local culture areas, the interrelation of each of these, and of each to outside cultures.

But few specimens have been found in the whole area extending from the central Arctic region to the Columbia River, and from there southward along the coast to the Santa Barbara Islands, thence to the Pueblo region and eastward as far as the mounds of the Mississippi Valley. Literature on the archeology of the area is scanty. That whole region, north to the Arctic, across all the plains towards the east, and the plateaus south throughout Nevada, remains to be explored.

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CURRENT NOTES ON METEOROLOGY.

CYCLONIC DISTRIBUTION OF RAINFALL.

MENTION has several times been made in these columns of the great value of discussions of weather elements, not on the basis of monthly and annual averages, but on that of cyclonic control. A further contribution to such investigations is a report by J. A. Udden, 'On the Cyclonic Distribution of Rainfall' (*Augustana Library Publications,* No. 4, 1905). The method employed is the one familiarly known as the composite portrait method. The general region of a cyclone is divided into twenty-five areas, separated by four concentric circles and by a series of eight radii. The precipitation, wind direction and cloudiness shown on the 8 A.M. weather maps for a series of selected stations were entered in the appropriate divisions, and the results then summarized and charted. The stations are Davenport (Iowa), Amarillo, Dodge City, Wichita, Oklahoma, Helena, Miles City, Leander, Boise City, Detroit and Buffalo. In some cases the observations relate to the year 1899 only; in others the period covers several years.

CLIMATIC NOTES ON THE SAHARA.

Last summer Professor E. F. Gautier, of Algiers, crossed the Sahara between Algeria and the Niger River, being the first explorer to cross this wide part of the desert since Laing was murdered near Timbuktu in 1826.

Gautier says that the Sahara, viewed as a desert, is much less extensive than has generally been believed. The Adrar plateau, from 2,300 to 2,700 feet above sea-level, is not, properly speaking, a waste; and while he was still 360 miles from Gao on the Niger he reached a wide belt of steppe, which is the merging of the Sudan with the Sahara. This steppe region has its rainy season with about six to twelve inches of precipitation every year. This quantity suffices to cover the land with ponds and grass. Animal life is abundant.

Gautier distinguishes between the Tuaregs who ride on camels and those who use horses. The first inhabit the drier regions; the Tuaregs who use horses are on the whole more numerous and live in the steppe region and along the Niger.

The explorer found abundant evidences that this part of the Sahara once had a very large population of the Neolithic period of development. His finds included many arrow-points and axes of polished stone. Even the waste regions were inhabitable until a comparatively recent period. Proofs of this are found in the thousands of drawings upon the rocks, the graves in which, everywhere, the same kinds of implements and other objects were found, and the stones used for grinding grain. These stones show that agriculture was practised here, and that civilization was considerably advanced.

The gradual desiccation of this region advanced from the Sudan. To-day, however, the rain-belt is again extending more and more to the north. Gautier distinguishes these three epochs: the first was marked by dense population; the second by desert conditions, and in the third, or present period, the land is again assuming a steppe-like character. —*Bull. Am. Geogr. Soc.,* Jan., 1906.

METEOROLOGY OF THE SOUTH ATLANTIC OCEAN.

THE Meteorological Committee (London) has published a twelve-page pamphlet on the relation between pressure, temperature and air circulation over the South Atlantic Ocean, this being a summary of the facts set forth on a series of elaborate charts published previously by the hydrographic department of

the British Admiralty. The new pamphlet contains charts which show the variations, the position and the intensity of the anti-cyclonic areas, and their relation to the doldrums, the distribution of gales, fog, etc. Gales reach the South Atlantic by crossing the southern part of South America, or by rounding Cape Horn to the eastward. Fogs are rarely found north of the thirtieth parallel, except near the land on either side of the ocean, but it is increasingly frequent in higher latitudes.—*Nature,* January 11, 1906.

METEOROLOGICAL SERVICES IN SOUTH AMERICA.

THE latest information regarding meteorology in South America may be found in the *Monthly Weather Review* for September, 1905. Previous accounts of the South American meteorological services are those of A. Lawrence Rotch, 'The Meteorological Services of South America,' *American Meteorological Journal,* XI., 1894–95, 187–191, 201–211; and R. DeC. Ward, 'Meteorology in South America,' SCIENCE, N. S., V., 1897, 523–525.

PROTECTING CRANBERRIES FROM FROST.

A CRANBERRY grower at Cameron, Wis. (Mr. A. C. Bennett), protects his cranberries against frost in the following way. The marsh is surrounded by banks twenty-five to thirty-five feet high, with sloping sides. The principal reservoir is northwest of the plantation, and a trout stream is diverted around and outside of the marsh, forming a succession of reservoirs entirely surrounding the latter, from five to thirty rods wide. As the cold air descends from the high surrounding banks it must cross these reservoirs of water and pass over the dams before it can reach the vines.—*Mo. Wea. Rev.,* Oct., 1905.

NOTES.

PROMPTED 'by what has been urged against it by English physicists and others,' and 'by the inconclusive nature of the supposed results obtained by those who approve of it,' J. R. Sutton, of Kimberley, South Africa, has devoted some time to the black bulb thermometer *in vacuo.* His results have been published in *Trans. So. Afr. Philos. Soc.,* XVI., Part 2, Oct., 1905.

THE typhoon of June 30 and July 1, 1905, is discussed in the *Bulletin* of the Philippine Weather Bureau for July, lately received. Curves showing the barometer readings at Aparri and at Santo Domingo (the latter a barograph curve) are given. Students of tropical cyclones will find the frequent discussions of individual typhoons which are published in these *Bulletins* of great interest.

ANOTHER account of a tropical cyclone is a very much belated one of the West Indian hurricane of August 11, 1903, by Maxwell Hall, in the *Monthly Weather Review* for September, 1905. Several sets of barometer readings during the passage are given.

THE rapid progress which is being made in the exploration of the free air is evidenced by the fact that the British *Weekly Weather Report* for January 6 contains, for the first time, observations made during kite ascents during the first week in January.

R. DEC. WARD.

FREDERICK C. PAULMIER.

FREDERICK C. PAULMIER, Ph.D., zoologist to the New York State Museum, died in New York, March 4, in the thirty-third year of his age. Dr. Paulmier was a graduate of Princeton University of the class of 1894 and received the degree of M.S. in 1896. He held a university scholarship in zoology at Columbia in 1896–97, was appointed to a fellowship in 1898–99, was assistant in zoology in 1899–1900 and received the degree of doctor of philosophy in 1900. In the same year he became assistant in zoology at the New York State Museum at Albany, and in 1904 was appointed to the position that he held at the time of his death. During his connection with the museum he published a number of systematic zoological papers including catalogues of the reptiles and batrachians of the state (in conjunction with E. C. Eckel), of the higher crustacea of the region of New York City, and of the squirrels and other rodents of the Adirondacks (now in press). He also published papers on the crab fisheries of Long Island and on the life-history of the edible crab. His most considerable contribu-