J. R. Sage, in the Monthly Review of the Iowa Weather and Crop Service for October, says:

The board of control is composed of William Bullock Clark, director, representing the Johns Hopkins University; Milton Whitney, secretary and treasurer, representing the State Agricultural College, and Ferdinand J. Walz, meteorologist, representing the United States Weather Bureau. By means of a liberal State appropriation to cover necessary expenses, and a wisely devised system of cooperation, these three great scientific and educational forces are doing a great work for the people of that commonwealth. * * * * * *

In the production of this great work the Maryland Weather Service has taken the lead of all similar auxiliary services in the Union, demonstrating the value of cooperation of the State with the National Bureau in the dissemination of scientific and practical knowledge among the people. Every State in the Union may wisely follow that lead by establishing some system of cooperation whereby every section may enjoy the full measure of benefits to be derived from the generous helpfulness of the Government.

Mr. Alexander McAdie, in the October report of the California section, says:

Maryland now enjoys the result of a well-considered plan, worked out with care by competent laborers. * * * * *

It is clearly shown in a volume of this character that a knowledge of the climatology of a country is of great practical value to the merchant, engineer, the doctor, and, above all, the farmer. What such information is worth on the Pacific coast let agriculturist, miner, stockman, and engineer tell. Particularly at this time, when the Pacific seems destined to become the great connecting link between the civilizations of the new and old worlds, is it important that we should have climatic information complete as knowledge, skill, and means can afford. Meteorology may be, as sometimes stated, "the border land where physics, chemistry, and geology meet;" but climatology in the broadest sense embraces all the applied sciences. It weaves together many separate strands into a knowledge of the controlling factors of life; not only the life of an individual, a community, or a nation, but even of continents and worlds. A study of the climatic data of the Pacific coast as comprehensive as this work which issues from Maryland would be the starting point in the solution of the problems of climatic evolution which are discernible on the Pacific coast perhaps in a more marked degree than elsewhere.

Mr. R. DeC. Ward, in Science for December 1, says:

A new era has opened for climatology in this country. * * * The present volume is decidedly "*bahn-brechend.*"

THE DIRECTOR OF THE IOWA WEATHER AND CROP SERVICE.

We quote the following from the October report of the Iowa Weather and Crop Service. As is well known this service, like that of Maryland and some other States, has an independent appropriation of its own, and its monthly review has been a most valuable contribution not only to scientific literature, but especially to the popular literature of this subject. Its trenchant attacks on errors and instructive articles and practical suggestions on matters of daily importance have made the journal and its editor well known throughout the country. We welcome him as a valuable addition to the corps of the Weather Bureau, with which he has so long been in hearty cooperation.

By a special order of the President the director of the Iowa Weather and Crop Service was recently brought into the classified service, and was appointed by Secretary Wilson a section director of the Climate and Crop Service of the United States Weather Bureau, said appointment taking effect October 1, 1899. This honor is most highly appreciated because of the fact that it came without personal solicitation or political influence, accompanied by very pleasant messages from the Secretary of Agriculture and the Chief of the Weather Bureau, commendatory of the work that has been done in Iowa during the past ten years. This appointment does not imply any change in the existing system of cooperation of the United States Weather Bureau and the Iowa Weather and Crop Service, except that it may enlarge its scope and make the bond of union closer and more effective for good results. It is certain that the results achieved during the past decade have been more valuable than could have been secured without such cooperation, though justice requires the statement that the National Weather Bureau has been the major factor in this joint enterprise. The State, through its moderate appropriation, has undertaken to supplement the Government along practical lines, thereby securing a larger measure of the benefits of scientific investigation, and promoting a general knowledge of the climatology of this great agricultural section. How well this beneficent end has been attained the people of Iowa may be allowed to judge.

RAINFALL AND RIVERS IN IDAHO.

