times as much as the seed, but the dry matter in these plants was from 86 to 130 per cent only of that in the seed planted.

*Details of Weights and Measurements.*

| Plant No. | Weight in Grams. | | | Height of Plant above Ground. Inches. | Dry Matter. | |
|---|---|---|---|---|---|---|
| | Seed. | | Green Plant. | | In Plant. | Per cent of that in Seed. |
| | Dry Matter. | Total. | | | | |
| 1 | 0.378 | 0 437 | 3 235 | 14 | 0 493 | 130.4 |
| 2 | 0.346 | 0.400 | 1.79 ) | 9½ | 0.3 0 | 86.7 |
| 3 | 0.395 | 0.456 | 2.470 | 11½ | 0.435 | 110 1 |
| 4 | 0.404 | 0.466 | 2.610 | 11 | 0.348 | 86.1 |
| 5 | 0.424 | 0.490 | 3.540 | 12 | 0.437 | 103.0 |
| Growth above ground of two plants three weeks after planting. | | | | | | |
| 1 | 0.348 | 0.402 | 16.60 | 21½ | 1.826 | 524.6 |
| 2 | 0.413 | 0.477 | 18.60 | 20½ | 2.045 | 495 4 |

## ELECTRICAL NOTES.

Some of the practical results of Dr. Sumpner's work on photometry were alluded to in a previous note. As the Proceedings of the Physical Society are not generally accessible, and most of the abstracts given are rather brief, it may be worth while to give a short account of some of the more theoretical results.

The first is the practical demonstration of the very approximate accuracy of the cosine law of reflection of such substances as white paper, tracing cloth, and white cloth. From this follows the remarkable result, confirmed by experiment, that placing a piece of white paper behind a source of illumination more than doubles the illumination at a point normal to the plane of the paper, while the placing of a mirror in the same position does not quite double it. The reason of this is at once seen to be the fact that the reflecting power of white paper and the mirror are about the same, but that, of a given amount of light falling on the paper, in consequence of the cosine law, the greater part is reflected normally to its surface, whereas in the case of the mirror, the absorption of the glass is greatest in the case of the light falling perpendicularly to it, and so the greater part of the light is given off in directions which are not normal to the surface.

In the discussion following, it was pointed out that no known shape of the roughnesses would lead to the mathematical deduction of the cosine law, so it is probable that the phenomenon of diffusion of light is of a somewhat more complicated nature than is generally supposed. It is to be hoped that the definitions used by Dr. Sumpner will be generally employed in photometric work. They are as follows:

1. Candle-power.— The candle-power of a lamp is measured by the ratio of the illumination of the light considered, to that of a standard candle, both sources being at the same distance from the object illuminated.

2. Illumination.— The unit of intensity of illumination is that given by a standard candle at a distance of one foot.

3. Unit quantity of light.— Unit quantity of light is the quantity of light which falls on a surface of one square foot placed at a distance of one foot from a standard candle, and so that a normal drawn to the surface at any point, passes through the source of light.

The name candle-foot is given to the unit quantity of light.

From the definition, a source of light, candle-power X, gives out a total quantity of light equal to $4\pi$ candle-foots.

4. Brightness.— This definition only applies to solids which become sources of illumination, either through incandescence, as heated platinum, or through reflection, as paper exposed to sunlight. i.e., only to such substances as obey the cosine law.

A surface has unit brightness when a point at a distance of one foot from a surface of one square foot of the substance, and so placed that a normal drawn from any point of the surface passes through, the point, is illuminated with unit intensity.

From the definition, it follows that the total quantity of light given off by one square foot of surface of brightness, X is $\pi X$.

One interesting result, following from the considerations which lead to the last of these definitions, is that given by Dr. Sumpner, as it affords an explanation of snow-blindness.

The total quantity of light reflected from the snow will nearly equal the amount which falls on it. Therefore, if C be the intensity of the illumination of the sun at the surface of the snow, the brightness of the snow at a distance of one foot from it will be $C/\pi$. Therefore, if the observer is standing so that the snow-field subtends a solid angle of 90 degrees, we may easily find that the illumination at the point where his eye is, is nearly C, or that the effect is nearly the same as if he were looking straight at the sun.

R. A. F.

## LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

*On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.*

*The editor will be glad to publish any queries consonant with the character of the journal.*

### Early Attempts at Storm-Warning.

IN reading Haweis' "Music and Morals," I found on page 368 a statement of interest to meteorologists. Writing of the famous Strassbourg tower, he says: "The second bell, recast in 1774, is named 'The Recall' or 'Storm-Bell.' In past times, when the plain of Alsatia was covered with forests and marsh land, this bell was intended to warn the traveller of the approaching storm-cloud as it was seen driving from the Vosges Mountains towards the plain."

Probably Kopp, Günther, van Bebber, or Hellmann, in their records of antiquarian research, have mentioned this early attempt at storm-warnings, but I do not remember having seen anything about it.

FRANK WALDO.

Princeton, N.J., April 5.

### Pre-Historic Remains in America.

IN his letter in *Science*, March, 31, under the above title, Professor Cyrus Thomas misunderstands the quotation which he makes from my "American Race." He observes, "If the settlement was at one point by one race, and this race was never influenced by another, it is difficult to imagine in what respect the moulding process acted." Is it? Plainly the moulding process acted by modifying the intrusive population to another and a fixed racial type by long subjection to an environment to which previously it had never been exposed. Nothing is better recognized than such a process; it is taken for granted by all writers, as, for instance, by Dr. Braislin in the same number of *Science* in which Prof. Thomas's letter appears; and why such an objection should be offered to my statement, it is even more "difficult to imagine."

The general theory advanced by Professor Thomas of a fundamental difference between the civilizations of the Atlantic and Pacific groups, is one for which I have never found any evidence. He must know that the ancient civilization of the Mississippi Valley offers as strong, if not stronger, traits of analogy to that of Mexico and Yucatan than does that of the Haidahs. Consider the designs shown on the engraved shells, so well shown in the beautiful monograph of Holmes, or the copper work of the mounds of Ohio and Georgia! In view of such evidence, how could Prof. Thomas write, that "no such resemblance to those of the Atlantic slope is observable?" Is he not also aware that both the Nahuatl and Maya languages trace their affinities exclusively to the eastern and not to the western water-shed of the continent