

manufactured product is sometimes varied to suit the climate where the product is to be used, as in the case of prepared paints. Factories are sometimes located where water power may be obtained or where raw material is abundant, and both these conditions are peculiarly related to the climate.

Health and the personal attributes usually accompanying health all have an economic value, and these are dependent to a certain extent upon climate, either as climate affects the individual directly or as it brings about other conditions favorable or unfavorable for health. Often the climatological conditions affecting health are extremely local. The congregation of large numbers of health seekers in a region known to possess a healthful climate is a commercial asset to such a region. The efficiency of labor is reduced by a climate which is unfavorable for outdoor work.

Many forms of amusement and recreation have been commercialized, and of these a number are of such character as to group themselves naturally in certain climatological zones. Tourist travel is being deflected from its former lines and will be an increasing source of revenue to those sections known to have good scenery, good roads, and good climate. The industry of staging photoplays has become a regional one, owing to the favorable climate of certain sections.

There are certain meteorological phenomena that are much dreaded, and regions known to be free from these phenomena attract population because of such freedom. In such varied enterprises as the study of astronomy, the conservation and restoration of the forests, and the adjudication of cases at law, climatology plays a part, and in fact there is scarcely a human activity to which it is not related.

There are few lines of scientific investigation which promise greater return from an economic standpoint.

THE MEANING OF THE WORD "FAIR" IN METEOROLOGY.

By ELEANOR BUYNITZKY.

[Dated: Weather Bureau Library, Washington, Feb. 2, 1916.]

The meaning of the word "fair," as applied by meteorologists to weather conditions, has varied somewhat from time to time. In this country it was formerly used in recording the state of the sky, with reference to the degree of cloudiness. To-day, however, both in the United States and England, it is employed by meteorologists principally in connection with forecasts, to denote absence of precipitation.

The general dictionaries published in the United States have made some attempt to recognize the technical definitions of this term, as shown by the following quotations:

Century Dictionary.—Comparatively favorable or propitious; not obstructive or forbidding; moderately fit or suitable: as, *fair* weather (as distinguished from clear or foul weather). In the weather reports of the United States Signal Corps, the sky is said to be *fair* when it is from four-tenths to seven-tenths (inclusive) covered with clouds.—*Report of Chief Signal Officer for 1881*, p. 745.

New Standard Dictionary.—Having the sky from four- to seven-tenths covered with clouds: said of the weather, and distinguished from *clear*.

Webster's New International Dictionary.—Free from rain, hail, or snow; so used in the predictions issued by the United States Weather Bureau. The weather may be cloudy or threatening, but if no precipitation occurs it is called *fair*.

The old Signal Service definition found in both the *Century* and the *Standard* dictionaries has not been in official use since 1888, so far as the *regular* observers of the service are concerned, although the word "fair" in the sense "partly cloudy" was employed by *voluntary* observers until some years later. This was probably due to the fact that, for some unknown reason, the "Instructions for Voluntary Observers," published by the Weather Bureau in 1892, retained the old definition of the term, notwithstanding the fact that a Signal Service order had been issued four years earlier, substituting "partly cloudy" for "fair" in the various forms and reports of the service and stating specifically that "the term 'fair' will be construed in the Signal Service publications to mean absence of precipitation." (See list of definitions below.)

Reference is made to the official use of the word "fair" in the Report of the Chief Signal Officer for the year 1870,

page 20, in connection with certain forms used by the "Division of Telegrams and Reports for the Benefit of Commerce." The term is not defined, but the context indicates that it was used to mean "partly cloudy" or "cloudy," without rain. A similar use of the word is also shown in the "Instructions to Observer Sergeants," Signal Service, 1871, page 15. Its history in the meteorological service of this country may be further traced in the following quotations taken from the "Instructions," etc., of the Signal Service and the Weather Bureau:

1875. U. S. Signal Service. Instructions to Observer Sergeants, 1875, p. 52:

In deciding whether a day is clear, fair, or cloudy, its character will be determined by taking the sum of the entire number of fourths of clouds observed at 7 a. m., 2 p. m., and 9 p. m. A clear day will be one in which the sum of the observed fourths is three or less than three; a fair day, one in which the sum is from four to eight, inclusive; and a cloudy day, one for which the sum is from nine to twelve, inclusive.

1881. U. S. Signal Service. Instructions to Observers, 1881 [replacing all former editions and amendatory orders up to and including June 14, 1881], p. 63:

The state of the weather will be determined as follows: *Clear*, when the sky is three-tenths or less than three-tenths covered with clouds; *fair*, when the sky is from four-tenths to seven-tenths (inclusive) covered; *cloudy*, when the sky is more than seven-tenths covered.

