cent; Oahu, 125 per cent, excepting Kahuku, 270 per cent; North Kauai, 60 per cent; South Kauai, 125 per cent. The rains were quite evenly distributed through the month.

Mean temperatures: Pepeekeo, Hilo district, 100 feet elevation, mean maximum, 81.3°; mean minimum, 71.6°; Waimea, Hawaii, 2,730 elevation, 81.6° and 64.7°; Kohala, 521 elevation, 80.8° and 68.4°; Waiakoa, Kula, Maui, 2,700 elevation, 81.8° and 62.0°; Ewa Mill, 50 elevation, 86.0° and 69.8°; United States Experiment Station, 85.9° and 71.4°; United States Magnetic Station (near Ewa), 50 elevation, 89.8° and 69.8°; W. R. Castle, Honolulu, 50 elevation, highest, 86°; lowest, 68°; mean, 77.1°.

Ewa Mill mean dew-point, 66.4°; mean relative humidity, 68.2 per cent; United States Magnetic Station, 67.7° and 68.0 per cent; Kohala, Dr. B. D. Bond, 68.5° and 84.0 per cent.

Earthquakes reported: Pepeekeo, 24th, 9:30 p. m., and Hilo, 28th, 6:13 a. m., smart shock, "severest in six years;" Kealakekua, 19th, 5:30 p. m.; Waimea, 26th evening, 27th evening, and the morning of the 28th. During the first half of the month the molten lava disappeared from the pit in Kilauea; on the 16th active again and rising, light visible at 30 miles distance. The glows brighter than in August.

Light fall of snow on Mauna Kea, 20th. No electric storms noted. Heavy surf, 1st to 4th, and 27th. Tidal wave on Puna coast, southeast Hawaii, on 2d. Calm weather 10th to 21st, without trades.

## 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. When the author of an article is not known the title is preceded by a ——.

*Scientific American. New York. Vol. 87.*
—— Temperature and Humidity Regulators. P. 201.
**Collins, Frederick.** Some New Detectors for Wireless Telegraphy. Pp. 220-221.
**Hall, Alfred E.** Curious effect of Lightning on a Brick Chimney. P. 336.
**Fyfe, H. C.** Experiments at St. Catherine's with Fog Signals. P. 240.
—— Commercial Utilization of Atmospheric Elements. Pp. 254-255.

*Scientific American Supplement. New York. Vol. 54.*
**Dewar, James.** History of Cold and the Absolute Zero. Pp. 22386-22387; 22370-22371; 22406-22407.
—— Cold Weather and Belated Crops in Germany. P. 22412.
**Mott, S. D.** Aerodromes. Pp. 22416-22420.

*Philosophical Magazine. London. 6th series. Vol. 4.*
**Everett, J. D.** On the Comparison of Vapour-Temperatures at Equal Pressures. Pp. 335-338.
**Edser, Edwin.** The Diffraction of Light from a dense to a Rarer Medium, when the Angle of Incidence exceeds its Critical Value. Pp. 346-352.
**Thomson, J. J.** Experiments on Induced-Radioactivity in Air, and on the Electrical Conductivity produced in Gases when they pass through Water. Pp. 352-367.
**Wood, R. W.** On the Electrical Resonance of Metal Particles for Light-Waves. Pp. 425-430.
**Stevenson, John.** The Chemical and Geological History of the Atmosphere. Pp. 435-451.

*Nature. London. Vol. 66.*
**Nutting, P. G.** The effect of Light on Cyanin. P. 416.
—— Sea Temperature Variations on the British Coasts. Pp. 452-453.
—— Snow-waves and Snow-drifts. Pp. 453-454.
—— The Upper Air and Auroras. Pp. 474-476.
**Sherborn, C. Davies.** Effect of a Lightning Flash. P. 492.
—— Convention of Weather Bureau Officials. Pp. 543-454.

*Terrestrial Magnetism. Baltimore. Vol. 7.*
**Nippoldt, A.** Ueber die meteorologische Natur der Variationen des Erdmagnetismus. Pp. 101-114.
**Beattie, J. C.** Work in Terrestrial Magnetism and Atmospheric Electricity in South Africa. Pp. 114-115.

*Geographical Journal. London. Vol. 20.*
**Andersson, J. Gunnar.** The Winter Expedition of the "Antarctic" to South Georgia. Pp. 405-408.
—— The Arctic Expeditions—Return of Sverdrup, Peary, and Baldwin. Pp. 434-438.
—— The Scottish National Antarctic Expedition. Pp. 438-440.

