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THE AUDIBILITY OF THE AURORA

By C. A. CHANT

FOR some years I have been collecting evidence regarding the audibility of the aurora, and notes embodying information gained have been printed in this JOURNAL from time to time. On March 24, 1922, there appeared in the *Toronto Globe* an article on the editorial page, which discussed an address before the Royal Geographical Society by Mr. G. M. Gathorne-Hardy, who claimed that he had heard a characteristic sound from the aurora while he was in Labrador in the autumn of 1920. The speaker, it was stated, was a man of standing; he had been a distinguished student at Oxford and was a wide traveller. He was quoted as saying:

Two points occur to me as worthy of mention in this connection. The first is that I have occasionally seen what appears to be the aurora by day, in the form of faint clouds having the characteristic appearance of the bands and streamers. The second point I raise with some hesitation, as I believe the balance of scientific opinion is against its possibility. That is, that, judging merely by the evidence of my senses, I should say that I had sometimes heard the aurora, when in rapid movement, making a faint, crisp, rustling noise. If this is a hallucination, it is a very strange one.

The article also gives the evidence of Captain H. P. Dawson, who was in charge of the British Polar station at Fort Rae in 1882-83 and who wrote:

The Indians and the voyageurs of the Hudson's Bay Company, who often pass their nights in the open, say that it (the sound) is not uncommon.

On one occasion Dawson himself heard it and he says:

The sound was like the swishing of a ship or the noise produced by a sharp squall of wind in the upper rigging of a ship.

That the subject aroused great popular interest was shown by the number of letters to the editor which it called forth. When these had ceased coming in, I made a request, through the same paper, that any others who had made observations on the phenomenon and who did not care to write to the press would send me statements regarding them. This brought to me some very interesting letters.

When in Ottawa some months later, I learned that several men in the Department of the Interior had interesting experiences to relate, and through the assistance of Mr. W. W. Cory, Deputy Minister, and Mr. R. Meldrum Stewart, Acting Director of the Dominion Observatory, I have been supplied with some of these.

In what follows I give extracts from the various communications I have received. In most cases only the bare statement of the observations is given; attempts at theorizing or aspersions on the scientists for being so slow to believe are omitted.

DR. O. C. J. WITHROW, Toronto (*Globe*, April 7):

For many years I lived in Fort William, Ont., and there one sees the aurora in all its brilliancy and grandeur. In the silent midnight hours I have been frequently called from my bed in the practice of my profession, and have many times seen the heavens swept by the majesty of this manifestation of nature's handiwork. Many a time I have heard a swishing sound, which I have always felt came from the aurora.

MISS ROSE DUNCAN, Forest, Ont. (*Globe*, April 7):

I lived on St. Joseph's Island a great many years, in a very quiet place, where I could account for every sound, especially on a winter's night, and have on several occasions heard sounds I could attribute to nothing else but the northern lights which were very bright. Sometimes the sounds would be quite plain. I do not recall hearing sounds unless the lights were plain.

MARY D. KENNEDY, Toronto (*Globe*, April 8):

I was brought up in the country, in Nova Scotia, and have known all my life that sometimes during certain displays a soft, slithering whisper can be heard. My father used to tell us to "listen and you will hear them change". At such times they seem very near, and move quickly.

F. G. HORNER, Bracebridge, Ont. (*Globe*, April 13):

Having spent several years in the Yukon, three winters being dog-team work that kept me in the wilds, where a tent was our chief habitation, I have had a very good opportunity to observe the aurora in all its grandeur near the Arctic circle. The sounds were very plainly heard in the very cold, dry atmosphere when the aurora was most active and showed the colours of the rainbow.

A. J. WOODWARD, Mimico, Ont. (based on many years of daily meteorological observations (*Globe*, April 22):

There is a distinctly audible noise from the aurora, but only from general displays that produce running waves from horizon to zenith in about one second. If these waves are wide, and consequently nearer, a rustling sound is produced, and the narrower the wave, the sharper the noise, almost to a crackling sound.

MRS. H. F. NASH, Toronto (*Globe*, April 25):

We were staying at the Kootenay Hotel, on the Arrow Lakes, B.C. A party of us took a trip to the Minnie Mack mine and the summit of Silver Mountain, 11,000 feet above sea level. While there we had a wonderful view of the northern lights. Great long shafts of light spread out in the shape of huge fans, waving from side to side like powerful searchlights. We heard a gentle swish, faint but still audible. We watched them for a long time.