In his October report of the Idaho Section, Mr. S. M. Blandford, Section Director, gives some account of the discharges of the rivers during 1898. He says:

All of the rivers of Idaho that have received the attention of the Division of Hydrography have their source in the mountains of Idaho, except the Snake River. The drainage area of the Malade, Little Wood, Boise, and Weiser rivers is 7,580 miles, and with the exception of the Payette, embraces all of the important rivers that flow into the Snake from the north. * * * * * *

The normal precipitation in Idaho ranges from 40.30 to 8.41 inches. In Shoshone County the annual precipitation, 40.30 inches, is equivalent to that of southern Maryland, and the precipitation of Kootenal and Latah counties, which ranges from 22 to 25 inches, is sufficient for the needs of vegetation. In Fremont and Bear Lake counties, and the eastern sections of each of the southeastern counties, grains and grasses mature on unirrigated lands during years of normal precipitation with an equitable distribution of rainfall during the crop growing season. However, more than seven-tenths of the area of Idaho is semiarid. It is in the semiarid sections where the annual precipitation ranges from 9 to 15 inches over the valleys and plains, to 20 and 27 inches near the summit of the mountains, that the Division of Hydrography has made river discharge measurements. During 1898 the annual precipitation over the drainage area of the rivers in the above table [omitted] was considerably less than the normal, the deficiency ranging from 1 to 5 inches.

THE CENTRAL OFFICE OF THE ILLINOIS SECTION.

It is announced that the central office of the Illinois Section of the Climate and Crop Service was removed on November 25 from Chicago to the office of the United States Weather Bureau at Springfield, Ill. The Section still continues in charge of Mr. Charles E. Linney, Section Director. In general, it is found best that section centers should be at the capitals of the respective States, and we doubt not that in his new location, which well represents the climate and the agricultural interests of Illinois, Mr. Linney will come into those intimate relations with the farmers and the legislators that were not easily attained when he was located within the influence of the rush of commercial business in Chicago. By thus establishing two meteorological centers within the State, the light of knowledge will, doubtless, be more uniformly diffused.

IRRIGATION BY WIRE.

In the continuation of the correspondence published on page 301 of the MONTHLY WEATHER REVIEW for July, Mr. Arthur Betts writes, under date of October 17, as follows:

In reference to the statement that "the 0.13 inch of dewfall was more than twelve times that amount by wire (1.58 inch)" bear in mind that I did not catch the one forty-ninth part of the drip from the wire. The largest part of the drip was wasted on the ground beneath. To have caught it all would have required a basin 7 feet square and 1.58 inch deep. A closer network of wire would have increased the amount of drip. Perpendicular wire would not answer. A horizontal wire 1 rod long would irrigate every inch of the rod, but when hanging vertically, only a little spot.

The following extracts are taken from a letter addressed to Mr. Arthur Betts by Mr. A. D. Elmer of Northfield, Mass., and communicated by the former to the Editor for publication in the MONTHLY WEATHER REVIEW:

An unusually heavy fog occurred here, at Northfield, Mass., on the night of October 25–26th. Our fog was one of the heaviest I ever knew. At present (October 26) the appearance of the higher stratum of atmosphere is one of dryness; therefore, the humid stratum is on the ground, therefore, as natural, rain must be produced above the ground, it remains for man to produce artificial rain from the fog. About 3 o'clock this morning I was awakened by the noise of drops falling from various leafless trees. There are three rain spouts conducting rain water from the north and west sides of slated roofs into a cistern and each spout was running a stream. After the sun had risen, although the fog had not gone from the surface of the ground, yet the precipitation stopped evidently because the tendency of the air was to rise upward. Therefore, fog rain must be produced on the windward side of the catch or stream. As the fog movement is either up or down and not horizontal, therefore the catching screens should be so placed as to intercept the vertical ascending or descending currents. The ground itself and its attachments, such as vegetation, buildings, etc., intercept, perhaps, one-half of what might be caught, viz, they catch only those particles of fog that are descending. Allowing that Mr. Betts' system of wire screens catches only what a similarly exposed surface in nature catches, it would appear necessary to construct, instead of one, a series of networks from which pipes could be led to the cultivated area, cisterns, etc. As this series would have to extend many feet upward into the air the first cost would be considerable, but when properly painted it should last many years. I may be pardoned for suggesting that by the introduction of electrical currents, some test might be made as to the influence of that agent in attracting and collecting cloud particles into raindrops.