*Journal of Geography. Lancaster. Vol. 1.*
**Chamberlin, J. F.** Climatic Conditions in Southern California. Pp. 297-303.
**Ward, R. DeC.** Relative Humidity of our Houses in Winter. Pp. 310-317.

*Scottish Geographical Magazine. Edinburg. Vol. 18.*
**Bruce, W. S.** Scottish National Antarctic Expedition. Pp. 536-543.

*American Inventor. Washington. Vol. 9.*
**McAdie, Alex. C.** Fog Studies. Pp. 209-214.

*Astrophysical Journal. Chicago. Vol. 16.*
**Very, Frank W.** The Absorptive Power of the Solar Atmosphere. Pp. 73-92.
**Peters, G. H.** Some results of the Total Eclipse in Sumatra of May 18, 1901, obtained with the Photoheliograph at Fort de Kock. Pp. 92-97.

*Symons's Meteorological Magazine. London. Vol. 37.*
**Lockyer, Norman, and Lockyer, William J. S.** A Short Period of Solar and Meteorological Changes. Pp. 120-122.
—— An African Rainmaker. Pp. 122-124.

*Proceedings of the Royal Society. London. Vol. 70.*
**Travers, Morris W.; Senter, George; and Jacquerod, Adrien.** On the Measurement of Temperature. Pp. 484-491.

*Aeronautical Journal. London. Vol. 6.*
**Bacon, John M.** Balloon Ascents in Thunderstorms. Pp. 62-65.
—— The St. Louis Airship Competition. P. 68.

*Ciel et Terre. Bruxelles. 24me Année.*
**W., P.** Notes sur les éruptions du mont Pelé. Pp. 374-382.

*Revue Scientifique. Paris. 4me série. Tome 18.*
**B., L.** La météorologie des États-Unis en 1901. Pp. 400-401.

*Annuaire de la Société Météorologique de France. Paris. 50me Année.*
**Raulin, V.** Les régimes pluviométriques saisonnaux des Iles Britanniques. Pp. 129-139.
**Maillet, Edmond.** Résumé des observations centralisées par le Service Hydrométrique du Bassin de la Seine pendant l'année 1900. Pp. 145-168.

*Comptes Rendus de l'Académie des Sciences. Paris. Tome 135.*
**Janssen, J.** Sur les travaux de cette année, à l'observatoire du sommet du mont Blanc. Pp. 341-343.
**Jodin, Victor.** Sur la durée germinative des graines exposées à la lumière solaire. Pp. 443-444.
**Deslandres, H.** Organisation, à l'Observatoire de Meudon, des spectrographes automatiques dits des vitesses, qui enregistrent les mouvements radiaux et l'épaisseur de la chromosphère solaire. Pp. 500-503.
**Guillaume, J.** Observations du soleil faites à l'Observatoire de Lyon pendant le premier trimestre de 1902. Pp. 523-525.

*La Nature. Paris. 30me Année.*
**Perand, H.** Nouveau composé volatil dans l'air atmosphérique. P. 198.
**Corbigny, Brossard de.** Cerf-volant porte-amarres de sauvetage et de sport. Pp. 219-222.

*Archives des Sciences Physiques et Naturelles. Genève. 4me série. Tome 14.*
**Rabot, Charles.** Essai de chronologie des variations des glaciers. Pp. 133-150.

*Meteorologische Zeitschrift. Wien. Band 19.*
**Sprung, A.** Photographische Aufnahmen des Sonnenring-Phänomens vom 13 März 1902, zu Potsdam. Pp. 345-348.
**Goeldi, E. A.** Zum Klima von Pará. Pp. 348-366.
**Hergesell, G.** Vorläufiger Bericht über die internationale Ballonfahrt vom 6 März 1902. Pp. 366-367.
—— Täglicher Gang der meteorologischen Elemente am Observatorium auf Mauritius. P. 367.
—— Täglicher Gang des Luftdrucks und der Temperatur zu Rosario, Argentinien. Pp. 367-369.
**MacDowall, Alex. B.** Mond und Wetter. Pp. 369-370.
**Maurer, J.** Meteorologische Station St. Gotthard-Hospiz. Pp. 370-371.
—— Der Mai 1902. P. 371.
**Fényi, J.** Ueber den Gewitterregistrator in einer neuen sehr einfachen Form. Pp. 371-372.
**Kossatsch, M.** Ueber eine Lücke in den Theorien der Wärme und der Temperaturänderungen im Boden. Pp. 272-273.
—— Ueber die normale Vertheilung der magnetischen Deklination und Inklination in Frankreich. Pp. 373-374.
—— Gewitter und Hagel im Department de l'Herault 1875-1899. P. 374.
—— Sonnenscheindauer zu Montpellier. P. 374.

