ings, and add eleven more memoirs to the above list, making thirty-six in all, so that the whole constitutes one of the most important recent meteorological publications and gives one a clear impression as to the advanced problems that agitate meteorology at the close of the nineteenth century.

The editorial work, by Professor Angot, has been executed most conscientiously and the pages bear no evidences of the many vexatious annoyances and delays to which he was subjected in the course of the work.

KNUT ANGSTROM ON ATMOSPHERIC ABSORPTION.

While the recent Bulletin G by Prof. F. W. Very, on atmospheric radiation was in press, Prof. Knut Angström of Upsala, was preparing a short paper on the part played by aqueous vapor and carbon dioxid gas in the phenomena of absorption in the earth's atmosphere, which was published in the Annalen der Physik immediately afterwards. In this memoir based on unpublished researches of Dr. J. Koch at Upsala, on the absorption of radiation from heat sources at different temperatures by various depths of gas, Professor Angström approximately determines the influence of a layer of carbon dioxid gas 30 centimeters thick and under a pressure of 780 millimeters, absorbing the radiation from a black body at 100° temperature, and finds that it is about 10 per cent and that it does not change more than four-tenths of one per cent of the original radiation when the pressure is decreased to 520 millimeters. He infers, therefore, that a layer so thick as to be equivalent to that contained in the earth's atmosphere will absorb about 16 per cent of the earth's radiation, and that this absorption will vary very little with any changes in the proportion of carbon dioxid gas in the air. This limitation of the absorption to spectral regions between definite wave lengths is also rendered very probable by Paschen's observations in the Annalen der Physik, volume 51, page 33.

The influence of carbon dioxid gas in absorbing the direct radiation from the sun is more difficult to determine; it certainly absorbs all the broad band designated by the letter Y in the solar spectrum, but this does not amount to more than one-fifth per cent of the total solar radiation.

An attempt is made to determine the absorptive effect of aqueous vapor on the total solar radiation. By passing a smooth curve tangent to the maxima of the energy curve of the solar spectrum between 0.3 and 4.0 microns, and assuming, what is no doubt true, that the difference between these curves is principally due to the absorption of aqueous vapor, minimum values of 15 and 27 per cent are obtained for this quantity with solar altitudes 32° and 5° 40′, respectively, the pressure of the vapor of water being 3.3 millimeters and relative humidity 70 per cent at noon. An additive correction of 5 per cent is made to allow for the absorption of solar rays of greater wave length than 4 microns, giving 20 and 32 per cent, respectively, which are considered to be maximum values of the aqueous absorptions under the given conditions. But since the total radiation had diminished from 1.320 to 0.627 small calories, or by more than 50 per cent, between the high-sun and the low-sun measurements, and as a considerable part of this additional loss is undoubtedly to be attributed to the vapor of water, one or the other of the maximum values assigned for the absorption of total solar radiation by aqueous vapor may possibly need to be doubled.

The remainder of Angström's paper is devoted to a destructive criticism of the theories put forth by the Swedish chemist, S. Arrhenius, in which the total absorption of CO_2 is quite inadmissibly inferred from data which include the combined absorption of CO_2 and the vapor of water. On these incorrect premises Arrhenius has founded an hypothesis as to the cause of the Ice Age, attributing it to variation in the amount of atmospheric CO_2. The geologists who have adopted Arrhenius's views should recall that his hypothesis evidently fails in the light of present knowledge of the absorptive powers of carbon dioxid.

Undoubtedly the aqueous vapor powerfully absorbs the terrestrial radiation, but no quantitative estimates of its effect are made by Professor Angström.

The preceding preliminary statement by Angström is of interest in connection with the very instructive article published by Maurer in the Meteorologische Zeitschrift for May, 1901. A translation of this article will be interesting, not only on account of its high appreciation of Professor Very's work, but because of its instructive presentation of the present state of our knowledge of the obscure but very important details of atmospheric radiation and absorption.

On the basis of Very's quantitative determinations of aqueous absorption in certain special cases, Maurer adopts the value of 75 per cent for the atmospheric absorption of radiation from a terrestrial surface at the freezing point, obtaining thereby the further estimate of 0.052 small calories per minute as the radiation from such a surface toward space. But, as is evident from the variation in the aqueous absorptive power, which Professor Very has demonstrated and which he attributes to the varying complexity of the vaporous molecules, depending upon the prevailing relative humidity, such estimates must be subject to a wide range of uncertainty.

A more exhaustive report on the general subject of atmospheric absorption will be published in a few months in the MONTHLY WEATHER REVIEW.—*F. W. V.; C. A.*

ERRATA.

MONTHLY WEATHER REVIEW for April, 1901, page 176, column 2, interchange lines 24 and 26 from the bottom.

MONTHLY WEATHER REVIEW for May, 1901, page 212. In table of meteorological observations at Honolulu, make max. sea-level pressure for the 12th read, "30.11", instead of "29.11."

MONTHLY WEATHER REVIEW for May, 1901, page 213, column 1, line 4, in the expression "thirty-four of new forms," omit the word "of." Page 211, rainfall table for Hawaii, column 2, heading for "elevation," read "elevation approx." Page 211, table of rainfall data for Hawaii, column 2, for "Kukuinaele," read "Kukuihaele;" for "Kohola," read "Kohala;" for "Hawi Mill," read "Hawi;" for "Kipahullai," read "Kipahulu;" for "Keomoku," read "Keomuku;" Manoa, "Woodlawn D" should read "Woodlawn Dairy;" for "Maakiki" (reservoir), read "Makiki," and add approximate elevation "150 feet;" Nuuanu (electric station), elevation, for "450," read "405" feet; for "Waimamalo," read "Waimanalo;" for "Wahiawa, Mount," read "Waiawa, Mountain;" Olowalu, annual normal rainfall, add "8.80" inches; transfer annual normal rainfall "34.80" inches from "Haiku" to "Kula (Erehwon)." Same page, column 1, line 9 from bottom, highest mean temperature at sea level, for "84," read "86."

Page 212, column 1, line 6, extremes of precipitation, for "0.07 at Niulii," read "0.02 at Awini;" same line, for "Wahiawi, Mount Kauai," read "Wahhiawa Mountain on Kauai Island. Same page, column 1, line 4 from bottom, barometer, greatest 24-hour change, for "0.9," read "0.09;" column 2, line 7, Kapiolani Park, for "—," read "no report;" line 29, average temperatures, Oahu, add "mean 75.4°."

Page 219, "Hail Insurance," column 2, line 13, "167,340,000," should read "167,270,400;" line 16, for "1,000,000," read "5,000,000" tons; line 20, for "5,000,000 foot-tons," read "five thousand million;" lines 30 and 31, "by an engine of 1,000,000 horse-power, and therefore represents the work," to be struck out, and line 31, "1,000,000," should read "5,000,000;" line 33, "local winds," should read "forces of evaporation and diffusion."