

NOTES FROM THE OCTOBER REPORTS OF THE  
CLIMATE AND CROP SECTIONS.

## ALASKA.

Although no printed general report has yet been received from the Alaska section of the Climate and Crop Service, which is now being established by Mr. H. L. Ball, section director, yet, as we have just received Mr. Ball's abstract of Daily Journal for the months June-October, we think the following extracts will be acceptable. (Mr. Ball notes that mean local time is used temporarily at this station.)

*June.*—Considerable delay has occurred in opening the station for the reason that no suitable quarters could be secured until June 12, when a house known as the "Swanson Cottage," situated on the road to the Russian cemetery, and immediately north of Sitka, was secured for one month. Owing to the uncertainty of stay, the instruments were not erected until definite arrangements were concluded for the lease of the buildings and ground for the six months beginning July 1, 1898. This was consummated June 12. Immediately thereafter the office supplies were moved and preparations made for the erection of the instrument shelters, platforms, and the installation of the instruments. The small, insecure roof of the cottage forbade the erection thereon of a platform, consequently a platform 18 by 18 feet, and 6 feet high, was erected over sod. On this were placed anemometer and wind vane supports and the sunshine recorder. The instrument shelter was erected over sod and 25 feet distant from the cottage, with thermometers 5.7 feet above sod. The rain-gauge is 20 feet from the shelter and 45 feet from building, and excellently exposed—free from obstruction of any kind. Height of barometer cistern above mean sea level, 89.3 feet. A plan of building, grounds, instruments, and field notes of surveyor were prepared on September 28, 1898, and forwarded to the Central Office. The Sitka local Weather Bureau Office was opened June 15.

The first part of this month was bright and pleasant, in fact an extraordinarily warm and dry spell continued for nearly two weeks, the 8th, 9th, and 10th, being exceedingly warm. The observer noted temperatures of 86° on the 10th in several parts of the town from good thermometers. This period of sunshine and warmth was exceedingly beneficial to the gardens planted by the Agricultural Experiment Station, which were somewhat late in planting.

*July.*—On the 7th, Mr. H. L. Ball left for western Alaska and the observations were kept up in his absence by Mrs. C. C. Georgeson as voluntary observer (Mrs. Georgeson is the wife of Professor Georgeson, Director of the Agricultural Experiment Station).

*August.*—Mr. Ball still absent from Sitka.

*September.*—Mr. Ball returned on the 20th. Cloudy and rainy during the rest of the month. The first snow appeared on the mountain tops on the 23d. Heavy squalls and two flashes of lightning with distant thunder on the 25th. These squalls passed from south to north and were preceded by light dashes of hail.

*October.*—Heavy frosts on the 1st. Minimum temperature, 23°. The day was generally clear, bright, and quiet. Heavy frost on the 2d, minimum temperature, 34°. Killing frost on the 3d with a wonderfully clear and bright morning, minimum temperature, 33°. Ground frozen at the surface on the 4th. Minimum temperature, 28°. Frequent squalls on the 20th passing along the coast from southwest to northwest; a single flash of lightning and sharp peal of thunder.

Following are the means and extremes of temperature and precipitation and other data illustrating the weather at Sitka during 1898:

*June.*—Observations were made during the last half of the month only. Maximum temperature, 69°, on the 17th; mini-

mum, 38°, on the 26th; mean for fifteen days, 54°. The total precipitation was 1.37 inch; days with 0.01 inch or more of rain, 9.

*July.*—Maximum temperature, 68°, on the 8th; minimum, 43°, on the 13th; mean, 54.4°. Total precipitation, 3.97 inches; days with rain, 23; greatest fall in twenty-four hours, 1.05 inch, on the 23d. Rain fell on every day from the 18th to the 28th, both inclusive.

*August.*—Maximum temperature, 78°, on the 10th; minimum, 42°, on the 28th; mean, 56°. Total rainfall, 3.92 inches; days with rain, 12; greatest number of consecutive days with rain, 5; without, 12; greatest amount in twenty-four hours, 1.70 inch. August was the warmest month of the season.

*September.*—Maximum temperature, 74°, on the 10th; minimum, 33°, on the 19th; mean, 52°. Total precipitation, 5.98 inches, on sixteen days; greatest number of consecutive days with rain, 7; without, 6; greatest fall in twenty-four hours, 0.66 inch.

