West Virginia.—Vegetation received a severe set back by the freeze of the 5th. Nearly all cherries, peaches, plums, and apples were killed. Even wheat, which was in the best condition in years, was slightly injured, and oats and clover were cut down in some cases. The weather continued unfavorable for growth during the rest of the month, and, at its close, but little improvement could be noted. Farm work was very backward, and plowing had been delayed by the wet condition of the ground. There was a prospect of some apples from late bloom.—*E. C. Vose.*

Wisconsin.—Although the average temperature for April was about normal, vegetation made but little progress, owing to the cloudy, wet weather and cold nights. Freezing temperatures were frequent throughout the month in the central and northern sections, and heavy frosts in the southern. The rains were frequent, copious, and well distributed, but not excessive. Seeding was much delayed by the wet weather, and was not entirely completed by the end of the month. Little progress was made in preparing for corn and potatoes. Winter wheat, rye, and grass made fairly good progress.—*W. M. Wilson.*

Wyoming.—Cool weather prevented range grass from getting a good start before the close of the month. Plowing and seeding made good progress over the earlier sections, but over some of the later sections practically no spring work was done before the close of the month. The storm from the 27th to 29th, which was accompanied by cold weather, was severe on weak cattle and newly shorn sheep, and some losses were reported.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

HAWAIIAN CLIMATOLOGICAL DATA.

By CURTIS J. LYONS, Territorial Meteorologist.

OBSERVATIONS AT HONOLULU.

The station is at 21° 18′ N., 157° 50′ W. It is the Hawaiian Weather Bureau station Punahou. (See fig. 2, No. 1, in the MONTHLY WEATHER REVIEW for July, 1902, page 365.)

Hawaiian standard time is $10^h\ 30^m$ slow of Greenwich time. Honolulu local mean time is $10^h\ 31^m$ slow of Greenwich.

The pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet and the barometer 50 feet above sea level.

Meteorological Observations at Honolulu, April, 1903.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m. Greenwich time, or 1:30 a. m. Honolulu time.									Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	30.05	67	60	72	61	57.3	71	ne.	3	7	30.17	30.04	0.08
2	30.05	66	62.5	74	64	56.7	66	ne.	4–2	4	30.11	30.02	0.22
3	29.99	62	61	76	62	61.0	74	ne.	3	4	30.08	29.99	0.01
4	29.95	70	65	79	61	62.3	77	se–ne.	3	4	30.04	29.94	0.01
5	29.98	70	67	78	67	62.5	71	ne.	4	3	30.03	29.95	0.42
6	30.02	72	67	76	66	67.0	84	ne.	1	10–8	30.06	29.95	0.43
7	30.01	71	66	77	69	63.5	72	ne.	2–4	9	30.08	30.01	0.01
8	30.01	70	66	77	70	63.0	70	ne.	3	10–4	30.08	29.99	0.03
9	29.98	68	64	76	68	61.3	71	ne.	4	4	30.07	29.96	0.05
10	29.99	67	62.5	74	66	61.5	75	ne.	4–1	4	30.06	29.97	0.16
11	29.99	68	61	72	63	57.7	69	ne.	3–6	8–2	30.04	29.95	0.01
12	30.00	68	63.5	75	67	57.0	64	ne.	5–3	3	30.06	29.96	0.01
13	30.01	70	66.5	77	66	61.3	71	ne.	4	3–6	30.06	29.97	0.22
14	30.03	71	66.5	73	67	64.7	82	ne.	5	8	30.11	30.01	0.20
15	30.09	70	63.5	76	68	63.0	74	ne.	5–6	7–10	30.14	30.02	0.10
16	30.09	68	62.5	74	68	61.0	72	ne.	5–4	8	30.15	30.06	0.02
17	30.04	69	63	75	68	57.0	64	ne.	4	1	30.11	30.03	0.01
18	30.04	71	66	77	67	59.7	67	ne.	3–4	5	30.08	29.99	0.05
19	29.97	68	63.5	77	68	63.0	74	ne.	4	7	30.08	29.97	0.03
20	29.94	71	64.5	77	66	60.7	70	ne.	3	6–2	30.02	29.93	0.10
21	29.94	67	66	78	67	60.7	66	ne.	3	5	29.98	29.90	0.01
22	29.95	69	65.5	79	66	63.3	76	ne.	3	4	30.01	29.92	0.01
23	29.94	70	65.5	79	69	62.7	72	ne.	3	5–1	30.01	29.92	0.00
24	29.92	70	65	78	68	63.0	72	ne.	3	2	30.00	29.88	0.00
25	29.92	68	66.8	80	69	63.5	71	ne.	3	1	29.96	29.90	0.00
26	29.94	71	68.5	81	67	67.7	80	se.	1–0	7–10	29.99	29.89	0.01
27	29.94	74	68.5	81	70	67.5	80	sw.	0–1	10–0	30.01	29.93	0.00
28	30.00	71	65.5	79	69	64.7	70	nne.	0–4	7–3	30.04	29.95	0.00
29	30.04	69	65	77	70	62.5	73	ne.	4–5	3	30.09	30.01	0.07
30	30.01	67	66	77	68	63.5	75	ne.	4–3	4	30.09	30.00	0.08
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.35
Means	29.994	69.1	64.8	77.0	67.0	62.3	72.8	.....	3.2	5.1	30.090	29.967	.....
Departure	—.027	.....	.....	.....	.....	.....	.....	.....	.....	0.0	.....	.....	—.55

