The destruction of fruit, truck, gardens, potatoes, sugar beets, corn, unharvested grain, alfalfa and other crops was very great within the limited area mentioned, little being left worth harvesting excepting the tubers. Hundreds of chickens and some rabbits perished before they could reach shelter, and numerous horses and cattle, as well as several persons caught without shelter during the storm, suffered more or less bodily injury. Runaway teams destroyed considerable property about the city and in the adjacent agricultural fields, and composition roofs and automobile tops were riddled by the hailfall. Practically all the north windows within the central area of the storm and many of the west windows were broken; and the large greenhouses of the Lehi Floral Co., with their contents, were almost totally destroyed with the breaking of about 7,000 roof glass. (Fig. 3.) The total loss was estimated by Mr. Joseph Anderson, the cooperative weather observer, at about $50,000.—*J. Cecil Alter*, Meteorologist, Salt Lake City, Utah.

LIGHTNING PHOTOGRAPHS.

Mr. J. W. Stjernstedt, manager of the Pacific coast office of the American Transmarine Co. (Inc.), has furnished the Weather Bureau with two lightning photographs. These pictures were taken about 10 p. m. at Jamaica, Long Island, July 12, 1919. The storm was approaching from the east or northeast. Both pictures were made with a small kodak, using the F:45 stop. The two diagonal lines seen on fig. 1 J. W. S. near the upper left and lower right hand corners are defects in the negative. The white spots in the same picture are caused by falling raindrops illuminated by the lightning flash. Fig. 2 J. W. S. shows five successive flashes almost parallel; this is due to the wind movement, which carried forward the air through which the lightning was discharging.—*C. L. M.*

LIGHTNING INJURY IN A POTATO FIELD.

Articles have appeared from time to time in botanical literature describing lightning injury to plants. Such injuries to trees are of course quite common, but occasionally herbaceous plants growing in a level field are injured. The injured plants usually cover a more or less circular area of 10 to 30 feet in diameter.

A heavy electric storm occurred at College Park, Md., on August 9, between 6 and 6.30 p. m. A few days after this storm Mr. T. H. White, of the Agricultural Experiment Station, called the writer's attention to an area in one of his experimental potato plots that had apparently been struck by lightning. On the day following the storm the plants in this area were lying on the ground in a wilted condition, with stems somewhat twisted just above ground. This injured area of approximately 30 feet in diameter was staked off and no increase in its size has since been found. A 10-foot strip of grass separated this plot from an adjacent one and was partly included in the circular area, but no injury to the grass was noticed, although a few potato plants in the adjoining plot and just within the circular area were slightly injured. Fig. 1 E. S. J. (on plate opposite) was obtained 16 days after the storm and shows the area containing the dead plants.

All the conditions of the injury and the circumstances under which it occurred seem to be in good agreement, with the following explanation given by Jones and Gilbert: [1]

"When an electric storm breaks suddenly following a period of dry weather and the first rain wets the top soil, there remains a layer of dry earth between this wet surface and the moist soil underneath, which is a poor conductor of electricity. When the lightning strikes the wet surface soil it disperses in all directions, horizontally and then downward into the earth, following lines of least resistance. The plant stems and roots with their abundant water content are better conductors than the layer of dry soil just mentioned, and so the electric current passes through them. The tissues may thus be variously injured or killed, depending upon the amount of current passing through them. The strength of the current, of course, diminishes the farther it gets from the center of the affected spot, and consequently the lessened injury at the margins of the area."—*Earl S. Johnston*, Agricultural Experiment Station, University of Maryland.

STANDING WHEAT FIRED BY LIGHTNING.

On July 16, 1920, a field of standing wheat belonging to R. H. McKean and W. B. Rice, near Wasco, in Sherman County, Oreg., was set on fire by lightning, and about 200 acres were burned over. From such information as can be obtained it appears that the lightning struck in the open field, no buildings, trees, or fences being near. The storm was accompanied by high wind for a few minutes, and light rain fell. At Wasco, the nearest cooperative meteorological station, the rainfall on that date amounted to 0.10 inch.

While fires in ripe standing grain are very common in this section, the firing of standing grain by lightning direct is very unusual.—*Edward L. Wells.*

LIGHTNING AND FOREST FIRES.

Though forest fires caused by lightning are of frequent occurrence in California, the summer of 1920 will be recorded as one of the most disastrous in history. These summer thunderstorms are usually limited to the elevated portions of the State, which are densely forested. Lightning discharges are particularly dangerous, because, unlike eastern thunderstorms, these storms are usually accompanied by little or no rainfall, which might extinguish a fire once started.