1881. U. S. Signal Service. Instructions to Special Observers in the Cotton Belt [published in connection with Signal Service Orders No. 55, July 14, 1881], p. 7:

In recording the state of the weather, at the time of observation, the following characterizations must be used:

"Clear," when the sky is less than one-fourth covered with clouds.
"Fair," " $\frac{1}{2}$ cloudy," " $\frac{2}{3}$ cloudy," and " $\frac{3}{4}$ cloudy," according to the amount of clouds observed at the time of observation.

"Cloudy," when the sky is more than three-fourths obscured by clouds.

1888. U. S. Signal Office. General Orders, No. 54, December 21, 1888, p. 1:

On and after January 1, 1889, the term "fair" will be construed in the Signal Service publications to mean absence of precipitation. The use of the word "fair," in the various forms and reports of the Service, to indicate partly cloudy weather will be discontinued and replaced by "partly cloudy."

1892. U. S. Weather Bureau. Office Instructions, No. 3, February 15, 1892 [effective January 1, 1892], p. 1:

Forecasts of fair weather will be considered to indicate the absence of rainfall in excess of 0.01 of an inch.

1892. U. S. Weather Bureau. Instructions to Voluntary Observers, by T. Russell, 1892, p. 60:

The weather is recorded clear when the sky is $\frac{1}{10}$ or less obscured; fair, when the sky is from $\frac{1}{10}$ to $\frac{7}{10}$ obscured; cloudy, when the sky is more than $\frac{7}{10}$ obscured; light rain (*lt. r.*), when there is light rain; [etc.].

1895. U. S. Weather Bureau. Instructions for Observers, 1895, p. 32:

In forecasting weather, the term "fair" is used to indicate that no precipitation in excess of 0.01 of an inch is anticipated.

1897. U. S. Weather Bureau. Instructions, No. 61, August 2, 1897, p. 2:

Forecasts of fair weather will be considered to indicate the absence of rainfall in excess of 0.01 of an inch.

1905. U. S. Weather Bureau. Station Regulations, 1905, paragraph 280:

Forecasts of "fair," "partly cloudy," or "cloudy" will be made when precipitation to the amount of 0.01 inch or more is not expected.

This was amended, October 1, 1905 (see Appendix to the 1905 Regulations, paragraph 8), to read as follows:

Forecasts of fair weather will be verified when precipitation in excess of 0.01 of an inch does not occur.

1915. U. S. Weather Bureau. Station Regulations, 1915, paragraph 425:

Forecasts of "fair," "partly cloudy," or "cloudy" will be made when precipitation to the amount of 0.01 inch or more is not expected.

In England, the term "fair" as used by meteorologists has much the same meaning that it has in the United States. Murray's New English Dictionary contains the following definition:

Of the weather. Favourable, not wet or stormy. Also with some notion of sense 1 [beautiful]: Fine, bright, sunny. Now sometimes contrasted with *fine*, as "the weather was fair, but not fine."

British official usage in this connection is described in a letter from the Director of the Meteorological Office, London, dated December 2, 1915, as follows:

I am in receipt of your letter of November 12th, asking whether the terms "fair" and "fine" have ever been officially defined by this Office.

THE AURELIA ALTO-CUMULUS CLOUD.

By GEORGE REEDER, Section Director.

[Date: Weather Bureau, Columbia, Mo., June 27, 1914.]

The accompanying rough sketch that I made in Columbia, Mo., at about 8:30 a. m., June 25, 1914, shows an interesting and unusual cloud formation. I do not own a camera, otherwise I would have photographed them; and, it goes without saying, I am a poor sketch artist. I have named the cloud "Aurelia" because each time (this being the third) I have observed them my thoughts instantly flashed to the jellyfish (*Cyanea arctica*), called "stinging nettle" by some southern fishermen.

This cloud formation, so far as my own observations go, seems characteristic of the Middle West or semiarid regions. I never observed a similar formation in other