E. A. COLLYER, Toronto (*Globe*, April 4):

Coming up the St. Lawrence in September, 1907, I witnessed a great display. The whole northern sky was aglow with shifting lights—the greatest auroral exhibit in my experience. I heard unquestionably a distinct crackling, rustling sound. The vessel was the S.S. Parisian. There was an entertainment in the saloon below, and the deck was almost deserted. Critics will, of course, say it was sounds from the saloon which I mistook for the aurora. But they will be wrong—it came from the heavens and nowhere else.

MRS. ISABEL DAVIDS, Toronto (*Globe*, April 10):

One very cold night many years ago I was walking along College St., when I was attracted to a magnificent display of northern lights, which took on different shapes, at once resembling a huge fan spreading wide, then part way, then closing, and other designs after the manner of a kaleidoscope. The colours were delicate blue, pink and corn colour. While gazing upward I distinctly heard coming from the sky a sound resembling the rustling of silk.

“OBSERVER”, Arnprior, Ont. (*Globe*, March 31):

I know for a fact that a sound sometimes accompanies the northern lights, having heard it on at least two occasions in northern Minnesota about the year 1892. During the fall very brilliant displays were seen, and on at least two occasions a faint but unmistakable crisp, rustling sound was heard by myself and others.

REUBEN BUTCHART, Toronto (*Globe*, April 18). Mr. Butchart’s letter deals chiefly with the journey of Sir John Franklin to the Polar Sea in 1819-22, and, though rather long, is very interesting. It is given in full:

Based on the recollection of a vivid boyhood experience and conclusion, I had for years assumed that I had heard the Aurora. But now I am not so sure. Nor is it likely that occasional observers in this latitude have any ground but imagination for their beliefs. The “suggestion” of sound is so obvious. My revised opinion is gained from a re-reading of portions of the old classic on the Arctic, Sir John Franklin’s Journey to the Polar Sea in 1819-20-21-22. It is apparent that more than one hundred years ago the question of the Aurora being audible was a live one, since the British Government included it in their list of objectives for Capt. Franklin. I quote from the Everyman edition, introduction:

“That I should take particular notice whether any and what kind of degree of influence the Aurora Borealis might appear to exert on the magnetic needle; and to notice whether that phenomenon were attended with any noise.”

There are frequent references, and that on page 241 of the same edition is to the point:

“The night was fine and the Aurora Borealis so vivid that we imagined, more than once, that we heard a rustling noise like that of autumnal leaves stirred by the wind; but after two hours of attentive listening we were not entirely convinced of the fact. The coruscations were not so bright, nor the transitions from one shape and colour to another so rapid, as they sometimes are; otherwise, I have no doubt from the midnight silence which prevailed, that we should have ascertained this yet undecided point.”

On page 253 the following good story occurs:

“One of the partners of the North West Company related to me the following singular story: ‘He was travelling in a canoe in the English River, and had landed near the Kettle Fall, when the coruscations of the Aurora Borealis were so vivid and low that the Canadians fell on their faces, and began praying and crying, fearing they should be killed; he himself threw away his gun and knife that they might not attract the flashes, for they were within two feet of the earth, flitting along with incredible swiftness and moving parallel to its surface. They continued for upwards of five

minutes, as near as he could judge, and made a loud rustling noise, like the waving of a flag in a strong breeze.'"

The reader is now referred to the same book (quarto edition) found in our Reference Library, where, in the appendix devoted to scientific observation, occurs the following:

From Lieut. Robert Hood: "The delicate electrometer suspended at the height of fifty feet from the ground was never perceptibly affected by the Aurora, nor could we distinguish its rustling noise, to which, however, such strong testimony has been given that no doubt can remain of the fact."

Captain Franklin writes: "I have not heard the noise ascribed to the Aurora, but the uniform testimony of the natives, and of the residents of this country, induces me to believe that it is occasionally audible. The circumstances, however, must be of rare occurrence, as is evidenced by our having witnessed the Aurora upwards of 200 times without being able to attest the fact."

Dr. Richardson states: "I have never heard any sound that could be unequivocally considered as originating in the Aurora, but the uniform testimony of the natives, both Crees, Copper Indians and Esquimaux, and that of older residents of the country, induces me to believe that its motions are sometimes audible. These circumstances are very rare, as will appear when I state that I have now had an opportunity of observing that meteor for upwards of two hundred different nights."

Lieut. E. F. Kane of the U.S. Navy, who headed two "Grinnell" expeditions for the relief of Franklin and who reported his findings in several volumes, with scientific notes on the Aurora to the Smithsonian Institution, says nothing of the emanation of sound from it.

