

"Fog Whistles,"—"Sound Waves,"—"Cloud Waves."

MARION, Ferry Co., Alabama

Dear Sir,

I have received your newspaper slip containing "Curious Phenomena, Reported by a Sound Navigator," taken from the Norwich (Conn.) Bulletin, and republished by the N.Y. Daily Times, under the head, "STORM WHISTLES IN A FOG." You say you cannot unravel the slip by my system of sound waves, and you ask me to unravel it for you, as a favor. Let me answer you by stating what the article turns the problem to be solved:—"Why the sound of whistles is not conveyed as well on a foggy night as on a clear one, is a problem to be solved." And this is followed up by a sort of negative reasoning in these words, "It cannot be attributed to headwinds or heavy seas, for the sea was calm and the air almost motionless. The signals at Huntington and Execution lights have been heard over fifteen miles against a north-east gale. The navigators of the Sound are anxious to have the phenomena explained," have made this long extract, because I think you have found a difficulty in reconciling the transmission over fifteen miles in the face of a north-east gale, with the non-transmission of sound in a fog. I will refer to this again, after I have given you some of the reasons why the sound of steam-whistles is not conveyed as well on a foggy night as on a clear one. The long range of sound, as connected with the cloud-system, has been a life-time study with me, and this is the conclusion of the whole matter. If you would hear sound distinctly from a great distance, or, even from a short distance, the sound-wave must be transmitted through a swath of atmosphere, which is homogenous in electromagnetic tension or polarity. In other words, the genesis of the sound and the point of observation must both be in the same swath of winds, having the same polarity, whether it be northern or southern. You have often heard me say, the long range of sound is a part of the cloud-system. I cannot turn aside here to discuss the cloud-system. It is enough to say, that when a cloud-wave is very large, the north and south winds, in their approach to the axis of the wave, will run over large segments of rotation, and sound, having its genesis in either of these swaths of winds, will be transmitted down the same, to a distance proportionate to the barometrical gradient of the wave. But the sound can never be heard beyond the axis of the wave. The north and the south winds, bring in opposite states of electromagnetic tension, attract each other with great and increasing energy, as they approach the centre of the wave. But not even this force, aided by the force of gravitation, and by the relief of pressure on the left of the winds, can ever entirely extinguish the centrifugal force, a contingent thereof always remaining, being represented by the calm near the centre of the cloud. The winds moving in involute descending spiral, curving to the left, approach the axis near enough to discharge their electricities through the medium of the calm, and when they have done so they become homogeneous as to electro-polarity, and repellent, moving off in involute ascending spirals around the axis of the wave. And right here, let me say, that every sound wave, coming either from the North or from the South, is either extinguished by the electric discharge between the opposite swath of winds, or it ascends with them beyond the reach of the observer. I believe it is quenched on the meeting of the opposite winds. I would as soon expect to hear clear and well defined words passing over the telephone wire, without the electric fluid, as to hear clear and well defined sounds passing through a heterogeneous mass of atmosphere.

Beyond question, the fog is always in the calm of the cloud-wave, and if it be a phosphorescent fog you need not expect to hear the steam whistle much further than you can see the boat. A clear sky is evidence of homogeneous winds whether they blow at the earth's surface or not. When I hear sounds, which reach me from a great distance north, I know it means dry weather, and if in the winter, it means cold weather. If I hear sounds coming from a great distance south, I know it means rain, and if in the winter it means warm weather. This physical truth must have been known almost a thousand years before the beginning of our era, for one speaking on this subject at that time, said: "For there is a sound of abundance of rain;" and this was the only reason given why he knew the rain was coming. This simple sentence has been a sealed book to theologians and men of science from that day to this. But the long range of sound may mean dry weather.

On the 22nd day of July, 1864 at 2 o'clock p.m. the cannonading at Atlanta, Georgia, was distinctly heard at Marion, Ala., a distance of one hundred and eighty miles, the wind was a dry north-east wind and it brought with it in twenty-four hours the smoke of the battle field in a dense cloud. The bombardment of Port Royal, was heard at Jacksonville, Florida, and the smoke floated over the latter city in ten hours after the bombardment. Both of these cases show that the sound transmitted ran down long segment of north winds. When I heard the cannon at Atlanta I knew the fact that no primary cloud was on the continent on that day east of the Rocky Mountains and south of the Lakes. Of course I could only know this by knowing the relation between the form of the cloud-wave and its capacity to transmit sound, and to show that my views were well founded, I quote from the Agricultural Reports, 1865, p. 532.