Mean temperature for April, 1903, $(6+2+9)\div 3=71.9°$; normal is 72.6°. Mean pressure for April, 1903, $(9+3)\div 2=30.005$; normal is 30.032.

* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 4.31 p. m., Greenwich time. ‡ These values are the means of $(6+9+2+9)\div 4$. § Beaufort scale.

Maximum thermometer set at 9 p. m. and minimum at 2 p. m., local time.

GENERAL SUMMARY FOR APRIL, 1903.

Honolulu.—Temperature mean for the month, 71.9°; normal, 72.6°; average daily maximum, 77.0°; average daily minimum, 67.0°; mean daily range, 10.0°; greatest daily range, 18°; least daily range, 6°; highest temperature, 81°; lowest, 61°.

Barometer average, 30.005; normal, 30.032; highest, 30.15, on the 15th; lowest, 29.88, on the 23d; greatest 24-hour change, that is, from any given hour on one day to the same hour on the next, 0.06; lows passed this point on the 4th, 10th, and 23d; highs on the 1st, 15th, and 20th.

Relative humidity average, 72.8 per cent; normal, 71.5 per cent; mean dew-point, 62.3°; normal, 63.5°; mean absolute moisture, 6.22 grains per cubic foot; normal, 6.42 grains; dew, 3 mornings.

Rainfall, 2.35 inches; normal, 2.90; rain record days, 25; normal, 17; greatest rainfall in one day, 0.43, on the 6th; total at Luakaha, 17.73; normal, 11.06; at Kapiolani Park, 1.14; normal, 1.19.

Rainfall data for April, 1903.

Stations.	Elevation.	Amount.
HAWAII.		
HILO, e. and ne.	*Feet.*	*Inches.*
Waiakea	50	17.69
Hilo (town)	100	23.17
Kaumana	1,250	25.21
Pepeekeo	100	11.86
Hakalau	200	18.45
Honohina	300	23.15
Puuohua	1,050	48.85
Laupahoehoe	500	38.48
Ookala	400	23.57
HAMAKUA, ne.		
Kukaiau	250	21.72
Paauilo	300	13.32
Paauhau	300	8.87
Honokaa (Mill)	425	10.20
Honokaa (Meinicke)	1,100	.....
Kukuihaele	700	13.18
KOHALA, n.		
Awini Ranch	.....	19.68
Niulii	200	8.80
Kohala (Mission)	521	8.62
Kohala (Sugar Co.)	270	8.43
Hawi, Mill	700	.....
Puakea Ranch	600	6.38
Puuhue Ranch	1,847	2.97
Waimea	2,720	3.49
KONA, w.		
Holualoa	1,350	5.88
Kealakekua	1,580	5.82
Napoopoo	25	2.87
Hoopuloa	1,650	.....
Hoopuloa	2,500	.....
KAU, se.		
Kahuku Ranch	1,680	.....
Honuapo	15	2.04
Naalehu	650	3.13
Hilea	310	2.50
Pahala	850	3.00
Moaula	1,700	2.90
Volcano House	4,000	9.15
PUNA, e.		
Olaa, Mountain View (Russel)	1,690	28.72
Olaa (Plantation)	.....	.....
Kapoho	110	10.16
Pahoa	600	.....
MAUI.		
Lahaina	40	.....
Waiopae Ranch	700	1.89
Kaupo (Mokulau), s	285	7.96
Kipahulu, s	308	8.09
Hana	.....	.....
Nahiku, ne	800	42.29
Nahiku	1,600	.....
Haiku, n	700	9.62
Kula (Erehwon), n	4,500	0.33
Kula (Waiakoa), n	2,700	0.68
Puuomalei, n	1,400	8.77
Paia	180	4.06
Haleakala Ranch	2,000	3.64
Wailuku, ne	250	3.12

