

parts of the country. Now weather varies greatly in different parts of the United States. For this reason weather descriptions must be specific, both in time and in place. For example, March is ordinarily a disagreeable month in the central and eastern portions of the United States, whereas on the Pacific Coast it is one of the most delightful months of the year. Moreover, a typical August day in New York is very different from a typical August day in San Francisco. To have a universal appeal among readers, therefore, weather descriptions must be scientifically correct, both in regard to time and to place.

Another suggestion is that the flow of the narrative is often impeded by lengthy weather descriptions. A reader of fiction is interested in the narration of events and the portrayal of character. He is likely to omit whole paragraphs devoted to descriptions of weather. This point is so well illustrated by the preface to Mark Twain's "American Claimant" that the same is repeated herewith:

"No weather will be found in this book. This is an attempt to pull a book through without weather. It being the first attempt of the kind in fictitious literature, it may prove a failure, but it seemed worth the while of some daredevil person to try it, and the author was in just the mood.

"Many a reader who wanted to read a tale through was not able to do it because of delays on account of the weather. Nothing breaks up an author's progress like having to stop every few pages to fuss-up the weather. Thus it is plain that persistent intrusions of weather are bad for both reader and author.

"Of course weather is necessary to a narrative of human experience. This is conceded. But it ought to be put where it will not be in the way; where it will not interrupt the flow of the narrative. And it ought to be the ablest weather that can be had, not ignorant, poor quality, amateur weather. Weather is a literary specialty, and no untrained hand can turn out a good article of it. The present author can only do a few trifling ordinary kinds of weather, and he cannot do those very good. So it has seemed wisest to borrow such weather as is necessary for the book from qualified and recognized experts—giving credit, of course. This weather will be found over in the back part of the book, out of the way. See appendix. The reader is requested to turn over and help himself from time to time as he goes along."

And in the appendix he has furnished enough samples of different kinds of weather to satisfy the most fastidious.—*A. H. Palmer.*

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## THE BERGEN GEOPHYSICAL INSTITUTE.

### "POLAR-FRONT" WEATHER FORECASTING.

The following account is extracted from a letter, dated October 1, 1920, from Miss Anne L. Beck, who holds the fellowship in meteorology of the American Scandinavian Foundation (see September BULLETIN, pp. 95-96).

"The Bergen Geophysical Institute has two divisions. The A. division in charge of Professor Helland-Hansen carries on investigations in Oceanography both chemical and physical. We have a regular schedule of lectures Wednesday and Friday from 9.45 to 10.45 A.M. Later some laboratory practise is to be taken up supplemented by actual research and observations in the nearby fjords. These lectures I am to assist in editing for publication as a possible text in Oceanography.

"Geophysical Institute B., the Meteorological Division, is in charge of Professor V. Bjerknes. A weather bureau, in connection with the Institute forms a splendid laboratory. The staff of the weather bureau, includes besides the Director, Mr. J. Bjerknes, now on a lecture tour to the southern countries of Europe, two Swedish meteorologists, Mr. E. Björkdal, Director Pro. Tem., Mr. C. G. Rossby, Mr. A. Tveten and a number of assistants. Mr. Tveten is especially concerned with the problem of the nucleus of condensation in raindrops and is daily making observations by pilot balloon for use in the forecasts and for

the pilot of the passenger aeroplane from Bergen to Haugesund and Stavanger. Mr. Björkdal and Mr. Rossby are in charge of the weather forecasting.

"A weather chart is prepared 3 times daily, at 8 A.M., at 2 P.M., and 7 P.M. There are three forecast districts, one for northern, one for western and one for eastern Norway, the forecast centres being at Tromsø, Bergen and Christiania, respectively.

"An entirely different method of forecasting from that of the U. S. Weather Bureau is used by the Norwegian Service. Messrs. Solberg, J. Bjerknes and Bergeron, at the Bergen Institute have developed the theory that the phenomena of the weather of the Northern Hemisphere are largely dependent upon the surface of junction of polar and equatorial air. This line of discontinuity can be detected at the earth's surface by conditions of temperature, pressure, hourly pressure change, wind direction and force, humidity and visibility. The line of discontinuity passes through the centres of cyclones connecting the centre of one with those of the preceding and succeeding cyclones. The polar air at the surface is identified as being cold, dry, very transparent, usually blowing from an easterly point, while the air identified as equatorial is warm, moist, with poor visibility, and blows from a westerly point.

"The polar front of each cyclone or surface of demarkation of these two air types is divided into a steering surface and a squall surface. The Bergen weather bureau associates most of the phenomena of cyclones with different parts of the polar front, and in particular on all synoptic charts set out definite rain areas in connection with the two surfaces which meet in the cyclonic centre. The forecasts are built almost entirely on the movement of these surfaces. [See also p. 61.]

"No formal lectures have as yet been given in Meteorology at Geophysical Institute B., but Professor Bjerknes has promised to give some mathematical treatments of the problem in the very near future. Before Mr. J. Bjerknes left on his southern trip, several informal discussions of the Bergen Theory had been given.

"So far you may be glad to note I have had no difficulties because I could not speak or understand the Norwegian language. Many people speak English fluently and all are willing to practise it whenever an opportunity presents itself."

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### WATER POWER.

Students of hydrological meteorology will be interested in a pamphlet entitled "Our Vast Unused Energy," issued on September 15, 1920, by the Guaranty Trust Company of New York. The same can be obtained free of charge from the company's headquarters, 140 Broadway, New York City.

In this pamphlet are published a brief discussion of water power and its possibilities, together with a complete copy of Public Act 280, known as the Water Power Act, a law enacted by the 66th Congress, and approved by the President of the United States on June 10, 1920.

The introductory paragraphs of the article referred to follow:

"The increased costs of fuel and the state of available fuel reserves, which according to the latest report of the Federal Reserve Board continue to be of the most limited character and will necessitate much more energetic action if industrial conditions are to be made safe for the coming winter, are forcing our attention as never before upon the need for more economical power.

"Probably the most significant achievement in the field of American industry in the post-war industrial adjustment is to be the development on a large scale of the nation's vast water-power resources. With the revival of normal industrial activity by the recently belligerent nations, competition in the world's markets will become increasingly severe. Economy in the application of power to the production and transportation of goods will in large part measure the competitive ability of the various nations. As emphasis is more and more placed upon cheapness of power resources, coal and iron alone henceforth will not be such decisive factors in measuring the potential industrial capacity of nations. Water power