 48, 56, and 28, and in the Maritime Provinces 37, 69, and 27.

As gales, as a rule, continue for at least one and not infrequently for two or more days, the large diminution of the number of gales in March must necessarily mean a considerable decrease in the number of days with high winds compared with the number of days of high winds occurring during the three preceding months. It might here be noted that the much smaller number of gales in February than in January is in part accounted for by the lesser number of days in February, taken, of course, in conjunction with the gradual decrease of stormy weather as the season advances toward spring. It may be suggested that when a high wind sets in in March it is likely to continue longer than at any other season of the year, but there is nothing in the general movements of high and low pressure areas to warrant such a supposition. As to the winds being of excessive coldness, temperature records for a long series of years prove March in Ontario to be from 6° to 10° warmer on the average than in February. In Quebec March is 9° warmer and in the Maritime Provinces 7° warmer than in February. Such a large difference in the average mean temperature between the two months must give fewer cold winds in March than in February. We also find, on comparing records again, that the snowfall of March is very much less than during the preceding winter months.

We are all familiar with the old English saw, "If March comes in like a lion it goes out like a lamb," or vice versa. This saying has been apparently somewhat perverted, for a reference to an old book styled "Weather Folk-lore" quotes the following: "March comes in like a lion and goes out like a lamb." "March comes in with an adder's head, but goes out like a peacock's tail." Turning again to the records of the past thirty years we see that in Ontario March went out rough

[1] Presumably the author means days with gales.—C. A.

on nineteen years, in Quebec on eighteen, and in the Maritime Provinces on seventeen years; consequently, March appears to be more likely to go out like a lion than a lamb. As to the idea that if March comes in rough it will go out quietly, or vice versa, there is nothing in the records to justify this assumption, for during the past thirty years these conditions were maintained in twelve years only, in Ontario and Quebec, and in eleven in the Maritime Provinces. With such a long series of records opposed to the generally conceived notions of the dreaded conditions to be anticipated in March, it must be allowed that the supposed eccentricities of the weather of the month are largely illusory.

Many of the old sayings and proverbs regarding the weather and its changes have been handed down in Canada from generation of descendants chiefly from the British Isles, and these legends if applicable to the weather conditions of those Islands, which is very doubtful, are not so to a continental climate such as we enjoy.

Ontario, Quebec, and the Maritime Provinces have only been treated of in this paper because similar records of the winds, etc., are not available for the remaining parts of Canada, however, there can be no apparent reason why the same sequence of changes experienced over the districts reviewed should not occur elsewhere in the Dominion and in fact throughout the northern temperate zone generally; i. e., a marked decrease in stormy weather as the season advances toward the spring and summer.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physical Geographic Institute.
[For tables see the last page of this REVIEW preceding the charts.]

Notes on the weather.—On the Pacific slope the drought was excessive and continuous, but for a few light squalls of rain during the 27th, 28th, and 29th. In San José the pressure was slightly above the normal, while the heat and relative humidity were less. The sunshine records show an excess of about thirty-two hours above the general mean. On the Atlantic slope the rainfall was almost everywhere in excess of previous years, except on the coast belt where the drought was rather marked, and provoked, in Port Limon and its surroundings, a spell of bad fevers and general diseases.

Notes on earthquakes.—March 2, $6^h\ 47^m$ p. m., slight shock NW-SE, intensity I, duration 3 seconds. March 12, $2^h\ 25^m$ a. m., pretty generally felt shock N-S, intensity II, duration 4 seconds. March 21, $4^h\ 40^m$ a. m., prolonged vibration E-W, intensity II, duration 15 seconds. March 30, $5^h\ 33^m$ a. m., long oscillatory movement WNW-ESE, intensity III, duration 30 seconds. The same earthquake was officially reported from Cachi and San Isidro de Alajuela and was generally felt all through the interior of the country.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——.

Science. London. N. S. Vol. 17.

Bolton, Henry Carrington. Origin of the word "Barometer." Pp. 547–548.

Ward, R. DeC. Bigelow's Barometry. [Note on report by F. H. Bigelow.] Pp. 595–596.

Ward, R. DeC. Meteorological Observations in Bosnia. [Note on article by Hann.] P. 596.

Ward, R. DeC. High Winds on the Pacific Coast. [Note on article in Annual Report of the California Climate and Crops.] P. 596.

Scientific American. New York. Vol. 88.

Crookes, William. Sir William Crookes on Radium. P. 311.

Scientific American Supplement. New York. Vol. 55.

—— The New Observation Kites invented by S. F. Cody. P. 22804.

—— Kites as Meteorological Instruments. P. 22823.

Proceedings of the Royal Society. London. Vol. 49.

Lockyer, Norman and Lockyer, William J. S. Relation between Solar Prominences and Terrestrial Magnetism. Pp. 244–250.

Russell, W. J. On the formation of Definite Figures by the Deposition of Dust. Pp. 285–287.

Aeronautical Journal. London. Vol. 7.

Anderson, John. The Kite Equipment of the Scottish National Antarctic Expedition. Pp. 25–28.

Alexander, Patrick Y. The Aërosac. P. 28.

Blackden, L. S. Observations and Experiments relative to Equilibrium in Air of a Body Heavier than Air. Pp. 28–40.

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—— Great Dustfall of February, 1903. Pp. 21–24.

Stupart, R. F. Canadian Climate. Pp. 31–33.

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Physical Review. Lancaster. Vol. 16.

Barus, C. The Nucleation during Cold Weather. Pp. 193–198.

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Rosse, Lord. Effects of the Gale of February 26. P. 462.

Windsor, E. V. Hygrometric Determinations. Pp. 463–464.

Harding, Chas. Remarkable Winters. Pp. 466–467.

S., F. J. J. Movement of Air studied by Chronophotography. Pp. 487–488.

—— Accumulation of Meteorological Observations. Pp. 497–498.

—— Lodge, Oliver. Radium Emission. P. 511.

Rutherford, E. Radio-Activity of Ordinary Materials. Pp. 511–512.

Crookes, William. Emanations of Radium. Pp. 522–524.

Milne, J. Seismometry and Gëite. Pp. 538–539.

—— Variation of Solar Radiation received on the Earth's Surface. [Note on article by Henri Dufour.] P. 545.

Russell, W. J. Formation of Definite Figures by the Deposition of Dust. Pp. 545–546.

—— London Fog Inquiry, 1901–02. Pp. 548–549.

Comptes Rendus de l'Académie des Sciences. Paris. Tome 136.

Curie, P. and Laborde, A. Sur la chaleur dégagée spontanément par les sels de radium. Pp, 673–675.

Chauveau, A. B. Sur les poussières éoliennes du 22 février. Pp. 776–777.

Mascart, E. Remarques sur la note précédente. Pp. 777–778.

Pellat, H. De la température absolue déduite du thermomètre normal. Pp. 809–811.

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L., V. D. Les vents dominants indiqués par les arbres. [Note on article by J. Früh.] P. 41–42.

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Chauveau, A. B. Historique des théories relatives à l'origine de l'électricité atmosphérique. Pp. 59–70.

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Besson, Louis. Un nouveau néphoscope. Pp. 29–31.

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