

Lightning-Discharge.

ON Feb. 24, 1890, at 8.45 P.M., there was a case of lightning-discharge here which is perhaps worthy of notice. The building struck was Newcomb Hall, the property of Washington and Lee University. It is a three-story brick building covered with tin, having seven downfalls not connected with the earth, and having no lightning-rods. On top of the building, for lighting and ventilating purposes, is a square cupola. This has wooden corner-posts six or eight inches square; its walls are almost entirely glass; its roof is tin. The distance between the tin on the roof of the cupola and the nearest tin in connection with that on the roof of the building is about four feet. The lightning struck the roof of the cupola, passed down one of the corner-posts to the roof of the main building, and then down five of the seven downfalls to the ground. The roof of the cupola is "hipped;" and just under each of the four eaves, in a horizontal position, are two planks, each about ten inches wide. The four planks adjacent to the post struck were thrown entirely off. The tin on the roof just above the post was thrown back, uncovering about a square yard of the roof. The post itself was torn to splinters at the top. All but five panes of glass, out of a total of about fifty in the walls of the cupola, were shattered. Nearly all of the glass fell outside, and the tin all over the roof of the cupola showed signs of having been pushed upwards. When the discharge left the post, it divided, part of it going to the tin on the lower part of the post and thence to the roof, and part of it to a strip of tin on the window-sill. This strip of tin was composed of five or six pieces tacked together, not soldered. Nearly all of these joints were separated, about two inches of the tin being bent over in the direction in which the discharge travelled, from above down. This part of the discharge reached the tin on an adjacent post of the cupola, and thence passed down to the roof. One sharp corner of tin was burnt off, leaving a burnt curved edge about an inch in length. The two posts and the tin on them were blackened at the point where the discharge reached the tin. There was no further trace of the discharge until it reached the ground. As already stated, it passed down five of the downfalls, but apparently much the largest part passed down one. At this point, for a distance of ten or twelve feet, the ground was as much turned up as it would have been by a large plough. Some of the earth was thrown to a distance of twenty or thirty yards. The clerk of the faculty has his office in a corner room on the ground floor next to this downfall. He found the steel pens in a box on his desk so strongly magnetized that one pen could support four or five others. The pens in the penholders were also magnetized. Two panes of glass were broken in this room. Fifteen or twenty feet from this corner of the building is a water-pipe, wrought iron, one inch in diameter. This pipe at a short distance connects with a cast-iron pipe whose internal diameter is two inches; this, in turn, connects with the system of pipes supplying the town of Lexington with water. The two-inch cast-iron pipe was found the next day to be leaking badly in seven places within a few hundred yards of Newcomb Hall. There seems to be no reason to doubt that the discharge in some way burst the pipe. The leak nearest the building was over fifty yards away. There were no indications of melting. One hole in the pipe was an inch wide and about three inches long, a piece of that size apparently having been knocked out. The pipe is very old and rotten, being almost as soft as graphite. The water in the pipe is under a pressure of about a hundred feet of water. The only other case with which I am acquainted, where water-pipes were damaged by lightning, is that given by Secchi in the *Telegraphic Journal and Electrical Review* (London, 1872, translated from *Les Mondes*). In that case the pipe was broken, and some lead melted, at the point where the discharge first reached the pipe.

The report at the time of the discharge may be described as terrific; it was the more so, because it was the very first indication of any thing like a thunder-storm. There was no lightning before this discharge, and not much after it.

Besides the facts given above, there were some other reports concerning the discharge which may be of interest. Having heard that some persons saw what seemed to be a ball of light-

ning, I made as careful inquiry as I could concerning it, with the following result:—

1. A student was sitting before an unshaded window, from the roof of which Newcomb Hall is visible, and less than two hundred yards from it. Attracted by a bright flash, he looked up, and reports that he saw a ball of fire, in size and appearance about like a Roman candle, slowly descending on the building. It disappeared about the time it reached the roof, when the explosion was heard. He at once reported what he saw to his uncle, the president of the university, saying he thought the building was struck. They then looked out for signs of fire, but saw nothing.

2. In another direction, and at a greater distance, is a house from which Newcomb Hall is plainly visible from top to bottom. A lady in this house, sitting before a window, had her attention attracted by a flash, looked up, and saw a shower of fire-balls falling on Newcomb Hall. On careful inquiry, I learned that she did not see these balls above the top of the building: they seemed to be very nearly or quite on it when she saw them. She possibly saw what was concealed by the building from the student. This lady told me that some young ladies in another room in her house saw what she herself saw: I did not talk with them about it.

3. About a quarter of a mile from Newcomb Hall, on Main Street, stands the Court-House, a short distance back from the street. Mr. B. was standing in the door of the Court-House, looking out on Main Street in the direction of Newcomb Hall. He first heard a sharp, quick noise like that produced by slapping the hands together, which seemed to come from his telephone. He then saw across the street from him, at a height of about fifteen feet from the ground, a ball about the size of a large orange just luminous enough to be plainly visible, followed by a brighter trail ten feet long. This ball moved horizontally and slowly up the street about twenty yards, and then burst with the brightest flash Mr. B. ever saw, and a terrible noise. This noise was immediately followed by another of like character in the direction of the university buildings. Mr. B., I should state, is a man of the very highest character, and his word would be taken without question by all who know him. He is calm and unimaginative. I omitted to mention that his face felt as if it had been hit with sand, and that there was an unpleasant sensation for some hours afterwards. It was rainy, and Mr. B. saw no one on the street; but I learned that three negroes were standing on the sidewalk nearly under the point where Mr. B. saw the globe burst. As they were not moving, Mr. B. might easily miss seeing them. I questioned two of these negroes. They were standing facing each other, one looking up the street, and the other down. Each of them thought he saw a ball of fire fall in the street in the direction in which he was looking, and at a distance of from fifty to one hundred yards away. Neither of them knew any thing of the explosion reported by Mr. B., although it was almost immediately over their heads, and only twenty or thirty feet away. Newcomb Hall could not be seen by either Mr. B. or the negroes.

I give the facts as I gathered them, without comment. There is no reason to think that any of the persons questioned failed to give a substantially correct report of the impressions made on their senses.

S. T. MORELAND.

Washington and Lee University, Lexington, Va., April 26.

Sunspots and Tornadoes.

THE following figures show a slight parallel between the frequency of tornadoes in the United States for the last twelve years, and the sunspot curve of the eleven-year cycle. The solar data employed have been obtained from Professor Rudolph Wolf (Zurich), the well-known sunspot specialist. The tornado numbers are supplied by Lieut. John P. Finley of the United States Signal Service, but should be regarded as only approximate, and subject to more or less change, for these reasons: (1) better facilities now exist for obtaining news of tornadoes than existed fifteen or twenty years ago, owing to the special activity of the United States service, the organization of State weather bureaus, and the co-operation of the press; and (2) west of the Mississippi the coun-