arch we find that the highest clouds that receive the sun's light appear white, while the lower clouds are of rich salmon and golden tints, and that every shade of intermediate color is found here and there between, down to the very lowest clouds, which receive no direct sunlight and are of ashy white or dark gray. If we recall that the color of the sun was dark red or bright salmon when last seen at sunset, we shall at once realize that if we could rise upward a little way until we again saw the sun in the horizon we should be where these brilliant-colored clouds now are and that the color of the illumination of the clouds must grow deeper and deeper as the sun sinks deeper in the west, or rather as the earth, revolving eastward, carries the clouds more and more deeply into its own shadow, until finally they receive no direct sunlight at all, but perhaps a little reflection from surrounding objects. The deep-red arch seen in the east is the boundary between the illuminated part of the atmosphere and the darker portion below; it rises higher every minute, and eventually passes over our zenith and sinks in the west or northwest. The so-called civil twilight ends and night begins when this arch passes westward over the zenith, but the astronomical twilight ends only when the arch disappears in the western horizon, so that the entire sky is free from diffuse sunlight. Owing to the influence of clouds or hills in the distant west and of possible haze at great heights, such as that of 1884–85, the end of the astronomical twilight may vary to a very great extent. In northern latitudes, such as St. Petersburg, on the 21st of June, when at midnight the sun is only a few degrees below the northern horizon, the twilight arch at that time stretches from east to west, reaching up half way to the zenith and is very sharply defined. Observations of this arch were formerly used as a basis for the calculation of the altitude of the upper limit of the atmosphere and gave results of from 40 to 50 miles, but it is now well understood that this can only refer to the height of such layers of dust or aqueous vapor as are capable of reflecting appreciable light to the eye. The most remarkable sunsets of modern times are those supposed to be due to the vapor thrown up by the eruption of Krakatoa. The aqueous particles that produced the red sunsets of 1884 were undoubtedly large as compared with those ordinarily present at great heights, and may have been correspondingly lower in the atmosphere.

In several of the reports of State sections and in the daily press we find quotations from the bulletin on Storms and Storm Tracks, by Prof. F. H. Bigelow. The reference to this should always be Weather Bureau Bulletin No. 20 and not No. 114, as the latter is simply the current number in the chronological list of publications of the Weather Bureau.

NEBRASKA.

Prof. C. E. Bessey, of the University of Nebraska, contributes the following interesting note on the so-called "false dew," known also as "guttation," or the exudation of water drops from leaves:

Observations and experiments made upon many plants in the physiological laboratory and the plant houses of the University of Nebraska show that under certain conditions water may exude in drops from the surface or margin of leaves. It is well known, of course, that water escapes from living leaves in the form of vapor whenever the air is not saturated with moisture. Thus, when a geranium plant is placed upon one of the pans of a pair of scales (after wrapping the pot with sheet rubber so as to prevent evaporation from the soil), it is found that in a little time the loss of water vapor from the leaves is great enough to be readily measured. If the plant be allowed to remain upon the scale pan for a day or two, the amount of water lost will be quite considerable in quantity and weight. This kind of water loss has been well-known for a long time, but there is another loss of water with which we have not been so familiar. To show this, experiments were made as follows:

1. In a box of sandy soil fifty or more kernels of wheat were planted and kept growing vigorously until the plants were two or three inches high. They were kept well watered, so that the roots were fully supplied with water. The air of the laboratory during the experiment was pretty dry, requiring the roots to be quite active in absorbing water to make good the loss of water by evaporation from the leaves. The box was then put over a warm radiator, and the soil slowly warmed to a temperature of 77° to 78° Fahrenheit. After an hour or so drops of water were observed upon the leaves, and these continued to increase in spite of the fact that the humidity of the air was shown by observation to be only 31 per cent.

2. Another box, containing vigorously-growing wheat plants, was treated as follows: Warm water was slowly poured upon the soil, so as to quite considerably raise the temperature. The box was then put under a bell jar and the temperature of the air suddenly lowered by sprinkling the bell jar with water, when water was seen to ooze from the leaves, usually near the tips. This was repeated again and again, always with the same result.

3. Similar trials were made with small plants of maize (indian corn) with similar results.

4. In the plant house small cabbage plants were observed to exude drops of water from the projecting points on their margins under similar conditions.

Here we have an exudation of water drops (known as "guttation") quite resembling the dew which so often wets the grass. At first we might suppose it to be nothing more than dew, but careful tests, which I need not describe here, show it to be an actual exudation. It appears that the roots in the warm, moist soil become very active in absorbing water to supply the water loss through leaf evaporation, and when the latter is suddenly checked by the cooling of the air and consequent increase in its humidity the root pressure forces out the water in the little drops just described. When unusually active, the roots may even force out drops in dry, warm air, as in one of the experiments described above. Exudation may thus take place when the soil is moist and warm, especially when, with these conditions, the air is quickly changed from a hot and dry to a cooler and more humid condition.

SULPHUR RAINS.

The Cincinnati Enquirer of March 22 reports that a "sulphur rain" fell at Mount Vernon, Ky., early on the morning of March 21, as also at several other places in Rockcastle County; the stuff burned and gave out fumes of sulphur.

Those who are not seeking after mysteries may rest assured that such a rain of sulphur simply brings down to the ground some pollen from the pine woods, or some other light substance that has only a short time before been carried up by a strong gust of wind. It saddens one to think that any superstition should attach to such an ordinary phenomenon, one that occurs every day of the year at some place on the globe. Still more is it a pity that our daily press should repeat, and apparently indorse, any of the popular errors regarding these and other meteorological phenomena. It is quite as easy for a popular journal to present the best thoughts of the best people as it is to merely diffuse and strengthen the errors of the ignorant. The past century has witnessed the banishment from our text-books of innumerable erroneous ideas that were accepted by our ancestors. Why can not the daily press assist in the work of educating the public and resolutely refuse to print such nonsense as "the people generally consider this a sure harbinger of war," or such headings as "a red sun: bloody omen," or again, "great drought: belief that the world is drying up and that its end is drawing near"? If any one thing is more clearly taught than another by all our teachers, both religious and secular, it is that the future is not and can not be revealed by signs and omens.

MOONSHINE AND FROST.

Among the many mysterious meteorological influences ascribed to the moon, the following is quoted from the Evansville (Ind.) Courier of April 4, 1898:

Within the past week there have been several frosts, but to all appearances vegetation is not injured in the least. The reason of the immunity is explained by James Wiltshire, one of the oldest inhabitants of that city, who states that he obtained the idea from Mr. Willard Carpenter more than fifty years ago. Mr. Wiltshire says: "Since then I have carefully observed this every year, and have yet to see the