*October.*—Highest sea-level pressure, not reduced to standard gravity, 30.32 inches, on the 5th; lowest, 29.10, on the 13th; mean, 29.73. The reduction for gravity for latitude 57° is +0.03 inch. Maximum temperature, 58°, on the 1st; lowest, 28°, on the 4th; mean, 44.4°. Total precipitation, 8.22 inches; days with precipitation, 23; greatest consecutive number of days with precipitation, 10; without, 5; greatest fall in 24 hours, 1.40 inch. A trace of snow fell on the 30th.

## ARIZONA.

Attention is called to the meeting of the State Agricultural Association; Mr. Burns, section director, has secured for the voluntary observers in his State the right to a commission from the Governor appointing them as delegates to the Farmers' National Congress, to be held at Fort Worth, Tex., December 6-14. As he correctly states, "The voluntary observers and crop correspondents represent in the highest sense the best agricultural interests of this Territory."

## CALIFORNIA.

Mr. W. H. Hammon has increased the size of his monthly report, and among other things admitted a very seasonable article by Mr. Marsden Manson on the seasonal and monthly rainfall at San Francisco, 1849-1898. The rainfall is given in full for every month and year, although there is no precise information as to a possible systematic difference between the rain gauge, 1849-1870, kept by Mr. Tennent, and that kept by the Signal Service and Weather Bureau since that date. Mr. Manson concludes that—

It is entirely within the range of scientific investigation to determine in general what the conditions are, and to foretell within reasonable limits the probable amount of the seasonal rainfall.

## COLORADO.

The average temperature for October was unusually low, viz, 3.2° below the normal. High areas in the north exerted a controlling influence. The mean local pressure was normal, but the barometric range was very large, due to the very low pressure of October 1. Mr. F. H. Brandenburg, section director, says:

It is probable that the extensive fires in the mountain region and Colorado Springs contributed largely to the development of the unusually low pressure.

It occurs to the Editor that these fires lasted from the middle of September to the middle of October, whereas the lowest pressure did not last all this time. The fires did immense damage to the forests and the interests of Colorado, but we do not see how they could have produced low barometer on the 1st at Denver. All efforts to show that rain or heat or aqueous vapor directly cause low pressures have failed to

stand the criticism of those who best understand mechanics and physics, and we fear the same fate will befall the effort to demonstrate the influence of forest fires. Meteorologists accept Ferrel's law that in the Northern Hemisphere the movement of the air as wind produces a low pressure on the left-hand side and a high pressure on the right-hand side—that is to say, the wind while trying to move in a straight line along the earth's surface and revolving around the earth's axis once a day, finds itself continually pushing toward the right, and if there is air on that side it pushes against that and produces a high pressure on the right-hand side, but leaves a low pressure on the left. This is the ordinary mechanism by which areas of low pressure are formed in the Northern Hemisphere, no matter whether they are as small as the center of a tornado or as large as our ordinary lows.

## FLORIDA.

The section director, Mr. Mitchell, has drawn and printed by the chalk-plate process, the chart of isobars for 8 a. m., October 2, illustrating the severe hurricane of that date. This appears to be one of the few times that any one of the section reports has ventured upon illustrations other than the two regular charts of isotherms and precipitation. We congratulate Mr. Mitchell on his enterprise. Now that such illustrations are shown to be possible, we hope that many of the interesting phenomena and subjects will be illustrated in the respective section reports. The Editor is told that diagrams of insects injurious to agriculture and sketches of arrangements for making smudges to protect from frost have already been published in this manner and there seems no limit to the useful applications of the chalk-plate process.

## GEORGIA.

The following paragraph, by Section Director Marbury, catches the eye :

It is the general impression that owing to the low price of cotton, farmers are planning to devote a larger area than usual to small grains.

The Editor has spent much time in studying the supposed relations of the climate to the crop. The total crop as harvested, and as presented in the statistics, depends largely upon the anticipated market price, so that if high prices are anticipated big crops will be raised. Even the yield per acre is also subject to the influence of prices, for the planter spends more money in fertilizers and cultivation and works enthusiastically for a larger yield per acre when he anticipates that high prices will repay the labor. The discouraged farmer has no energy, puts forth no effort, and accepts small crops. The yield per acre is, therefore, by no means an index to the influence of climate, but is very largely affected by the *morale* of the farmer. A big crop is usually the result of intellectual energy in taking advantage of a favorable climate. In the irrigating States a big crop is especially due to human energy and intellect.