Note that the scientific observers heard it not, but that they accepted the testimony of unscientific men, some of whom were under the influence of fear when they "heard." I give it up.

MISS MARIETTA L. DINGLE, Toronto:

While living in Winnipeg with others of my family, and while enjoying some very brilliant displays of the aurora, more than once I have distinctly heard an accompanying sound like a rustle of silk or tissue paper, which certainly was allied to the aurora very closely, and appeared to follow its waves of light as it travelled across the heavens.

Many times during three winters I spent in Winnipeg, 1891-2, 1892-3, and 1904-5, and occasionally in the autumn I saw wonderfully beautiful displays spread out upon the sky softly, like colour on a map, but having no audible accompaniment. When the sound was noticeable the aurora seemed to travel rapidly, in waves of light. The sound was not at all loud, but was decidedly arresting to music-loving ears, and is difficult to describe as it is so distinctive—neither rustling, nor crackling, nor swishing, but a mingling of all three sounds, faint and distant.

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JOHN F. HENRY, Owen Sound:

About twenty-five years ago I was farming in the Township of Holland near the village of Strathaven. As I was coming home from the village one night I noticed that the sky was bright with northern lights, very bright and changing every few minutes. I could hear at times a long drawn out noise, faint but perfectly distinct, and a few high musical notes very sweet and clear. The night was perfectly still.

DR. GEO. A. FRASER, Park Hill:

About September 10, 1908, Mrs. Fraser and I were visiting in Miami, Manitoba, and one evening were coming home at about 10 o'clock in company with Mr. and Mrs. Robert Munro, when we saw one of the grandest displays of the aurora we ever witnessed. The whole northern sky, clear to the zenith, was one mass of shooting rays. The evening was beautiful and mild. Our attention was drawn to the "sound" by Mr. Munro, and on listening one could hear light swishing sound mentioned by various correspondents. The Manitoba people spoke as if it was a matter of course to hear the sound.

GLENN A. GREEN, Hamilton:

In 1897 I crossed the Rocky Mountains near the Arctic circle and was near the summit for three or four months. Everything was still and the air clear. Late in the fall the northern lights were certainly quite audible. The sound is like one heard in an electric power house, and by the Indians it is said to be The Great Spirit whispering. I was within the Arctic circle for four years and never tired going out of the tent to see and to listen to the lights. There were six in our party and they all said they distinctly heard the sound.

MRS. JOHN MYERS, Brantford:

In 1870 the writer, then a young woman of 22, lived in Ingersoll. It was the time of the Franco-Prussian war and all that summer there were the most wonderful displays of the aurora. Often I had to be going home very late, probably 11 or 12 o'clock and the nights were quiet. The colour was all a beautiful crimson. Generally there were two broad bands right across the sky, with shoots of crimson darting from one band to the other, and certainly there was a faint crackling sound whenever the lights moved. It was a very solemn and impressive scene and has remained with me all these years.

LUTA MUNDAY, Niagara Falls, Ont.:

I resided many years in the vicinity of Cumberland House, northern Saskatchewan, and while there I heard the northern lights many, many times. Words of mine are inadequate to describe their marvellous beauty, and the sound of them was always audible when they were vivid. I would



describe the sound as a soft swishing and crackling sound, similar to that of a woman walking in a stiff silk dress. The last display I saw before leaving that truly wonderful country was in February, 1919, and it lasted over an hour. The heavens seemed to be divided into four sections: on one side, pure white rays; on the opposite side, rays of all colours; and joining the two, a vivid flame of the very brightest; and all meeting. I lay for an hour on my back on the snow watching the display and all that time I heard the same low swishing sound.

PROFESSOR WILL C. BAKER, Queen's University, Kingston:

