

Color Names.—The color names appear difficult to analyze, and vary from those in Chapaneec. Thus, as given by the various authorities, they are :

	Mangue.	Chapaneec.
Black,	nanzome, R.	dujamä.
White,	nandirime, R.	dilimä.
Yellow,	nandiume, R.	nandikumä.
Blue or Green,	{ nandipame, R. apame, B.	ndipamä.
Red,	arimbome, B.	nduimä.

In these adjectives the termination *me* or *mä* does not belong to the root. Father Abornoz tells us that this suffix characterizes adjectives in the singular number, when they qualify a certain class of nouns "in *tighe*." (See his *Gram.* p. 15.) The nasal or resonant beginning most of them is also a mere prefix.

Proper Names.—But few native families of the Mangue districts of Nicaragua have retained names drawn from their ancient tongues. In a list before me of several hundred persons in Masaya and Managua, the only surnames from the Mangue are *Norori*, *Ñamendi*, *Namullure*, *Putoi*, *Nionongue*, *Macanche*, and perhaps *Huembes* and *Piura*. Generally, the natives adopted Spanish surnames.

On the other hand, a large number of local names, derived from the Mangue language, on the map of Nicaragua still define the region once occupied by this nation. Such are *Nindiria* (from *ninda*, shore, *diri*, hill), *Nakutiri* (from *naku*, fire, *diri*, hill), *Monimbe* (*nimbu*, water, rain), *Nandasimo* (*nanda*, brook), *Mombonasi* (*nasi*, woman), *Masaya*, *Managua*, *Namotiva*, *Norome*, *Nicoya*, *Oretina*, etc., etc.

Photography by a Lightning Flash.

By Prof. Edwin J. Houston.

(Read before the American Philosophical Society, November 20, 1885.)

Mr. Albert S. Barker, of Philadelphia, has recently sent me two photographic views of his stable and surrounding objects, the exposure for which were made during an exceedingly dark night, with no other illumination than a single lightning flash for each.

The photographic negatives were taken during the severe storm that

occurred in Philadelphia and vicinity on the 29th of October, 1885. The exposure was made at 7 P. M. The thick clouds produced pronounced darkness. At the same time the rain was heavy, and the wind high. Considering the circumstances, the negatives secured were very good.

The circumstances of the exposure were as follows, viz: the camera was placed in an open window, and pointed towards the stable, its focus for this point having been previously obtained. The slide was then drawn and the plate left exposed to the night until a lightning flash came. This occurred in less than one minute, when the slide was instantly closed, the plate holder reversed, and another exposure obtained by means of the illumination of the next flash.

The plates were developed during the evening. The results obtained were, in Mr. Barker's judgment, about equal to what would have been secured by an exposure of about $\frac{1}{300}$ of a second in bright sunlight at noon.

The plates used were exceedingly sensitive gelatine films. A comparatively large diaphragm was employed in these exposures.

The circumstances under which these exposures were taken were such as thoroughly prevented any illumination of the objects save by the flash itself. The room in which the camera was placed was of course quite dark.

Apart from the interest attached to Mr. Barker's photographs as evidence of the recent advances made in what is generally called instantaneous photography, they appear to present considerable value in the light they throw on the question of the duration of the ordinary lightning flash.

The views generally held as regards the duration of the lightning flash is, that it is practically, if not actually, instantaneous. From experiments made by Wheatstone and others, the duration of a flash, as determined by means of a rapidly revolving disc, it is generally believed to be from the $\frac{1}{1000}$, to the $\frac{1}{10000}$ of a second. Whatever may have been the duration of the flashes thus measured, it would appear probable that flashes of great severity, where the discharge traverses many miles of air, would, under many circumstances, continue for quite an appreciable time.

Mr. Barker's photographs appear to show that this was the case during the night in which they were taken. While the fixed objects, such for example as the stable, came out quite sharply, the trees show unmistakable evidences of violent motion. It is true that these trees were not in sharp focus, being nearer the camera than the stable. Though somewhat blurred, they nevertheless exhibit unmistakable signs of having perceptibly changed their position during the time of exposure. In other words, the plate was illumined for a sufficient length of time to permit the motion to be clearly shown. The lightning flash, therefore, was not instantaneous in the sense generally attributed to it, but continued to illumine the plate for quite an appreciable time.

It would be interesting for the photographic experiments of Mr. Barker

to be repeated under other circumstances to determine this question more certainly. For example, if the camera were focussed sharply on a distant tree, and a negative taken during a violent thunder storm by a lightning flash while the tree is in motion, if the foliage comes out in detail with no perceptible motion shown, the continuance of the illumination would then be proved to be too short a time for its appearance. If, on the contrary, the leaves appear blurred as if moved, then the generally received notions concerning the instantaneous character of the lightning flash must be changed.

Or, if the camera should be focussed on a rapidly moving wheel, and a photographic picture be taken during its illumination by a lightning flash, then the peculiarities of the negative could be utilized, not only to determine the question of the greater or less duration of the flash, but even to measure the actual duration itself.

It will be observed that the method here suggested substitutes the sensitive plate of the photographic camera for the retina of the eye. From the results of Mr. Barker's photographs, it might be inferred that the former is far more sensitive than the latter. If this be the case, then the photographs thus obtained would furnish more precise means for measuring the duration of the illumination, and hence of the flash itself, than the method followed by Wheatstone and others.

The lightning flash contains so large a percentage of the blue rays of light, that we may fairly suppose that its actinic effects on a photographic plate would be more decided than with equally bright sunlight. This greater sensitiveness of the light of a lightning flash may perhaps account in some degree for the possibility of taking photographic pictures by its means, but it also equally explains the probability of the blurred foliage in Mr. Barker's views being actually due to their movement during the short time they were exposed to the camera, and thus disproves the approximate instantaneousness of the flash itself.

Central High School,

Phila., Nov. 20, 1885.

*Résumé of the Work of the International Geological Congress, held at Berlin,
Sept. 28 to Oct. 3, 1885. By Dr. Persifor Frazer.*

(Read before the American Philosophical Society, November 20, 1885.)

An abstract of the Proceedings of the late Geological Congress at Berlin has been published by the writer in *Science*; a fuller report is about to appear in the *American Journal of Science and Arts*. The report, containing all the documents relating to the work of the Congress, and only less complete than the official report, will be presented to the American committee whenever it meets. In the meantime, it will interest Geologists



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