We notice that the observer at Marshallville had a heavy "equinoctial gale" on the 2d. This is the first equinoctial that has appeared in the MONTHLY WEATHER REVIEW for a long time. As it has been clearly shown that the equinoxes (March 21 and September 21) have nothing to do with storms on those dates, we can not see why the name should be applied to a gale of October 2.

## IOWA.

The October number of the Iowa Review contains some interesting statistics relative to the growth of Indian corn or maize, by Mr. E. R. Hodson, who is, we presume, a resident of Iowa. In order to learn something about the rate of growth, the height of the corn was measured at certain periods, while for other cases the averages are given, to show the influence of temperature and moisture on different classes

of corn, viz, sweet, dent, pop, and flint, as distinguished from their influence on specific individual plants. In general, the author concludes that "the period of greatest growth is from June 26 to July 16, when the date of planting is May 9." Although during that period the rainfall is very low, yet the soil is moist, owing to heavy rainfall early in the season; the temperature is high, and, as the corn is well developed, therefore the growth is rapid. In the next period, July 16 to 26, the rainfall still continues low and the temperature high; but we notice a decrease in growth; the decrease of moisture has commenced to take effect.

During the first period of growth, May 20 to May 30, the conditions were favorable; corn had a good start and ought to have grown rapidly during the next period, May 30 to June 11, but, owing to the excessive moisture, the rainfall being almost half an inch per day, the growth was not so rapid.

In the second part of Mr. Hodson's paper he does not—so far as the Editor can ascertain—make out a very clear case as to the influence of temperature and moisture either of the air or of the soil upon the germination and growth of the corn plant. In fact, as the Editor has given considerable attention to the study of climates and the growth of our crop plants, he may, with considerable assurance, say that the growth of a plant is altogether too complex a phenomenon to allow us to hope that we can settle such questions by means of observations made in the open air. The influence of the moisture and temperature of the air depends upon the sunshine and the wind. The influence of the air alone, without wind or sunshine, can easily be seen if we cover up a plant, as when a straw mulching is heaped up over an asparagus bed. The corn could not come to perfection without the action of the sunshine upon the green leaves, and this action depends upon the amount of cloudiness or the hazy condition of the sky. But the wind also comes in as a powerful influence in modifying the action of the sunlight upon the plant. If one wishes to determine with any accuracy the influence of any special meteorological condition upon the plant or the crop, he must raise the plant in a room within which all the many conditions that influence the plant may be entirely under his control. Every effort to establish a definite relation between the climate of any locality and the crops that are raised therein has simply resulted in showing that under natural conditions some sort of crop will be attained, no matter how adverse, but that no specific percentages can be assigned as representing the influence of each individual condition.

## KENTUCKY.

Mr. H. B. Hersey, formerly section director for New Mexico, having taken a leave of absence in order to serve in the recent Spanish War as major in the first U. S. Volunteer Cavalry, better known as the "Rough Riders," returned to Santa Fe to resume his work, but had scarcely done so before he was assigned to duty at Louisville, Ky. Major Hersey graduated from Norwich University, Vermont, in the class of 1885, and has not only shown a great deal of energy in Weather Bureau work at several stations, but also became, during his five years residence in New Mexico, a prominent and useful citizen.

## LOUISIANA.

Mr. Alexander McAdie gives much prominence in the October REVIEW to the subject of frost and, especially, those local features that interest planters. Among the many excellent paragraphs in his article we quote several that bring out a feature not often dwelt upon in works on meteorology.

Primarily, the formation of frost is a problem in air drainage. \* \* \* With the cooling of the air near the ground there is a change in its density; the warmer, lighter air and vapor give place to the colder and heavier layers. This explains why in valleys and depressed places we have frost, while on the hillsides near by there is often little or none.

\* \* \* That frost is essentially a problem in air drainage, was shown by a survey of the citrus fruit belt of southern California made in March of this year by the Los Angeles Times. Plotting the frost streaks and belts with the topography, a close relationship was found to exist. Even on seemingly level tracks the presence and absence of frost streaks can be accounted for by remembering that there are slow currents in the apparently quiet air. In a future article, in discussing the methods of fighting frost, we shall show how the air may be artificially put in motion and the currents made to help in the prevention of frost.

