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 4π 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 πX.

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

As for the "mathematical probability" referred to by Dr. Dall, it is illusory. We find "interwoven chains of customs and belief" of the most seemingly fanciful and artificial character in nations so remote that the theory of transmission is impossible —such as Niblack shows between New Zealanders and Haidahs, or as Morgan adduced between Iroquoiean and Dravidean tribes. These do not depend on transmission, nor yet on chance, but on the unalterable principles of human psychical development, which proceeds under fixed laws, operates largely on the same or similar materials, and produces identical or analogous results.

In conclusion, I repeat what I have said more than once before, that I challenge any one to cite a single American language showing clear traces of Asiatic or any other foreign influence; or a single native American art or industry obviously traceable to foreign culture.

D. G. BRINTON.

Philadelphia, April 5.

Auroras.

SINCE 1572 there have been 106 auroras seen as far south as the Mediterranean in Europe or Virginia in this country, and exhibiting features constituting displays of the first magnitude. In making up this list, the records consulted have been sufficiently complete to insure that very few, if any, displays, having the geographical extent indicated, have been omitted. The list comprises, practically, all the really great auroras during the past 420 years, few, if any, of which would have failed to be visible even in full moonlight or strong twilight. It is a very curious fact, that very few of these splendid displays reported from large numbers of localities and attracting the attention of even the most indifferent, fall near the solstices, while they are most numerous near the equinoxes. This peculiarity has long been known, but that the distribution is real and not factitious, depending upon twilight in the summer and cloudiness in the winter, is best shown by admitting only those auroras which are certainly on a sufficiently grand scale to insure that they will without fail be seen and widely reported. The monthly distribution of the displays belonging assuredly to this class during the past 420 years, is as follows:

January	6
February	17
March	14
April	8
May	3
June	0
July	4
August	4
September	14
October	21
November	12
December	3
Total	106

M. A. VEEDER.

Lyons, N.Y.

The Palæolithic Man Once More.

IN the first number of the new *Journal of Geology*, published under the auspices of the University of Chicago, Mr. W. H. Holmes, in the capacity of co-editor in "Archeologic Geology," has given to the world a long and labored article, in which he endeavors to demonstrate that because he has failed to find any evidence of the existence of the palæolithic man in the Trenton gravels, therefore no such evidence has ever been found by any one else. In his characteristic style he designates as "gravel searchers, unacquainted with the nature of the object collected and discovered, and little skilled in the observation of the phenomena by means of which all questions of age must be determined," several of the foremost men of science of our time, who claim to have discovered such evidence there. As he also makes

CALENDAR OF SOCIETIES.

Anthropological Society, Washington.

Apr. 11.—Frank Hamilton Cushing, Zuni Song and Dance.

Biological Society, Washington.

Apr. 8.—J. W. Chickering, The Botanical Landscape; Frederick V. Coville, Characteristics and Adaptations of a Desert Flora; C. W. Stiles. Notes on Parasites,—the Cause of "Measly Duck," with Microscopic Demonstration; R. R. Gurley, Natural Selection as Exemplified by the Cackling of Hens.

Geological Society, Washington.

Apr. 12.—Symposium—Subject: The Age of the Earth, taking as a basis for discussion the article by Mr. Clarence King in the *American Journal of Science* for January, 1893. The discussion was opened by Mr. Gilbert, and many others participated.