The Forest Service announced that lightning caused 60 forest fires in northern California during the first five days of July. Again, as a result of a series of extremely violent thunderstorms which passed over the same region on August 4, approximately 240 forest fires were caused by lightning, according to the Forest Service. Again, on August 6, 35 forest fires were started by lightning in a single thunderstorm in the vicinity of Sisson, near Mount Shasta. During this storm lightning struck the forest lookout station on the summit of Mount Eddy, seriously injuring the ranger on duty there, and the lookout station was destroyed in the fire which followed. During the second week of August there were 7 extensive forest fires beyond control in northern California as a direct result of these storms. The forest-fire situation in northern California was the worst in four years. Because of deficient precipitation during the past rainy season, the forest floor was extremely dry, and fires spread with

[1] Jones, L. R., and W. W. Gilbert. Lightning injury to herbaceous plants. Phytopathology 8:270-282. 1918.

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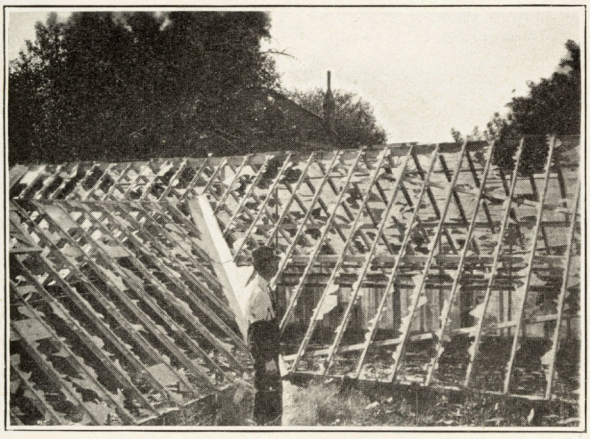

FIG. 1.—Lehi Floral Co.'s greenhouse, north slope (at right) and west slope (at left), after hailstorm of August 9, 1920. Photo by Zelda Kirkham, Lehi, Utah.

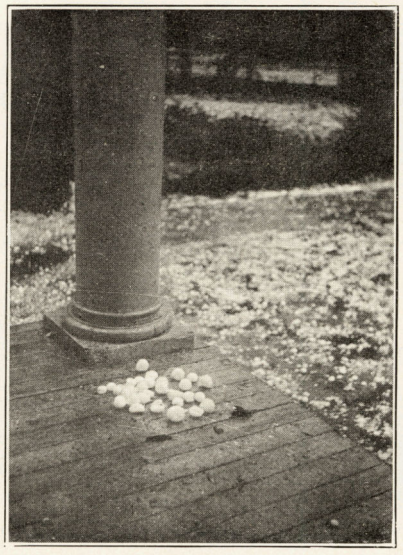

FIG. 2.—Hail gathered at random from adjacent yard, Lehi, Utah, August 9, 1920. The base plate of the porch post is 14 inches square and the flooring boards are 3¾ inches wide. Note that many hailstones are broken. Photo by Zelda Kirkham, Lehi, Utah.

FIG. 3.—A hail drift, Lehi, Utah, August 9, 1920. The two stones on the pavement in the foreground were about as large as a guinea egg or a hen egg. Photo by Zelda Kirkham, Lehi Utah.

FIG. 2 J. W. S.—Lightning flashes at Jamaica, Long Island, about 10 p. m., July 12, 1919. Photo by J. W. Stjernstedt.

FIG. 1 J. W. S.—Lightning flash at Jamaica, Long Island, 10 p. m., July 12, 1919. Photo by J. W. Stjernstedt.

FIG. 1 E. S. J..—Area of potato field injured during the heavy electric storm of August 9, 1920, at College Park, Md., is indicated by the stakes.

FIG. 1 W. S. D.—Undulatory strato-cumulus, seen as gray and white rolls of cloud near noon on an overcast day late in May while a strong east wind was blowing. Taken looking south.

FIG. 2 W. S. D.—Strato-cumulus. A type often seen on windy afternoons, especially during the autumn, this study having been made in November while a northwest wind was blowing, at 3 p. m., lens being pointed southwest.

unprecedented rapidity. These fires continued to burn for about 10 days, when expert fire fighters were carried by aeroplane to strategic positions around the conflagrations. Cooler weather, accompanied by high relative humidity, aided the fighters in checking the fires. During six weeks the Forest Service expended $80,000 in combating forest fires in the national forests of California, most of them in the extreme northern portion of the State. If only 2 per cent of trees struck by lightning are ignited, as is stated in Forest Service Bulletin No. 111, there must have been a tremendous amount of electrical activity in the atmosphere over northern California during the summer of 1920.—*A. H. Palmer.*

A HOT SQUALL ON THE MAINE COAST.[1]

August 15, 1920, there was an unusual hot squall between 6 and 7 p. m. on the Maine coast at Ogunquit, York County, about 24 miles south of Portland, Me.

