

20, 1920, 90th meridian time, at Topeka, Kans., the observations being communicated by Mr. S. D. Flora, official in charge of the United States Weather Bureau station there.

The halos are stated to have been quite distinct, lasting almost an hour; no prismatic colors were visible; the line joining the moon with the point of tangency was parallel to the horizon; the relative diameters of the two arcs were merely estimated. The sky was to all appearances clear at the time, the halos apparently being formed in a sort of haze. Mr. Graham is stated to be a very keen and reliable observer of natural phenomena; no one else observed the halo.

No forms like these have ever before been reported. The closest approach to them are the infralateral and supralateral arcs to the 22° halo, observations of which are cited by Besson, MONTHLY WEATHER REVIEW, July, 1914, 42, 444; they have never been explained. It

seems desirable to put the present observation on record,

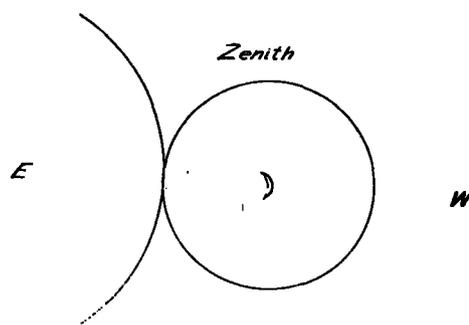


FIG. 1.—Lunar halo observed at Topeka, Kans., between 8 p. m. and 9 p. m., Sept. 20, 1920.

without making any attempt to interpret it.—Edgar W. Woolard.

WEATHER AND LITERATURE.

By ROBERT E. HORTON, Consulting Hydraulic Engineer.

[Voorheesville, N. Y., August, 1920.]

Literature owes much to the weather. It is nearly always the background, and sometimes the backbone, of pastoral prose and poetry. The Bible is filled with illustrations drawn from the aspects of the air. Thomson has made weather the theme of his "The Seasons." What would "The Midsummer Night's Dream" be without it?

Mark Twain claims the distinction of writing the only novel containing no weather, but even he did not venture to place the good nature of his readers under too great a strain, and so he added a compendium of assorted weathers as an appendix from which the reader may select to suit his fancy.

Three things make up the framework of the great outdoors: the rocks and soils and water, which determine the form and substance of the earth's surface; the organic or living forms which cover and inhabit it; and the air, which surrounds it. These appeal to lovers of the wood and open fields in various ways and to different degrees. To some the graceful molded forms of hills and valleys, the stupendous masses of mountains, and the appalling depths of canyons afford an exhilaration; to others they are mere curiosities of nature. Still others "have eyes, but they see not."

So it is with vegetation. To some the ever-changing verdure of the hills, the flowers of the field, and the lilies of the valley are things of beauty, interesting and inspiring in all their multi-varied forms and combinations. Others are like Peter Bell:

"A primrose by the river's brim,
A yellow primrose was to him,
And it was nothing more."

Those who enjoy natural scenery in its broad magnificence, or its even more wonderful detail, or who rejoice in the life of vegetation, owe much of their enjoyment to the background of weather conditions. Measured in human generations, Tamalpais or Shasta or Ben Nevis is always the same mountain, but it has numberless and ever-changing aspects, according to the state of the weather in which it is viewed.

To some, weather is merely one of Nature's confirmed habits; to others it is an evanescent gown in which Nature's beauties are clothed—now fully revealed, now half concealed. Some persons derive a peculiar enjoyment—a feeling of kinship with Nature—from the ex-

perience of storms. Perhaps it is this feeling which keeps many a sailor at sea and many a voyager in the wilderness.

Artists seem to specialize in clouds and sunsets, partly because of their intrinsic beauty, but also because they lend themselves more readily to the brush than do other weather conditions. Poets often dwell at length on storms, and most of us stand at the door with reverent, uncovered heads, as "Announced by all the trumpets of the sky, arrives the storm."

It may be that one of the functions of literature is to stimulate the more refined sensibilities of man in the same way that the aspects of Nature exhilarate and invigorate them. In any event, Nature, as exemplified by the weather, must ever form an important element of descriptive literature. Without it the description is incomplete.

One need not read many authors to note great differences in weather description, as regards both accuracy and minutiae. Minutiae of weather conditions are not always essential. In the parable of the two houses the picture is fully drawn—

"The rain descended,
And the floods came down,
And the winds blew and beat upon that house."

There are, perhaps, not many writers who can either describe or utilize details of weather conditions as well as Stevenson has done in "The Inland Voyage" and "Travels with a Donkey." Fortunately weather occurs in such endless varieties that impossibilities in events or their sequences are few, but it is to the positive, not to the negative, capabilities of the weather description as an ingredient of good literature that attention is called.

Some of us still have the old-fashioned idea that art in literature consists in painting a word picture that seems real. John Muir could portray a thunderstorm or snowstorm which Jupiter Pluvius and Mother Nature need not be ashamed to own as their child. The other extreme is found in the writings of those whose ability to utilize weather as a literary resource seems to go little further than besmutting the paper and leaving the rest to the imagination.

The argument seems never to be made that the study of good literature by a budding author debauches his natural style or dulls his imaginative faculties. So it seems reasonable to suppose that the quality of literary

weather would be improved if writers were given some training in the observations of weather forms and possessed some knowledge of weather causes. If writers will use, as needs they must, weather in amounts ranging from a modicum to a moiety in every outdoor scene, it is not improper to suggest seriously that meteorology, which is the science of weather, should have a place in the curriculum of *belles-lettres*.