—— Resultate der meteorologischen Beobachtungen auf dem Ben Nevis im Jahre 1900. Pp. 374–375.
—— Meteorologische Beobachtungen im Glen Nevis. Pp. 375–376.
—— Einstellung der meteorologischen Beobachtungen auf dem Ben Nevis. P. 376.
—— J. R. Plumandon über die Dauer der Hagelfälle. Pp. 376–377.
**Pernter, J. M.** Hagel ohne elektrische Entladungen. P. 377.
—— Ameisenregen. Pp. 377–378.
**Hann, J.** Meteorologische Beobachtungen zu Quito. Pp. 378–381.
**Neumayer, G.** Forschungen auf dem Gebiete des Erdmagnetismus innerhalb der Polarregionen und deren Einfluss auf die Theorie. Pp. 381–382.
**Schubert, J.** Der Wärmeaustausch im festen Erdboden, in Gewässern und in der Atmosphäre. P. 382–383.
—— R. Assmann über die Existenz eines wärmeren Luftstromes in der Höhe von 10–15 km. Pp. 384–385.
—— Luftelektrische Beobachtungen. Pp. 385–386.
—— Dauer der Dämmerung in den Tropen. P. 386.
**Richter, C. M.** Sonnenflecken, Erdmagnetismus und Luftdruck. Pp. 386–389.
**Fényi, J.** Einige Ergebnisse des Pluviographen in Kalocsa (ungarisches Tiefland). Pp. 389–391.
—— Dunkelheit während des Tages in London. P. 391.
—— Ein Drache für die schottische antarktische Expedition. P. 391.
*Gaea. Leipzig. 38 Jahrg.*
—— Die Temperaturverhältnisse des nordatlantischen Oceans. P. 636.
—— Blitzschutzvorrichtungen für elektrische Apparate. Pp. 660–671.
—— Sonnenuntergangs-und Dämmerungserscheinungen in subtropischen und tropischen Gebieten. Pp. 671–673.
—— Tödlicher Blitzschlag in eine Schutzhütte auf den Alpen. Pp. 696–697.
—— Einfluss grösseren Kohlensäuregehaltes der Luft auf das Wachstum der Pflanzen. P. 698.
*Das Wetter. Berlin. 19 Jahrgang.*
**Klengel, Friedrich.** Meteorologisches vom Mai 1902, in Leipzig. Pp. 169–173.
**Assmann, Richard.** Betrachtungen über die abnorme Witterung des diesjährigen Sommers. Pp. 173–184.
**Assmann, Richard.** Drachenaufstieg während eines Gewitters. P. 186.
**Stade, —.** Gefrorener Regen. Pp. 189–190.
**Assmann, Julius, Sr.** Ein Blitzschlag. P. 190.
**Grossmann, —.** Zur Frage der Verlegung des wettertelegraphischen Dienstes auf eine frühere Stande. Pp. 193–196.
—— Die zweite Versammlung der Beamten und Mitarbeiter des Weather Bureau im August, 1901, in Milwaukee. Pp. 196–204.
**Rimpau, W.** Die Wirkung des Wetters auf die Zuckerrüben-Ernten der Jahre 1891 bis 1900. Pp. 206–214.
**Stanhope-Eyre, A.** Beobachtungen am Blitzregistrator, Observatorium Uslar. P. 214.
**Treitschke, Fr.** Verdunstungskälte in einem Eimer. P. 214.
**Otto, —.** Regenbogen-Erscheinung. Pp. 215–216.
*Annalen der Hydrographie und Maritimen Meteorologie. Hamburg. 30 Jahrg.*
—— Ableitung der normalen Morgen-und Nachmittagstemperaturen der deutschen Stationen für die Wetterberichte der Deutschen Seewarte. Pp. 421–427.
**Burchard, O.** Meteorologische Beobachtungen auf einer Winterreise nach den Canarischen Inseln. Pp. 437–449.
*Petermann's Mittheilungen. Gotha. 48 Band.*
**Kassner, C.** Die Niederschlagsverteilung in Bulgarien. Pp. 145–151.
**Brückner, Eduard.** Zur Frage der 35 jährigen Klimaschwankungen. Pp. 173–178.
*Physikalische Zeitschrift. Leipzig. 3 Jahrgang.*
**Elster, J. and Geitel, H.** Ueber die Radioaktivität der im Erdboden anthaltenen Luft. Pp. 574–577.
*Zeitschrift für Gewasserkunde. Leipzig. 5 Band.*
**Walter, H.** Neues analytisch-graphisches Verfahren zur Bestimmung der Stauweite. Pp. 65–105.
**Hertmann, R.** Beitrag zur Kenntniss der Wirbelbewung. Pp. 106–125.
*Memorie della Societa degli Spettroscopisti Italiani. Catania. Vol. 31.*
**Bemporad, A.** Sopra un nuovo sviluppo dell' integrale della estinzione atmosferica. Pp. 131–143.
**Wolfer, A.** La fréquence des taches solaires pendant l'année 1901. Pp. 152–155.
*Memorias de la Sociedad Cientifica "Antonio Alzate." Mexico. Tome 17.*
**Laguerenne, Teodoro Luis.** Ligeras observaciones sobre la climatologica de Mexico. Pp. 43–51.

## CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of H. H. Cousins, chemist to the Government of Jamaica and now in charge of the meteorological service of that island, we have received the following table in advance of the regular monthly weather report for Jamaica:

*Comparative table of rainfall for September, 1902.*

| Divisions. | Relative area. | Number of stations. | Rainfall. | |
|---|---|---|---|---|
| | | | Average. | 1902. |
| | *Per cent.* | | *Inches.* | *Inches.* |
| Northeastern division | 25 | 21 | 8.34 | 5.48 |
| Northern division | 22 | 47 | 5.33 | 3.78 |
| West-central division | 26 | 21 | 10.53 | 9.70 |
| Southern division | 27 | 32 | 6.35 | 4.73 |
| | 100 | 120 | 7.64 | 5.89 |

## 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 weather continued dry until about the 15th, after which the rain was more frequent, although still scarce. In San Jose the pressure was normal, the temperature slightly above and the relative humidity under the mean. On the Atlantic slope the rainfall continued in excess at the stations at the foot of the Cordillera, while it was about normal on the coast. From Talamanca a strong hurricane is reported on the 14th, $0^h\ 30^m$ to $2^h$ p. m.

*Notes on earthquakes.*—September 9, $9^h\ 35^m$ p. m., slight shock, NE–SW, intensity II, duration 7 seconds. September 11, $11^h\ 30^m$ a. m., tremors. September 13, $2^h\ 23^m$ a. m., slight shock, NW–SE, intensity I, duration 4 seconds. September 13, $9^h\ 05^m$ a. m., very slight shock, NW–SE, intensity I, duration 4 seconds. September 25, $5^h\ 27^m$ a. m., strong shock, E–W, intensity III, duration 8 seconds. Moreover, the Tres Rios Station reports a short and slight shock on the 29th, $1^h\ 50^m$ p. m., which was neither registered nor felt in San Jose.

# NOTES AND EXTRACTS.

## WEATHER FIXES TRAIN LOADS.

The following is from the Pittsburg Dispatch of recent date:

There is a closer relation between the Weather Bureau and the operation of freight trains than is generally known. On the Pennsylvania lines, and in reference to train movements from Pittsburg to the West and Northwest, this is particularly the case.

Every day at noon the freight transportation department of the lines receives the weather report for the ensuing twenty-four hours from Observer Cox of Chicago. His district extends from the Rocky Mountains to the line dividing eastern Indiana from Ohio, and his standing for accuracy is such that, in the winter season particularly, the make-up of trains is arranged in accordance with Cox's reports—that is, the hauling capacity of a freight engine is decided upon on receipt of the daily bulletin. To this end four classes are arranged, designated alphabetically. The report being favorable places the engine's load in class A, or full capacity, 1,750 tons. Class B denotes a reasonably good weather report, but limits the locomotive's load to 1,625 tons. Still worse weather means a reduction of the load to 1,475 tons, or 150 tons less than class B. When Mr. Cox announces specially bad weather the order goes out for class D, which means that no engine shall leave Pittsburg for the West with more than 1,225 tons. In this way delays through storms and snowfalls and extreme low temperature are greatly lessened.

In the case of stock trains, class A is not 1,750, but 1,450 tons, and for high class freight running at higher speed than ordinary freight, this class means only 1,525 tons per train, with the same allowance for the three lower classes as is given above.

The load having been established in the office of the superintendent of freight transportation in accordance with the weather report, the order of the superintendent goes out to the trainmasters and thence to the yardmasters, who arrange the engine's load in accordance with instructions. It is doubtful if the United States Weather Bureau finds more practical application anywhere than in operating freight trains out of Pittsburg to the West.