The weather had been peculiar for a week. On the coast there was a light east wind with cool air and much dense fog, while inland it was very hot and humid. Within observation from the beach great cumulo-nimbus clouds were observed every afternoon and heavy thunder was heard and lightning seen, but these disturbances on nearing the ocean were completely smothered by the cooler air. There was no rain on the ocean rim, but very heavy downpours fell inland only 20 miles, with severe lightning. And these disturbances invariably followed the rivers. The fishermen maintain that thunderstorms can not occur on the beach except at ebb tide, and this rule was not broken [nor verified]. For days the same localities got a drenching, while spots only a few miles away had not had a bit of rain for a month.

On August 15, at 6 p. m., the air on the beach was quite cool, about 62° F., with a light east wind. A heavy thunderstorm was visible about 20 miles north moving southeast. A black bank of clouds was observed coming from the north-northeast, and it rapidly approached, giving a blue-black sky. The clouds were mammato strato-cumulus, and on reaching the observer a moderately strong squall broke. The wind came from the northeast, from over the cold ocean, yet the temperature rose to 73° and it felt distinctly hot and very dry. The temperature remained at 73° for nearly an hour. The thunderstorm proper made off to sea in a southeasterly direction at some distance with a fine display of lightning. No rain fell on the beach, nor did the lightning get any nearer. Two days later, when a northeast wind of the same velocity was blowing, the temperature registered 58°. It seems as if this hot squall must have been a down-draft, differing from the usual cool squall possibly through having insufficient evaporating rain to keep the descending air cool.[2] The same kind of a squall in a milder form took place the next evening about the same time.—*R. M. Dole.*

[1] Cf. MONTHLY WEATHER REVIEW, Aug. 1919, 47: 566-567.

[2] See ibid., July, 1914, 42: 384; or *Jour. Franklin Inst.*, July, 1918, 186: 63-64 (W. J. Humphreys).

NOTES ON CLOUD PHOTOGRAPHY.[1]

By WILLIAM S. DAVIS.

[Orient, N. Y., May 25, 1920.]

The accompanying cloud studies were made at Orient, a village located upon the small peninsula forming the east end of the north fork of Long Island, N. Y. Because of the small land area in comparison with that of the surrounding waters of Long Island Sound, Gardners Bay, and Orient Harbor, the air currents at low elevations are less affected by local conditions upon the ground than would be the case in most sections, especially those removed from the coast.

In regard to the best method of photographing clouds, my experience leads me to advise the use of color-sensitive emulsions at all times, and in combination with a suitable ray filter when color is an important factor. If plates, rather than films, are employed the double-coated "nonhalation" variety will permit more latitude in exposure than the single-coated kind, though either can be used successfully if proper care is exercised to avoid overexposure upon delicate cloud forms.

When exposing on gray clouds there is little if anything to be gained by placing a ray filter on the lens, unless one is aiming to secure a good rendering of landscape at the same time. In this case, a filter generally helps to equalize tonal differences between sky and foreground sufficiently to allow of timing the exposure for the latter without loss of quality in the sky.

White clouds against a blue sky always call for the use of a ray filter to secure the best possible results, as is also the case when dealing with a brilliant sunset to better preserve the relative visual luminosity of the different colors. For general use a ray filter of moderate depth of yellow will be found sufficient, representative ones of this class being the Ingento series A, Cramer Isos II, and Wratten K1. To secure for study purposes the clearest rendering of very thin filmy clouds, such as certain types of cirrus, however, it is advisable to employ considerably stronger colored filters to emphasize the slight contrast between the clouds and sky. The same applies in the matter of preserving the luminous effect of deep yellow and orange tints in a gorgeous sunset sky. Here is where such a filter as the Ingento B (or the C series for still more contrast), Wratten K2 series, or Isos III will prove helpful.

When timing exposures for clouds alone, without regard to any land shown below, one-fourth the time usually allowed an open landscape will be found approximately correct for well-defined cloud masses, but very delicate white clouds would need still less comparative exposure, followed by longer time of development than usual in a solution well restrained with potassium bromide.

As a rough guide for a beginner, it may be stated that when using plates similar in speed to the Cramer "Inst. Iso" an exposure of one-fiftieth second without a ray filter would be close to the mark for bold masses of gray cloud in summer light, with the lens stopped to F. 16. Using the same sized stop, and a light yellow ray filter over the lens, from one-fifth to one-tenth second could be given upon white clouds in good sunlight, though a longer time could be allowed without harm when the tonal contrasts are well defined. All these exposures should be increased in early morning or near sunset, and in the weaker actinic light during the winter season.

[1] *See also* A. J. Henry: Cloud photography. MONTHLY WEATHER REVIEW, May, 1895, 23:169-171, 255. In this article the use of a liquid filter is described. See also for a cut of the apparatus as used *Scientific American* 72:137, March 2, 1895. The use of orthochromatic photographic plates, a developer strong in the reducing agent and highly restrained is recommended.