Tables are given showing the first and last frosts, and snowfalls at New Orleans, also the frosts and ice at St. James sugar refinery in St. James Parish, about 50 miles west of New Orleans.

A quotation from the Louisiana Planter, from an unnamed correspondent, shows, according to Mr. McAdie, that—

As a rule, years of heavy rainfall have not been years of large crops. The most satisfactory crop comes with the proper distribution of rainfall. The total amount, if well distributed, may even be much below an average rainfall and still the yield may be large. According to this correspondent, the year 1880 had so much rain throughout the grinding season that the cane fields were ruined by the carts in hauling the cane; it was the worst season for delivering a cane crop ever seen by the oldest planters. \* \* \* Enormous quantities of cane were left in the fields.

The whole of this section report shows a careful attention to the needs of the planters and an earnest study of meteorological conditions, such as has long been a *desideratum* for Louisiana.

#### MARYLAND AND DELAWARE.

Mr. F. J. Walz gives a complete copy of the program of the Omaha Convention and an appreciative paragraph relative to the good work done there.

#### MICHIGAN.

Mr. C. F. Schneider also expresses his satisfaction with the Omaha Convention. With regard to the climate of the month, he states that practically no snow fell until October 26, and also that killing frosts did not occur until that date. He notes that the leaves on most of the hard wood trees were fully matured and dropped off without the help of frost.

It is quite popularly supposed that the brilliant colors of American forests are due to a touch of frost, but closer study has long shown that a frost at the surface of the ground, or in the low valleys, is not a frost on the tree tops or the hill tops, and that the colors of the leaves are as truly due to the ripening process as are the delicate colors of the apple or the peach.

#### MINNESOTA.

Mr. T. S. Outram, section director, gives a generous summary of the results of experiments in feeding stock, as made at the Minnesota Agricultural College.

The Editor has no means of knowing how many of the section directors receive regularly the reports and bulletins of the agricultural experiment stations of colleges in their respective States, but would earnestly urge those who do not receive these to make application for them, as they give the agricultural data needed as the basis for studies into the relation between the climatological and the agricultural interests. He, himself, has found these bulletins and reports a great stimulus and help in studying these important questions.

#### MISSISSIPPI.

Mr. W. T. Blythe, section director, was one of the officials, who after making every preparation to attend the Omaha Convention was prevented by quarantine regulations. We sympathize with him in his disappointment; but, fortunately, the quarantine does not stop the interchange of letters and printed matter, so that the good work done at Omaha will eventually find its way down the river to Vicksburg.

The October report gives an account of a waterspout that formed about three-quarters of a mile off the Gulf coast, opposite Bay St. Louis. As it approached the shore it rose into the air and moved inland in the form of a whirlwind. Its path could be easily followed for a mile or so by the leaves and small branches that it carried up with it. Its whirling winds seem to have increased in violence as soon as the waterspout struck the main land.

#### MISSOURI.

Mr. A. E. Hackett, publishes quite an interesting account of the remarkable hailstorm of September 5 in Nodaway County, and shows an enterprising spirit in making his report doubly interesting to his correspondents by including some photo-gravures, or half-tone plates illustrating the storm.

#### MONTANA.

Attention is called by Mr. E. J. Glass to the meteors of November 13-15. The meteors that are to be seen on almost any night shooting among the stars are now classified as either sporadic or periodic. Quite an appreciable percentage of the whole belong to the periodic, that is to say, they are always moving toward or from well-defined points in the sky, and are called groups, such as the Leonids which are always moving from a point in or near the Constellation Leo or Andromeda, because they are moving from a point in or near the Constellation Andromeda. The meteors belonging to a group of this kind may be seen on every night of the year, but are almost certain to be especially frequent on certain nights of certain years. Thus, the Leonids are numerous in the middle of November, and were observed to be especially numerous on November 11-14 of 1866 and 1833 and 1800, and so on backward at intervals of thirty-three years to some time long before the Christian era. It has in fact been shown that these meteors are a swarm of small objects representing the debris of a larger one that must have appeared as a comet at one time, if not even as a planet. The swarm pursues a regular path around the sun, which intersects the path of the earth in such a way that the latter shoots through the swarm of meteors about November 12. But the path of the stream of meteors is apparently not uniformly filled with these small bodies, so that many meteoric showers, due to the Leonids, are but feeble displays, while in all cases the brightest displays are only seen over a small portion of the earth's surface; in the present year, 1898, nothing at all brilliant was seen either in America or Europe.