Stations.	Elevation.	Amount.
OAHU.	*Feet.*	*Inches.*
Punahou (W. B.), sw	47	2.35
Kulaokahua (Castle), sw	50	1.69
Makiki Reservoir	120	2.80
U. S. Naval Station, sw	6	1.52
Kapiolani Park, sw	10	1.14
College Hills	175	3.17
Manoa (Woodlawn Dairy), c	285	8.96
Manoa (Rhodes Gardens)	360	12.87
School street (Bishop), sw	.....	.....
Insane Asylum, sw	30	2.98
Kamehameha School	75	.....
Kalihi-Uka, sw	485	12.73
Nuuanu (W. W. Hall), sw	50	3.44
Nuuanu (Wyllie street)	250	6.07
Nuuanu (Elec. Station), sw	405	6.73
Nuuanu (Luakaha), c	850	17.73
U. S. Experiment Station	350	4.02
Pacific Heights	700	6.08
Laniakea (Nahuina)	1,150	10.67
Tantalus Heights	1,360	9.95
Waimanalo, ne	300	3.17
Maunawili, ne	300	8.26
Kaneohe	100	7.66
Ahuimanu, ne	350	10.28
Kahuku, n	25	1.92
Waialua	37	.....
Wahiawa	900	4.08
Ewa Plantation, s	60	1.12
U. S. Magnetic Station	45	0.95
Waipahu	200	1.00
Moanalua	15	3.24
KAUAI.		
Lihue (Grove Farm), e	200	5.23
Lihue (Molokoa), e	300	5.30
Lihue (Kukaua), e	1,000	11.70
Kealia, e	15	3.01
Kilauea, ne	325	6.47
Hanalei, n	10	16.38
Waioli	10	17.75
Haena	15	16.30
Waiawa	32	.....
Eleele	150	2.58
Wahiawa (Mountain)	3,000	29.30
McBryde (Residence)	850	9.21
Lawai (Gov. Road)	450	12.24
Lawai, w	225	4.46
Lawai, e	800	12.33
Koloa	100	4.21
Delayed March reports.		
Hakalau	.....	10.51
Honohina	.....	10.21
Kipahulu	.....	4.95
Pahala	.....	9.38
Moaula	.....	10.61
Hoopuloa	2,500	4.15
Puuomalei	.....	.....
Wyllie Street	.....	.....

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

The artesian well water level fell during the month from 34.85 to 34.75 feet above mean sea level. April 30, 1902, it stood at 34.10. The average daily mean sea level for the month was 9.65 feet, the assumed annual mean being 10.00 feet above datum. For April, 1902, it was 9.75.

Trade wind days, 27, (1 NNE.); normal, 20; average force of wind during daylight, Beaufort scale, 3.2. Average cloudiness, tenths of sky, 5.1; normal, 5.1.

Approximate percentages of district rainfall as compared with normal: Hilo, 185; Hamakua, 185; Kohala, 185; Waimea, 112; Kona, 145; South Kau, 80; North Kau, 140; Puna, 155; Maui, 150, except Kula, only 16; Oahu, town, 80; Koolau, 175; elsewhere on the island, 130; Kauai, 150, except Hanalei, 240. The heaviest 24-hour rainfalls for the month were at Nahiku (800), 7.08, 29th; Puuohua, 5.39 and Kapoha, 5.30 on the 15th. Heaviest monthly rainfall Puuohua, 48.85.

Mean temperature table.

Stations.	Elevation.	Mean max.	Mean min.	Cor. av'ge.
	Feet.	°	°	°
Pepeekeo	100	74.1	66.4	70.3
Waimea	2,730	66.9	56.3	61.0
Kohala	521	74.6	64.1	68.7
Waiakoa	2,700	78.7	55.7	66.5
United States Magnetic Station	50	81.5	65.6	73.0
United States Experimental Station	350	78.1	66.2	71.5
W. R. Castle	60	.....	.....	71.3
Hilo	40	81.0	65.9	72.8

Kohala dew-point average, 68.7°; relative humidity, 84 per cent; Magnetic Station, 62.2° and 69 per cent; Ewa Mill, 60.5° and 58 per cent.

Heavy surf, 5th, 11–15th, 18th; lightning seen at Pepeekeo, 25th and 26th. light snow on Mauna Kea, 11th; slight earthquake at Hilo, 2 a. m., 19th.

An unusually large meteor passed over East Hawaii from the south at 5:30 a. m. on the 30th, seen at Hilo, North Hilo, Hamakua, and said to have been visible over Haleakala on Maui; though there may have been two distinct meteors. The noise of its passage was mistaken for thunder by the Pepeekeo observer and others. A fragment weighing over a ton is reported as having been found by a native in Kau, but no subsequent report has yet confirmed this.