In communicating the above letter, under date of November 11, Mr. Betts adds:

This letter seems to be plain proof that vertical wires will not easily catch the ascending and descending moisture in a fog or dew; the wire must be horizontal. * * * Iowa is an excellent country to experiment in, and March, April, May, September, October, November, are the best months.

The relative efficiency of horizontal and vertical wires must depend principally upon the force of the wind. In the case of the summit of Green Mountain, on the Island of Ascension, there is a steady strong wind, and the cloud particles are caught quite as well by horizontal as by vertical wires, provided they are transverse to the direction of the wind. In the still air of a foggy night in Iowa the wires would doubtless do best when they are horizontal, giving them, however, a slight inclination in order to facilitate the drainage toward a definite spot. In the fogs of the California coast the wires might have any inclination in a vertical plane transverse to the wind. It would be very desirable to investigate the total amount deposited upon a tin or slate roof and the percentage that can be made to run down the rain spouts and become useful for irrigation purposes. In most cases inclined surfaces or troughs of sheet iron or tin would probably be best. Various other suggestions are given in the REVIEWS for 1898, p. 466; 1899, pp. 100, 112, 195.

AURORAS IN TEXAS.

In the Commoner, published at Albion, Tex., September 30, 1899, Mr. D. Lee Slataper, civil engineer, publishes an account of a "rainbow" that occurred about 2:35 a.m., Sunday morning, September 17, at Alvin. It was also seen by others. Mr. Slataper says:

About 1 a.m. a storm was seen approaching from the east, very similar to the "northers" approach, with a complete line extending across the entire heavens. The storm of rain and lightning soon passed over, and the moon was seen about 30° high, in the southwest, while a heavy rain was also falling in the east. Mr. Slataper and several others now observed a complete rainbow, from horizon to horizon, with the center of the bow 45° high. The bow was of blue-gray, with silvery lining, mingled toward the ends with an almost solid purple. Its background consisted of clouds of the blackest tint possible. The colors in the bow seemed to twinkle and then fade for an instant and then reappear as bright as ever.

He desires an explanation of the causes of the change of color, from orange and red to silvery tints with blue and purple linings.

This bow of light is not likely to have been a rainbow due to the feeble light of the moon. It occurred, not only in connection with a local thunderstorm, but also in connection with an extensive aurora borealis, and it is possible that the observer really saw one of the numerous long horizontal beams of light that generally attend the aurora. The beams are nearly straight, but the effect of perspective is to give each one the appearance of an arch. The colors of the aurora borealis have not yet been satisfactorily explained.

FROSTS AND STRAWBERRY CROP.

In the October number of the Minnesota Section Mr. T. S. Outram, Section Director, publishes a letter by Mr. G. J. Kellogg, of Lake Mills, Wis., which is valuable as giving the observations of an experienced man on the actual effects of frost in that locality. Mr. Kellogg says:

A long continued cold east wind is frequently worse in its effect than frost. It will be remembered that in 1897 severe frosts continued up to June 8, and the impression was general that there would be no fruit, but the crop of small fruits was never better. In the season of 1898 there was no frost after May 6, and there was a crop as good as in the previous season, but no better.

The condition of the atmosphere, as regards moisture, has much to do with the effects of frost. If everything is dry at the time of frost there will be little injury, and if a mist comes up before the sun's rays strike the foliage, the injury will be almost nothing, unless ice has formed. * * * * * * * *

Our most severe frosts occur when the nights are dry and still, though there is often a heavy deposit of dew on the ground the same night.

In the spring frosts never occur in cloudy weather, but the blighting east winds may do more damage at that season than the frosts.

With strawberries we find the effect of light frost is greater on the pollen anthers than on the pistils, and that often the pistillate strawberries may become pollenized before the frost occurs and give better returns than the bisexual varieties near them, hence the opinion that the pistillates are greater bearers. There is no doubt that a strawberry producing a great deal of pollen is more or less weakened by the process, but we now have such varieties as the Splendid, Lovett, Wood, Enhance, and Clyde that carry plenty of pollen and still are just as productive as any of the pistillates.

I have known frosts at 45°, but there was no injury till the temperature went below 40°.