"On the 22nd and 23rd of July, 1864, the same general conditions of dry winds, accompanied by extreme atmospheric dryness, were present. (Haddonfield, N. J.)—On the 22nd, the afternoon of the day before the reduction of the temperature to 46°, a neighboring farmer remarked the extreme aridity of his oats, saying "they dried before they reached the ground," while cutting them, during the 22nd, 23rd and 24th, the days of lowest temperature by the self-registering thermometer, a smoky haze was observed extending from Maine over New Hampshire, Vermont, Massachusetts, New York, New Jersey, Pennsylvania, Ohio, Michigan and further West. An extended drought prevailed. On the 22nd of July, at 2 p.m. (the very hour when the cannon was most distinctly heard), the force of the vapor, or pressure in inches, on the barometer was but 0.188, which is lower than we have ever observed it during summer and autumn, and lower than is sometimes noticed even at the freezing point. A few local storms or mountain squalls may have been noted, but these did not disturb the haze, and the severity of the drought indicates that no rain storms occurred." Entertaining the opinion that the transmission of sound, through the atmospheric volume, is greatly modified, if not controlled, by the form and extent of the cloud-wave, in which the sound has its genesis, wrote, in 1868, to Prof. Henry, Secretary of the Smithsonian Institution, giving him many instances of long transmission of sound, and asking his views of the probable effect of the form of the cloud-wave upon the penetrating power of sound. He replied:

"The subject of sound is one in which I have been long interested, and on which, in connection with its application to fog-signals, for marine purposes, I have made many experiments.

The effect of a fog, or, in other words, a cloud at the surface of the earth, on the transmission of sound, has not, as yet, been experimentally determined; and I fear that observations of the kind you mention will scarcely be sufficient to solve the problem in question." He adds further:

"The facts you state, in regard to the variation in the penetrating power of sound under different atmospheric conditions are very interesting, particularly in connection with other similar cases, reported to me by officers of the Union Army." By this authority (and it is the very best authority.) The problem of the effect of a fog or cloud upon the transmission of sound had not been solved in 1868. And it appears, from the slip you have sent me, that it is still an unsolved problem. You will see the learned Professor considers the effect of the cloud at

the surface of the earth, on the transmission of sound, only within the limits of the visible vapors. Let me say something about this. It is evident that the fog or cloud is in the calm of the cloud-wave. My observations, extending through a long period of time, satisfy me that sounds cannot be transmitted through greatly extended space, unless they leave their genesis in swaths of winds, having large segments of rotation to run over before they reach the axis of their cloud-wave. If sounds have their genesis near the centres of areas of high barometric pressures, or near the centres of areas of low barometric pressures, then they will be circumscribed in the extent of their propagation. If they occur at or near the centres of areas of high barometric pressures, they will be lost by lateral diffusion. If they occur at or near the centres of areas of low barometric pressures, their intensity will be maintained, but their prolongation will be circumscribed; but if they occur near the periphery of a cloud-basin of great extent, then they will be prolonged down the wind and to its left, with maximum intensity, and to the greatest extent possible under that meteorological development. Study this telephone of the air and learn its secrets.

But the slip says signals at Huntington and Execution lights have been heard over fifteen miles against a north-east gale. I have heard sounds from the south-west when the wind was blowing from the north, as well as from the north-east and north-west at the surface of the earth. But there was always something in the form of the clouds, or in the aspect of the heavens to explain this apparent anomaly. I am in ignorance about the topography of the country in the vicinity of Huntington and Execution lights; and, at the time of noting the sounds nothing is said about the appearance of the heavens; nothing is said about the clouds moving in the upper currents of the air; their forms, their tints, their dip and their course; nothing is said about the changing of the wind through the points of the compass, and the time occupied in such changes; nothing is said about clouds moving in the face of the surface currents, and no mention is made about the barometric, thermometric and hygrometric conditions of the atmosphere at the time of making the observations, and I am left to mere inference in all these matters; but the winds under consideration were mere surface winds. The north-east storm comes bodily from the south-west. The axis of the north-west storm is greatly depressed towards the north almost becoming horizontal. The south-west winds pass over the axis descend and become surface winds returning from the north-east. I have notes of a case similar to the one named in the slip. On the 28th October, 1871, I heard the whistle of an engine and the ringing of a bell eight miles distant. The wind at the time was blowing from the north, north-east, and the engine and bell were at Hamburg station, almost due south; but rain clouds were at the time, coming up from the south-west in the face of the surface winds, and though considerable rain fell the north winds were not cut off by it until the axis of the wave passed over and gave place to the south-west winds. But I am running this scrawl to unreasonable length. Let me add that he who would successfully study sound signals must successfully study the cloud wave.

Very truly,

JOS. F. BAILEY.

The proposal to flood at least a part of the great Sahara desert which has been so long talked of has, it appears, been adopted by France as a measure necessary to protect her African colonies from incursions of Arabs and other hordes from the south. The proposal now is to form a lake seven times the size of Lake Geneva, or about two hundred and ten miles long by about twenty-five miles in width. To the south of Algiers and Tunis are great depressions which have only to be filled in, which can be done by opening a channel through the height of land which forms the coast. A canal from the Gulf of Gabes to the site of the proposed lake would be a hundred and fifty miles in length.