#### NEBRASKA.

Mr. C. A. Loveland gives a rather full review of the crop season with many details as to the influence of freezing and snow, rain and sunshine, on the progress of the crop plants during the growing season. On the whole the weather seems to have been exceptionally favorable although since the crops were gathered it has been unusually severe.

#### NEVADA.

Mr. R. F. Young, section director, states that there have been but five Octobers in the past nineteen years in which Carson City and Winnemucca had greater precipitation and the average for the State is little less than half the usual amount. In fact, the precipitation for the winter 1897-98 was but half the normal, and, in general, during the whole crop season it has been deficient. Mr. Young says:

That as yet water storage is the exception in Nevada, farmers depend upon the current supply in mountain streams for irrigation. These streams are fed by the snow which accumulates on the mountains principally in the months of December, January, and February, hence the precipitation during these months is of greater importance than that during any other period of the year.

## NEW ENGLAND.

Mr. J. W. Smith states that the mean temperature was considerably above the normal, having been exceeded but twice in the past ten years. The precipitation was large, having been exceeded but once in the past ten years. Despite the copious rains the month was favorable for late farming operations; the pastures and meadows are still green and capable of sustaining stock for some time. Several instances of garden flowers blossoming freely until the end of the month have been noted. Mount Washington was well covered with snow on the 16th.

## NEW JERSEY.

Mr. E. W. McGann, in a summary of the crop conditions, states that the season on the whole may be considered a profitable one to all producers of vegetables, grain, and grass, but unproductive to orchard and fruit interests of the State.

## NEW MEXICO.

Mr. R. M. Hardinge, recently appointed section director for New Mexico, gives an excellent selection on hot waves from an article by the Chief of the Weather Bureau. We have in our experience seen hot waves pass over New Mexico to Texas and Louisiana, and then spread over nearly all of the Atlantic States. Possibly, Mr. Hardinge may be able to give us some special observations of such a hot wave if one should appear next summer. Meanwhile, however, we fear that New Mexico, like Texas and Louisiana, must have suffered from the cold wave of the first week of December, 1898.

## NORTH CAROLINA.

Mr. C. F. von Herrmann, in reviewing the crop season, says that it began very favorably in February and March, and after an unfavorably cool April and a normal favorable May, and a variable June, entered upon a showery period in July which stimulated the green or grassy condition too much, and resulted in a deterioration during August and the first part of September. Unfortunate rains fell in the latter part of September, but still the end of the season was quite as satisfactory, as October weather was very favorable. The remarkable feature of the weather for October was the heavy rainfall on the eastern slope of the Blue Ridge in the western portion of the State. The first snow was seen on the Grandfather Mountains on the 23d and 27th.

As we follow the ups and downs of the relation between the crops and the weather, one can but be struck with the infinite complexity of the relation between the climate and crop and the difficulty of locating the special climatic influence that may have produced a good or a poor crop in any specific year and State.

## OHIO.

Mr. J. Warren Smith publishes a very appropriate note on the difference between hail and sleet, which will help observers to use the proper term. Hail is a summer phenomenon and usually accompanied by thunder and lightning and temperature above freezing. Sleet is a winter phenomenon; it is made up of small transparent drops of ice, apparently formed by the freezing of raindrops as they fall through the lower cold air. Hail is generally opaque, because made up of concentric layers of clear ice and snowy ice.

## OREGON.

Besides a number of personal notes, Mr. B. S. Pague acknowledges the receipt, at his office, of the volume of reports of the observatory at Hongkong, China, and several pleasant notices of the activity of the Oregon section. It is pleasant to see this and the California sections entering into intimate relations with the meteorologists far to the westward. The general circulation of the atmosphere over the ocean is so

simple and regular that it may well be true that the phenomena on the coasts of China and Japan will be found to have some connection with that a month later on the western coast of North America.

## PENNSYLVANIA.

Mr. T. F. Townsend continues his quotation from Professor Roddy on weather forecasts and health. It appears that the weather predictions of the Weather Bureau afford the people a most reliable guide as to the clothing necessary to protect against sudden changes. We all desire the greatest personal comfort, and we secure this by careful attention to the efficiency of clothing under variable weather conditions. A large field is open for investigation as to the relation of clothing to the temperature and the comfort of the body.