There were sixteen days up to May 25 of this year with the temperature ranging below 42°, but there were no frosts to cause injury except on the low grounds, and the outlook for fruit was good, had not the vitality of trees and plants been reduced by the dry root freeze of the winter preceding.

WARM RAINS AND ANGLE WORMS.

It frequently happens that after a warm rain the sidewalks in the city and the fields in the country show a great number of angle worms, or so-called earth worms, crawling about on the surface, and popular ignorance speaks of a "rain of worms" as though they had come down from the clouds. Tornadoes have been known to carry up all the water of a pond and allow the fishes to drop at some distant place, but they generally are found dead. These angle worms are not at all a case of this kind. In the October number of the report of the Michigan Section, Mr. C. F. Schneider, Section Director, gives the views of Darwin, and also the theory of Dr. Kedzie, of the State Agricultural College, as to the reason for the appearance of the angle worms. Darwin says:

The worms can live for several days below water. When the ground is dry they penetrate to a considerable depth and cease to work. Their respiration takes place through the pores of the skin which requires a certain amount of moisture to keep it in an active condition. When the skin dries up the worm dies because its respiratory organs have been closed by contraction.

MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for October, 1899, is based on reports from about 3,024 stations furnished by paid and voluntary observers, classified as follows: regular stations of the Weather Bureau, 170; West Indian service stations, 10; cotton region stations, 127; corn and wheat region stations, 133; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,238; Army post hospital reports, 27; United States Life-Saving Service, 14; Southern Pacific Railway Company, 96; Canadian Meteorological Service, 32; Mexican Telegraphic Service, 20; Mexican voluntary stations, 7. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Senor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Señor A. M. Chaves, Director-General of Mexican Telegraphs; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I Kimball, Superintendent of the United States Life-Saving Service; and Capt. J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

The most important storm of October, 1899, advanced from the west part of the Caribbean Sea along the Atlantic coast of the United States from the 28th to the 31st. For several days preceding the 28th unsettled weather had prevailed over the Greater Antilles and the western Caribbean Sea, and a marked barometric gradient between that region and an area of high barometer over the southeastern part of the United States caused high northeasterly winds over southern Florida, western Cuba, and adjacent waters. During this period Gulf and Atlantic coast shipping interests were advised of the conditions which prevailed, and careful watch was kept for a storm development which, at this season, these conditions favored. The evening reports of the 27th showed the looked-for storm development south of central Cuba, and storm signals were ordered at Key West and Miami, Fla., with the information that the center of the disturbance would probably move northwestward during the next twenty-four hours and cause high northeast winds over southern Florida and western Cuba. Similar advices were telegraphed to all Florida ports. During the 28th the storm signals were extended along the Atlantic coast to Jupiter, Fla., and the Bureau of Navigation, Navy Department, the Philadelphia and New York Maritime Exchanges, and Atlantic and eastern Gulf shipping interests, and also the Colonial Government of the Bahamas, were advised that the Caribbean Sea disturbance was approaching the south coast of central Cuba and that dangerous northeast gales were indicated for the southern Florida and west Cuban coasts, and southeast gales for the east Cuban coasts. The morning of the 29th south Atlantic and east Gulf ports were notified that the storm was moving northward over central Cuba, and in the evening of that day storm signals were ordered as far north as Norfolk, Va., with the information that the storm had advanced to a position east of Key West, Fla., and that during the following day northeast gales would prevail from Virginia southward, and that northeast gales would shift to northwest over the Florida Peninsula. During the 30th the center of disturbance moved northward, and in the evening was central off the Carolina coast. On the morning of the 30th the display of storm signals was extended to Sandy Hook, N. J., and advisory messages regarding the character and course of the storm were sent northward to Boston, Mass. The morning reports of the 31st showed a marked increase in the intensity of this storm, and coast interests along the middle Atlantic and south New England coasts were notified that dangerous northeast gales might be expected. During the northward passage of this storm severe gales were encountered along the south and middle Atlantic and south New England coasts.

In Cuba and Jamaica the feature of the storm was the exceptionally heavy rainfall. In Florida, Georgia, and South Carolina no special damage was caused, although dangerous gales prevailed off the coasts. At Charleston, S. C., the wind