Ethical as well as business reasons prevent the announcement of even approximate results, the complete elaboration of which will appear over Mr. Fuller's name early in 1897, whether in public form or as a private report to the Louisville Water Company I am not informed. In any case, the matter which it will contain concerns not Louisville alone, but the world as well. It is to be hoped that water experts will have access to it. I believe that I am entitled to say, however, that Ohio River water has been successfully filtered in quantity, under the most extreme conditions, during the course of these experiments. It has come from the filters clear and sparkling, on days when the chemists found in the neighborhood of 3,500 parts of solids per million, and when the river showed 12,000 to 25,000 bacteria to the cubic centimeter, I have counted six to ten individual colonies in the filtered water.

The equipment of both chemical and bacterial laboratories was complete and thoroughly up to date. The methods for bacterial work, preparation of media, classification, etc., were mostly taken from unpublished manuscripts. The steam sterilizer was largely replaced by the autoclave, at a pressure of 20 pounds and a registered temperature of 126 degrees Celsius. Color tests were a feature of the chemical work. the method being that of the Massachusetts State Board of Health.

Chemists and bacteriologists can not praise too highly those members of the Louisville Water Company, who, in the face of much criticism, and at such great expense, have not only made possible the solution of the question of their own water supply, but that of the great cities of the Mississippi basin, and at the same time placed in Mr. Fuller's hands the means of enriching our experience in the handling of refractory sources of potable waters for cities.

Indianapolis, December 30, 1896. GEO. W. BENTON.

A "TORNADO" IN RUSH COUNTY, INDIANA, AUGUST 1, 1896. BY W. P. SHANNON.

On the first day of last August there was a destructive storm along the southern line of Rush County. Approximately, we may say, it began near Milroy in Rush County, and ended near Metamora in Franklin County, running from west to east on a line bearing but little to the south. It was not continuous. The most destructive part of its course was shortly after the beginning, on my old home farm. I visited the place two days after the storm. My brother, H. F.

Shannon, who was in the storm, described it as a cannonading from the clouds, and, as the evidence shows, this figure is a good one.

What seemed to be an ordinary rain cloud rose from the north. In a short time the cloud showed that it was bordered behind with a straight line, and the blue sky appeared beneath. It seemed that in a few minutes the cloud would be over and all would be bright again, when suddenly from the rear edge of the cloud in the northwest vapor began to puff downward; in a moment a broad band of buff-colored cloud reached from the main cloud to the ground, not straight down but obliquely to the south, and curving more southward near the ground. This band was a half or a mile wide, the width of the storm as it was approaching; then parallel bands began to float southward from the main band. Then the real nature of the band began to show itself—it seemed that shots were being fired fast and thick in front of the main band from the upper cloud to the ground. Imagine the smoke from a cannon to continue to boil from the ball as it progresses, and you have a picture of one of these shots as it went from the cloud to the ground. The buff color, or the dust-like appearance, may have been due to electricity. The storm ran from west to east along the well defined rear edge of the main cloud.

While the storm was passing, my brother was in a barn near the south doors, which were open. (The roof of the barn slopes to the east and west). While the storm was approaching it gave a rumbling sound, while it was passing it made a hissing sound, and the air was so full of vapor that the house, a few steps from the barn, couldn't be seen. Suddenly there was a dead thud on the west side of the barn, then a deluge of water poured from the hay above, and all who had taken shelter in the barn had to gape for breath. Then he saw passing obliquely before the open door what he took to be the head end of one of the shots. It was like frost particles moving among one another, as bees while swarming. The thud west of the barn was another one of those shots. Those who were in the house had retreated to the cellar, when they were deluged with water. They noted the hissing sound and a glare of lightning over the ground, and had the same difficulty to get their breath. A woodhouse and the porch connecting it with the house were knocked into pieces, and large trees about the house and barn were broken off or uprooted; but no one heard any crashing of timber or buildings, the only noise was the hissing sound.

A hundred acres of corn west and northwest of the barn was laid flat. In a piece of timber, beyond the corn, three-fourths of the trees were knocked down. In another piece of timber, southwest of the barn, nearly all of the trees were down. About forty rods east of the barn is another tract of timber. In a hundred

acres of this more than half the trees were down. A map of the 2,000 acres of land covering the most destructive part of the storm's course, with lines showing the directions in which trees were thrown, should have the lines arranged fan-shaped, running from north to south on the western border of the map, and from west to east on the northern border. These lines may be evidence that the storm was not a tornado.

My brother took me over the ground and showed me the records of the work. They were not so striking as immediately after the storm, but they were still plain. In a piece of bottom land, covered with horse weeds, a large sycamore tree had been turned out of root, and in a circle of fifty feet or more in diameter about the root of this tree the horse weeds were flat, almost beaten into the ground. It looked as if a great ball of water, or something, had struck the ground there and turned the tree out of root. It was no trouble in the patch of horse weeds, or in the corn field, or in the grassy woodland, to pick out where every shot had struck the ground. In every case where a shot struck the ground in front of or at the base of a tree, the tree, if green, was turned out of root, if dead, was broken off even with the ground.

In most cases where the shot struck a tree above the base, the tree was broken off. In one case, while standing at the base of an upturned tree in the center of the spot of flattened grass, we could tell by looking upward and westward, the course of the shot by another tree that had been topped in its path. In another case we were standing in the center of a spot of flattened horse weeds, wondering why the shot didn't hit one or the other of two ash trees on the west side of the spot; soon we observed by limbs broken away that the shot had passed between the two trees. In nearly every case where a tree had been topped, we could find the spot of flattened grass a little distance east or southeast of the base of the tree, the direction depending upon our position in the devastated area. In this way we could, in nearly every case, make out the path of the shot through the air. Near the central part of the devastated area the shots moved from the northwest downward at an angle of 45°. In the eastern part of this area they moved nearly eastward at an angle of 30° with the horizon. In some cases a dead tree was unharmed, while a green tree near by was turned out of root, or had its top cut off. There was evidence that, on the south margin of the devastated area, trees were blown down by the wind; but in the central part they must have been knocked down by globe lightning, or something else, shot from the cloud.

The evidence is that each shot was accompanied by electricity, rarified air, and a deluge of water. The appearance resembling particles of frost flying among one another, as swarming bees, suggests electrified snow. Such a suggestion may lead to experiment. What kind of a storm was this?