'hotel' in the bottom of the cañon. This is a board shanty of a single room below, with a kitchen attached, and two bedrooms under the roof above. Primitive as the accommodations are, and although, when there is no press of company expected, the functions of stage proprietor, road-owner, driver, guide, landlord, and cook are all merged in one person, we found that person adequate to all those duties; and even the lady of our party was comfortably cared for, both as to bed and board. When this extraordinary place comes to be better known and more largely visited, ampler accommodations will doubtless be provided, both in the cañon and at the railway-station. The 'hotel' stands at the junction of the Peach-Spring Cañon and that of the Diamond River, close to the refreshing stream of pure water. The Diamond-River Cañon, of which Dr. Newberry gives two good illustrations, was explored upward for two or three miles on the afternoon of the first day. The following morning suffices for the junction of this cañon with the Colorado, which is near by, and for the views up and down the river, which are to be had for less than an hour of climbing. Altogether, there is nothing like this cañon. The far-famed Yosemite is more beautiful and more varied, but not more magnificent, nor half so strange and weird.

I may be allowed to add the remark that the botany of these lateral cañons is very interesting, and inviting to a longer stay. It had been so well explored by Mr. and Mrs. Lemmon a year before, that we could not expect our hurried visit to be rewarded with any thing absolutely new. But here we saw an abundance of the singular and striking Fouquieria in flower, and that alone well repaid the toils of the excursion.

This is the only accessible point at which a descent can be made into the bed of the Grand Cañon. But from Flagstaff — a station about nine hours farther east, and at considerably greater elevation, in a district of pine-forests, and close to the beautiful and snow-clad San Francisco mountains — a wagon-journey of two days over the mesa will take a party to the Marble Cañon, described and illustrated by Powell, where the Colorado flows twenty-five hundred feet below, between unbroken vertical walls of many-colored marbles. Moreover, the neighborhood of Flagstaff abounds in cliff-dwellings and cave-dwellings, the latter comparatively little known; and altogether this seems to us a most inviting place of summer resort.

Journeying eastward, the traveller passes one of the most interesting of the Indian pueblos, that of Laguna; and that of Zuñi is well within reach from Fort Wingate.

A. G.

THE WASHINGTON MONUMENT, AND THE LIGHTNING STROKE OF JUNE 5.

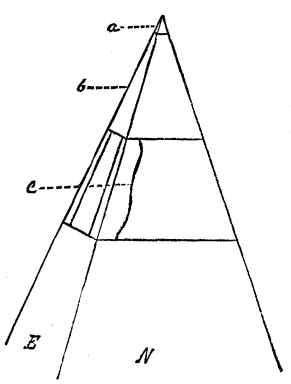
THE recent injury to the Washington monument by lightning has attracted attention throughout the country to such a degree that a short statement of the facts in the case will doubtless be of interest to the readers of *Science*. On the afternoon of June 5 a thunder-storm of no unusual character passed over Washington. At about fifteen minutes past three there was a single burst of thunder of some violence, which was about the only notable electrical disturbance of the afternoon. Although it had successfully passed through disturbances apparently much more violent on one or two previous occasions, this time the monument was 'struck,' and some damage done to one of the stones near the apex. Two men who were inside of the structure, at the base, describe the sound produced as resembling the simultaneous discharge of a great number of cannon, and declare that the 'whole monument trembled.' Two others were in a small wooden building, used as an office, near by. One of them was looking out of the window, away from the monument, toward the north. He affirms, in the most positive manner, that he saw a ball of fire, which he says was as large as his fist, coming directly towards the window out of which he was looking. Both he and his companion (who was not looking out of the window, and who did not see the ball of fire) seem to have felt something of the usual effect of a shock. Those who were within the monument say they felt no unusual sensations except those produced by the noise.