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. New York. N. S. Vol. 17.
Ward, R. DeC. Helm Cloud in the Blue Ridge of North Carolina. [Note on article of W. M. Davis.] P. 712.
Ward, R. DeC. Meteorological Phenomena of Volcanic Eruptions. [Note on article of R. B. White.] Pp. 712-713.
Ward, R. DeC. General Circulation of the Atmosphere. [Note on report of Dr. Hildebrandsson.] Pp. 752–753.

Scientific American. New York. Vol. 88.
—— Origin of the Word "Barometer." [Note on article of Henry Carrington Bolton.] P. 395.

Scientific American Supplement. New York. Vol. 55.
—— Some properties of the Radiation of Radio-active Bodies. Pp. 22862–22863.
—— The Conundrums of Radium. Pp. 22863–22864.
Lodge, Oliver. On electrons. Pp. 22898-22899.
Hammer, William J. Radium and Other Radio-active Substances. Pp. 22904–22907.

Nature. London. Vol. 67.
Mellor, J. W. The Thermal Energy of Radium Salts. P. 560.
Lockyer, William J. S. Solar prominence and Spot Circulation, 1872–1901. Pp. 569–571.
Harris, R. A. A New Theory of the Tides of Terrestrial Oceans. Pp. 583–584.
Bonney, T. G. March Dust from the Soufrière. P. 584.
Thomson, J. J. Radium. Pp. 601-602.

Nature. London. Vol. 68.
Strutt, R. J. Energy Emitted by Radio-active Bodies. P. 6.
Lockyer, William J. S. The Solar and Meteorological Cycle of thirty-five years. Pp. 8–10.

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Burrows, Alvin T. The Chinook Winds. Pp. 124-125.

Symons's Meteorological Magazine. London. Vol. 38.
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Brown, Robert Marshall. Climatic Factors in Railroad Construction and Operation. Pp. 178-190.

London, Edinburgh, and Dublin Philosophical Magazine. London. 6th Series. Vol. 5.
Townsend, John S. The Conductivity produced in Gases by the Aid of Ultra-Violet Light. Pp. 389-398.
McLennen, J. C. Induced Radioactivity Excited in Air at the Foot of Waterfalls. Pp. 419–428.
Wilson, Harold A. A Determination of the Charge on the Ions produced in Air by Röntgen Rays. Pp. 429–441.
Rutherford, E. The Radioactivity of Uranium. Pp. 441–445.
Rutherford, E. A comparative Study of the Radioactivity of Radium and Thorium. Pp. 445–457.
Parks, G. J. On the Thickness of the Liquid Film formed by Condensation at the Surface of a Solid. Pp. 517–524.
Trowbridge, John. On the Gaseous Constitution of the H and K lines of the Solar Spectrum, together with a Discussion of reversed Gaseous Lines. Pp. 524–529.
Durack, J. J. E. On the Specific Ionization produced by the Corpuscles given out by Radium. Pp. 550–561.
Rutherford, E. and **Soddy, F.** Condensation of the Radio-active Emanations. Pp. 561–576.
Rutherford. E. and **Soddy, F.** Radioactive Change. Pp. 576–591.

Ciel et Terre. Bruxelles. 24me année.
Prinz, W. Analyse complémentaire de la boue tombée en Belgique le 22 février 1903. Pp. 75–81.
Hildebrandsson, H. H. Sur la circulation générale de l'atmosphère. Pp. 82–90.
Hildebrandsson, H. H. Sur la circulation générale de l'atmosphère. Pp. 105–118.

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Nordmann, Charles. Sur les propriétés magnétiques de l'atmosphère terrestre. Pp. 960–962.

Annuaire de la Société Météorologique de France. Paris. 51me année.
Angot, Alfred. Sur le calcul des moyennes et la variabilité de la température en France. Pp. 53–59.
Thévenet, —. Recherches de thermodynamique sur la distribution des éléments météorologiques à l'intérieur des masses d'air en mouvement. Pp. 59–61.

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Gautier, R. Observations météorologiques faites aux fortifications de Saint-Maurice pendant les mois de août, septembre, octobre et novembre 1902. Pp. 327–334.

La Nature. Paris. 31me Année.
Gall, J. F. Station météorologique de la Schlucht. Pp. 275–276.

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Meyer, Stefan. Notiz über das magnetische Verhalten von Europium, Samarium und Gadolinium. Pp. 38–41.
Hann, J[ulius]. Die Schwankungen der Niederschlagsmengen in grösseren Zeiträumen. Pp. 67–186.
Oppolzer, Egon R. v. Erdbewegung und Aether. Pp. 244–254.
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