I distinctly recollect a great auroral display seen here in Kingston in 1884 or 1885. I well remember, that it was mid-winter (I think February) for I cannot forget the three-mile drive to the farm, with its short-cut over the ice in Little Cataraqui Bay, while we observed and wondered at the marvellous sight. From sundown until 10 o'clock—and I do not know for how long afterwards—the whole sky was full of bright auroral light, so that the stars were paled by it. It seemed to issue from a radiant point at or near our zenith and to mark out the whole dome of the sky, south, east, west and north, into wedge shaped bands of light. It looked like a striped jockey cap with its segments of coloured cloth. The wedges all centred in the zenith and reached to the horizon in all directions in about equal intensities, as far as one could judge, around the whole horizon. The colours were red, yellow and green; and they shifted with the motion peculiar to the aurora. I remember noticing here and there the brighter stars shining through it, but at times none of the smaller ones could be seen through the screen of light. One of the men in the sleigh with me called attention to the curious crackling noise that often, though not always, accompanied the flash of a new band of light across the sky. The sound seemed to follow very closely (within a second or so at most) of the appearance, and was like the crumpling of stiff paper. It reminds one of the noise heard when discharging the glass jar in that famous but misused experiment of Franklin's, that is supposed to prove that "the energy in a Leyden jar resides in the glass." The sound is heard often when observing other forms of brush discharge. Next day the papers were full of headings which read, "Auroral display puts telegraph systems out of commission," etc.

Now, bearing in mind the following facts:

(1) The sound apparently followed close on the appearance; within a second or two at most.

(2) The night was cold and the air clear—perfect conditions for strong electrostatic effects.

(3) The accompanying severe, magnetic storm. And

(4) The obvious objectivity of the sound—for it was heard at the same time by all in the sleigh and its connections with the streamers was discussed; I think it clear that the sound did not come from the aurora itself, that is,

not through the air from the streamers to us, for in that case there would have been a lag of more than the one or two seconds observed. Next, it seems most probable that both the aurora and the sound came from the same source—possibly the electric impulse of Hertzian or other waves, or the incidence of the cloud of electrons, or whatever it is that really causes the aurora. Might not the sound come from the discharge of static electrification—remember the state of the atmosphere—in the immediate neighbourhood of the hearers? Could it be a discharge released in some way by the electric impulse accompanying the flash—a sort of photoelectric effect due not to the visible light but to the impact of an electrical disturbance that set up the aurora itself? The nature of the sound (Franklin's jar) makes this suggestion worth thinking over.

I have "heard the aurora" on other nights much more recently, but never on a scale comparable to the occasion I have referred to. I think, however, it was always on dry, frosty weather. I am sorry that I did not know enough at the time to look for brush discharges—a sort of St. Elmo's Fire—on neighbouring objects, but doubt if it would have been visible in the glare of the unusual illumination. I distinctly remember a light that spread over the snow-covered ground that was noticed and discussed at the time. We put it down to a reflection of the light from the snow surface. What a pity that we did not look to see whether this light accompanied the flash or whether it lagged with the sound.

CHARLES HARVEY, Hamilton, Ont:

I have on several occasions heard quite distinctly a sound (which may be described as a subdued swishing sound) accompanying very brilliant displays of the aurora. The first time I noticed this phenomenon was in January, 1888. The place was three miles east and one mile north of Saskatchewan. I was fourteen years old and was on my way home from a neighbour's place. I was very much impressed and considerably frightened and have never forgotten it. A few times since then I have observed the same phenomenon, always on the prairie where I lived from 1883 to 1898.

In the year 1919 while surveying for the Dominion Government, in company with Mr. G. A. Bennett, another Dominion Land Surveyor, while we were camped about nine miles southeast of Broadview, Sask., we noticed the same phenomenon. The atmospheric and other conditions were almost exactly the same in every instance, and so a description of the one which took place about October 15, 1919, will serve for all; and I might here state that these displays seem to be more or less local, as people living a few miles away, while noticing that there was a brilliant aurora, did not notice the accompanying sound.

The hour was about 9 o'clock p.m., not a cloud in the sky, not a breath of air stirring, and the temperature, I should judge, not lower than zero Fahrenheit. We were called out of our tents by one of our men to see the unusually brilliant display of the aurora. It certainly was a sight well

worth watching, but would require a much more able pen than mine to do it justice. Some distance to the north appeared a long, wavy, brilliantly luminous belt stretching roughly in a horizontal line from east to west seemingly at a height of only a few hundred feet above the ground, and moving southward. This brilliant belt, while seeming to fold and unfold on itself, like a bright ribbon which is continually doubling up and straightening out, seemed to keep about the same distance above the ground in its progress southward.

Behind this oncoming wave of brilliance, streamers of light, more or less intense but never so brilliant as the lowest belt, kept shooting up towards the zenith, and the display seemed to fill the whole northern sky. We watched this display approaching from the north. At first there was no sound, but as it got nearer, we heard a subdued swishing sound, which grew more distinct as it approached, and was loudest when the ribbon or belt of light was right overhead.