When the monument was examined from the ground with the unaided eye, no injury could be detected. On applying a good telescope, however, it was seen that one of the stones just below the capstone was split from top to bottom, the crack produced being about four feet long, and it was open to the extent of about two inches. A small corner of the lower corresponding angle of the capstone had also been carried away, this doubtless resulting from the opening of the crack in the stone upon which it rested.

The appearance of the apex is fairly represented in the sketch, in which (*a*) represents the aluminum tip, (*b*) the capstone, and (*c*)

shows the crack in the stone in the next lower course.

Col. T. L. Casey, U.S.A., the engineer in charge of the construction of the monument, requested Professors Rowland of Baltimore, Newcomb of the U. S. navy, and Mendenhall of the signal-service, to examine the monument, and recommend such additions to the present arrangements for protection from lightning as would seem to them necessary and sufficient. It was ascertained on examination, that, with the exception of that shown in the sketch, the monument showed no evidence whatever of having received the stroke. A careful examination of the tip of the aluminum apex has not yet been made; but it seems likely that it will be found to be somewhat blunted by fusion, as is so often the case even where no other effect of the stroke is to be seen.



This aluminum pyramid is secured to the capstone by a heavy copper bolt one and a half inches in diameter. From the end of this, four copper rods, each three-quarters of an inch in diameter, are carried to the extremities of four heavy iron columns extending to the base of the monument, inside of which the elevator runs. As originally put in, these rods are bent out towards the four corners of the pyramid near which they run on their way to these iron columns. Just where one of these is nearest to the angle of the pyramid, and hence nearest to the outside of the structure, the rupture occurred; and to this must doubtless be attributed the localization of the stroke.

The damage done to the monument is in reality very small, and can easily be repaired; but the accident is exceedingly instructive to those interested in lightning protection. The conducting power of the interior seems to be ample for any discharge which could possibly occur, and no evidence appears of any weakness in this respect; but it is evident that the aluminum apex alone does not possess sufficient collective or distributing power, and the improvements suggested by the committee will doubtless be in the direction of increasing that power by the addition of more metal.

M.

Washington, D.C., June 15.

THE PERIODICAL CICADA.[1]

Just at this time considerable interest is manifested in this curious insect, because of the concurrence of two extensive broods, the one belonging to the typical septendecim form, the other to the tredecim race. These two broods appeared simultaneously in 1664, and will not concur again till the year 2106. The following are the localities in which these two broods will respectively occur: —

Tredecim (1872, 1885).

Illinois. — Jackson, Union, Macoupin counties.

Missouri. — St. Louis, Boone counties.

Georgia. — DeKalb, Gwinnett, Newton counties.

Tennessee. — Madison county, and northern portion of the state.

Mississippi. — Copiah county, Oxford, and eastern portion of the state.

Louisiana. — Carroll Parish.

Kansas. — Phillips county.

Arkansas. — Flat Bayou.

The existence of this brood has been verified in past years in the parts of Illinois, Missouri, Tennessee, Mississippi, and Arkansas, indicated; but the localities in Kansas, Georgia, and perhaps Louisiana, require further confirmation this year.

Septendecim (1868, 1885).

New York. — Kings, Monroe counties.

Massachusetts. — Fall River, south-east portion of the state.

Vermont. — Rutland.

Pennsylvania. — Lancaster.

Ohio. — Green, Franklin, Columbiana, Pike, Miami counties, and vicinity of Toledo.

Indiana. — Tippecanoe, Delaware, Vigo, Switzerland, Hendrick, Marion, Dearborn, Wayne, Floyd, Jefferson counties.

Michigan. — South-eastern portion.

Delaware. — Very generally.

Maryland. — Very generally.

District of Columbia. — Very generally.

Virginia. — Very generally.

Kentucky. — Around Louisville.

Georgia. — Habersham county.

From chronological data, the fact that seventeen years or thirteen years are respectively required for the underground development of this insect, according to the race, is fully established, one of the first recorded septendecim broods having been observed every seventeen years since 1715. Such anomalous and excep-

[1] Extracts from a paper read to the Biological society of Washington, May 30.