Let no one be deceived by the notion that any meteorologist desires literary descriptions in the form of categorical scientific facts. The desire is rather otherwise—that good literature shall not be permeated by bad weather, but that, on the other hand, it shall be improved by the use of weather that simulates Nature—weather that appeals to him who knows what weathers are made up of. March winds are not always “raw,” nor sunset skies always “imbued with a lurid glow.” There are many phases of weather which, even if rare, have been occasionally witnessed by most persons and would be recognized if well described.

Again, meteorological metaphors are not undesirable,

but, on the other hand, often facilitate the painting of a word picture in the most concise manner possible.

In Noah's flood “the fountains of the great deep were opened up and the windows of Heaven were opened.” This tells briefly a story which would require many adjectives for an adequate description in a matter-of-fact way. Who has not been impressed with Nature's grandeur in the thunderstorm, when “with whipcords of lightning she drives the storm on.” Here the metaphor is not strictly accurate, since in reality the storm generates the lightning; but the object of the metaphor is to create a true picture in the mind of the reader, and success is attained in a measure as the picture appears clean cut and correct, and the vehicle of the metaphor is forgotten.

In the use of better-defined weather types, accurate detail where detail is needed, and good metaphor where it will serve, as also in other ways, there are still opportunities for those who write to utilize weather descriptions that are not altogether trite and yet do no violence to Nature.

CLOUD NOMENCLATURE.¹

By CHARLES F. BROOKS, Meteorologist.

Weather Bureau, Washington, D. C., Nov. 3, 1920.]

SYNOPSIS.

Cloud names closely defined are essential not only for the cloud observer but also for the cloud investigator. Since heights and the atmospheric processes responsible for particular clouds are not always known, the best basis for a nomenclature for general use is cloud appearance. The aspect of a cloud may be described in terms of form, coarseness, and density; and rather complete records can be made by recognizing the seven principal types of form, three degrees of coarseness, or apparent angular size, and five degrees of density. Such a system of keeping cloud observations is to be recommended only for those who have plenty of time and who wish to have great detail in their cloud records.

The general needs of meteorologists were recognized many years ago, as evidenced in the adoption of an International Classification of Clouds in 1896. This classification was simple and included aspects of form, coarseness, and density. Although the original classification was revised in 1905, the distinctions between several of the cloud forms were not closely drawn, and practically no provision was made for uniformity in detailed cloud records. As cloud forms occur in great variety the lack of names to indicate adequately the appearance of the sky has made cloud observations, in general, the least complete and the least accurate of any records of the important weather elements.

Pending further international revision an attempt is here made to provide for stricter differentiation of cloud forms, with the aid of a guide to identification. Particular emphasis is placed on the desirability of confining the name cirro-cumulus to ice clouds in order to prevent its present indiscriminate application to both the true, high cirro-cumulus and the appreciably lower, thin alto-cumulus. Differentiation of thin alto-stratus from cirro-stratus, and of nimbus from other rain clouds is also discussed. Revised wordings of parts of the International descriptions are suggested for consideration. Photographs* are not presented, for it is desired to place emphasis on the fact that the definitions form the ultimate basis for differentiation of forms.

The addition of 14 generally applicable subclasses, several of which already are widely used, to the present, simple International Classification is urged as an aid to greater detail and greater accuracy.

INTRODUCTION.

Cloud names are as necessary in the work of the meteorologist as rock names in that of the geologist or plant names in that of the botanist. To be widely serviceable, a system should invariably use the same name for the same kind of cloud and offer a sufficient variety of names adequately to describe the appearance of the sky. International agreement has already provided a fundamental

nomenclature. As now used, however, different observers have various conceptions of the given types; and there is no uniformity in adding adjectives for describing certain cloud forms accurately.

CLOUD-APPEARANCE THE BASIS FOR CLASSIFICATION.

As a background for a discussion of the existing International Classification let us consider how cloud observations might be recorded were there no existent nomenclature and were there ample time at an observer's disposal. We are interested primarily in clouds as indicators of winds aloft, of atmospheric processes, and of future weather, and in clouds as sky cover affecting incoming and outgoing radiation. Horizontal movement and sky cover are recorded separately and are only in a minor degree involved in cloud form. But the name of a cloud should, if possible, give some indication of the atmospheric processes probably responsible for it, and also provide at least a partial basis for local forecast studies.

It would appear, then, that our classification of clouds should be based on cloud-forming processes. But how is one to know what processes are involved without being acquainted with the actual conditions in and about a particular cloud? A knowledge of meteorology, coupled with close observation of a cloud, may or may not provide unmistakable evidence of why there is a cloud and why it has such an appearance. Therefore, a classification by origin would be on an unsafe basis, especially since all observers do not study clouds with equal care nor interpret clouds alike, and since it should be possible to make a record without protracted observation. This leaves *appearance*, with, of course, all its indications as to height and origin, as the only safe and universal basis for cloud classification.

Form, coarseness, and density.—Cloud appearance may be described in terms of form, coarseness, and density. Since coarseness, or the apparent size of the elements and markings of a cloud, and density are matters of degree only, the primary differentiation of clouds must be based on form. The principal types of form to be seen

¹ Revised from paper presented at the meeting of the American Meteorological Society, Washington, D. C., April 22, 1920.

*A chart with 32 cloud photographs with legends conforming with this discussion will soon be issued by the U. S. Weather Bureau.