## SOUTH CAROLINA.

Mr. J. W. Bauer takes pleasure in announcing that hereafter the "monthly bulletins" (reports?) of the South Carolina section will be issued in the standard printed form. His first number is excellent. In an appreciative article on the value of the work of the voluntary observers he adds:

But the observations have an important scientific value as well. \* \* \* In the scientific study of the weather and the climate a long record becomes invaluable, and it is gratifying that the data is now issued in a manner worthy of its importance and convenient for file and future reference.

## SOUTH DAKOTA.

Mr. S. W. Glenn, in recounting the general climatic conditions of South Dakota, says—

In general the winter precipitation is comparatively slight, so that the central and western portions of the State are well adapted to raising live stock on an extensive scale. During the crop season the average precipitation compares favorably with neighboring States. \* \* \* The researches of the United States Weather Bureau do not indicate that settlement and cultivation of the soil have tended to increase the average annual precipitation. \* \* \* The successful farmers are men who have given their attention to diversified farming. After sixteen years of study, I think that the principal source of prosperity for the farmers in this State will be the conversion of her highly nutritious and abundant native grasses into money through the staple mediums of butter, cheese, and meat.

## TENNESSEE.

Mr. H. C. Bate, in reviewing the crop season, says that it opened unfavorably, since the early warm, dry weather favored premature planting and germination. Consequently the first week of April, with frosty weather, gave a serious blow to the expectations and forced the farmer to plant over again. By the close of April much of the lost ground was regained. May was unfavorably wet and cool. June brought a severe drought, notwithstanding which a splendid crop of winter wheat was harvested. The rest of the season was troubled mostly by rain, although the fall crops were generally good.

## TEXAS.

Mr. I. M. Cline reports that the weather during October was dry and exceptionally favorable for picking cotton, but high winds blew a great deal out of the bolls.

## UTAH.

Mr. J. H. Smith publishes his usual complete tables of data and says that the mild weather of the month was favorable to farming interests. The Utah section still uses the milleograph process, but we believe that arrangements will be made by which this and all other section reports will be printed from type on the regular quarto page.

## VIRGINIA.

Mr. E. A. Evans states that the month presented exceptionally favorable conditions for the growth and germination of crops sown in the fall, but was too rainy to allow additional sowing or planting. Mr Evans's map of the rainfall is de-

erving of commendation as having been engraved with excellent taste and printed in colors that are quite harmonious to the eye. His heavy black lines are especially impressive.

## WASHINGTON.

Mr. G. N. Salisbury gives an extract from the work of Reverend Benito Viñes on the Laws of the West Indian Hurricanes, especially that part expressing his conclusion that the hurricanes are transported by the general upper current. It does not at first thought occur to one that a paper on the West Indian hurricanes would be especially interesting to the voluntary observers in Washington, but upon second thought one will see that the importance of the upper currents is thus brought to their attention, and it is greatly to be hoped that these and all other voluntary observers will pay careful attention to the exact direction of motion of the highest cirrus clouds. This is not required as an item of regular climatological observation by the Weather Bureau, but those interested in meteorology will fully appreciate its importance. Every regular station of the Weather Bureau records this datum as an important item in dynamic meteorology, and its importance was especially dwelt upon by Espy in his very

earliest circulars to the Smithsonian observers of fifty years ago. Climatological work began at an early date in this country, but the cloud observations for meteorological work were first called for when Espy, Redfield, and Loomis began their determined attack upon the problem of storm development and storm movement.

## WISCONSIN.

Mr. W. M. Wilson, instead of trusting himself to comment on the Weather Bureau Convention at Omaha, has judiciously published some very interesting remarks by Mr. E. B. Calvert:

It was the first meeting of this kind, representing the service as a whole. \* \* \* Enthusiasm reigned supreme. \* \* \* Each seemed to realize that his work was in common with that of his colleagues; that all were striving toward one object, the perfection of the utilitarian value of the service.

## WYOMING.

Mr. W. S. Palmer presents us, for the first time, with the Wyoming report in print. Wyoming has now about thirty voluntary observers, and the number will doubtless rapidly increase now that each receives these well printed monthly reports.

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**METEOROLOGICAL TABLES AND CHARTS.**

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

For text descriptive of tables and charts see page 366 of REVIEW for August, 1898.

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