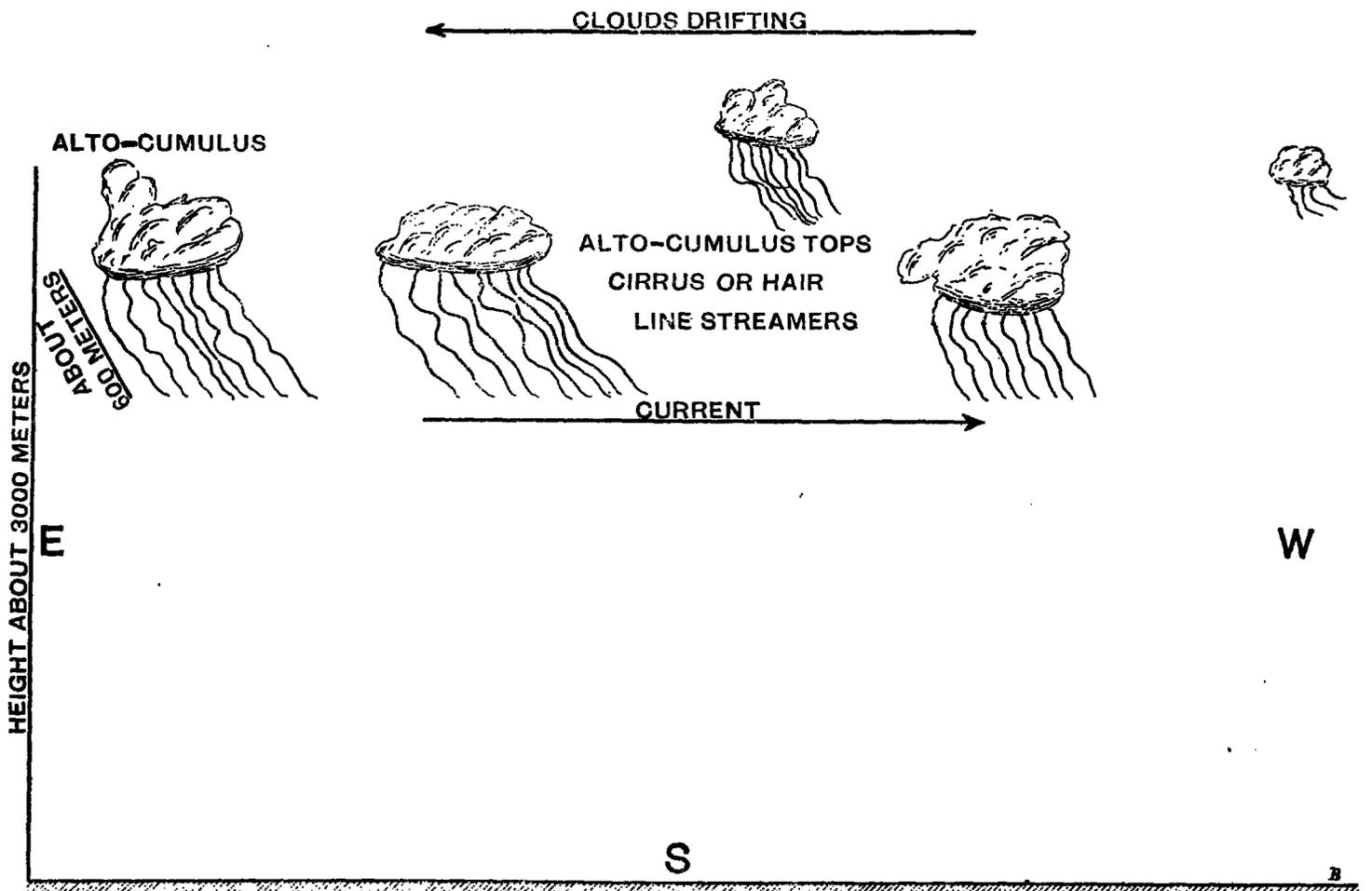


FIG. 1.—Peculiar form of alto-cumulus observed by Geo. Reeder at Columbia, Mo., 8:30 a. m., June 25, 1914.

No official definitions have been put forward, but the words have come to be used fairly regularly in our forecasts.

Both would only be applied to a day or an interval during which there was no precipitation. In using the word "fine" the forecaster has in mind a period over which the weather can be described by the Beaufort letters "b" or "bc," while "fair" would apply to an interval to which the Beaufort letters "bc" and "c" would be applicable, but I do not think anyone would quarrel with the use of the word "fine" to describe a period during which the sky was covered by a veil of high cloud, say, of the cirro-stratus type, even if technically the cloud amount might be represented by the figure 10 or by the Beaufort letter "o."

[The Beaufort letters referred to are officially defined by the British Meteorological Office as follows: b=blue sky, cloudless; bc=a combination of blue sky with detached clouds; c=sky mainly cloudy but with openings between the clouds; o=completely overcast.]

parts of the country during former years. Twice these clouds were seen in the southern part of the sky, and once in the north, rather low down. Each time, though, it was during periods of prolonged drought, and the formation was the same, i. e., alto-cumuli drifting slowly eastward, with long underneath streamers of hairlike texture, bent backward toward the west.

Presumably, then, this form of cloud is the result of two currents of air, flowing in opposite directions. In other words, the alto-cumuli float on eastward until they meet and enter the current coming from the east, which is, without doubt, a dry, descending one. The cumuli then soon begin to disintegrate and evaporate, small particles