The sound was at no time loud but was quite distinct for several minutes and seemed to vary in intensity with the brilliance and the wavy motion of the luminous belt. It passed on to the south, and in a few minutes the whole sky was full of auroral streamers which seemed to culminate at a point in the zenith. A few minutes after the first display had passed over our heads, however, we could not hear the sound. It appeared as if the display was too distant for the sound to reach us, and an hour after our attention was first drawn to it the display had faded to quite an ordinary one.

JOHN R. CRAIG, St. Thomas, Ont.:

About the 15th August, 1882, after a day's journey, I with three cowboys, camped on the prairie some 20 miles east of the N.W.M.P. headquarters at Fort McLeod. We built our camp fire and had supper and soon after retired to rest. The night was calm and bright. Lying awake in the tent, I heard a mild crackling noise which brought me outside quickly, fearing that our fire had not been thoroughly extinguished. The fire was dead, but the heavens to the north were showing a greater display than I had ever seen. The aurora was shooting upwards and receding with almost lightning rapidity and with varying colours. A broad yellowish splash of flame spread across from the west to the east, ascending from the horizon and proceeding with what I can best describe as a swishing noise, while at the same time a crackling noise accompanied the darting and shooting of the aurora.

The whole display seemed near. Its immanency impressed me and together with the very clear audibility inspired something bordering on fear. I have been near to pine forest fires and the flames running through the branches made a crackling noise which impressed me as similar to that accompanying the aurora which I am endeavouring to describe.

I was "brought up" on a farm in Toronto Township and often witnessed and admired the aurora, but there never was anything approaching the display I saw and heard in Alberta on or about the 15th August, 1882. There was no settlement. Lethbridge was not born and Calgary had three log buildings. Our camp was about 3,000 feet above sea-level. There was no one in the vicinity but ourselves, and our horses were picketed at a distance. The sound from the aurora was clear, distinct, impressive and so indelible that the forty years which have elapsed have left the audibility of this grand display fresh and clear. There is no exaggeration but on the other hand my description is weak in comparison with the reality.

O. S. FINNIE, Department of the Interior, Ottawa:

My recollection of the auroral displays in the Klondyke is that the "crackling" sound was not present, but I distinctly remember hearing a "swishing" sound when the aurora was at its greatest intensity and waving in the sky like a blanket or a sheet.

MAJOR L. T. BURWASH, Ottawa:

During the years I have spent in the Canadian Northland I have, on many occasions, been greatly interested in the aurora borealis and have observed it closely.

There is absolutely no doubt as to its audibility. I have heard it most distinctly and have discussed this phenomenon with many persons at the time of its occurrence when all noted identically similar hissing or crackling sounds. That these were directly caused by the aurora, there can be no doubt as they coincided with it as to time, commencing as the light of the aurora began to intensify, following it in its course across the sky and dying as the light faded.

These sounds are very similar to those known to wireless operators as "static disturbances", which so frequently interfere with the receiving of aerial messages. The effect of these disturbances when intensified or concentrated by the ordinary wireless instruments may be divided into several divisions.

(1) The more or less constant sounds, much like those made by an effervescing fluid.

(2) The sharp staccato sounds which come at more or less regular intervals.

(3) The heavier and duller sound coming at somewhat irregular intervals and resembling the "knock" which is heard in a defective engine.

The sounds accompanying the aurora are identical with the first two of the above divisions, the first not being as intense as I have heard from a wireless instrument, and the second, while distinctly present, being much subdued. The third and heaviest disturbing sound I have not heard from the aurora.

MR. W. W. CORY, Deputy Minister of the Interior, states that his experience in the Yukon and in Manitoba corroborates Major Burwash's comparison of the auroral sounds to the first two kinds of wireless disturbance mentioned above.

C. B. BURNS, Ottawa:

While I was in the Yukon I observed the aurora many times with great interest. We used to have "aurora parties", at which times we would sit up for hours paying great attention to the skies. There certainly was a distinct crackling sound, varying in sharpness apparently according to the state of the atmosphere. On my drive in 1903 with you [Mr. Cory], we heard the same sound, I remember.

#### IS THERE A SOUND EMITTED?

After reading the foregoing evidence one can hardly withhold belief that a sound is heard during some auroral displays. True, it is rather disturbing to learn that some scientific observers who have listened intently have not been able to perceive any sound; but a considerable number of those who kindly contributed a record of their experiences were capable observers. In some cases their attention was drawn to the aurora by hearing the sound. In more than one instance several persons in a party heard the sound and discussed it at the time. It has been remarked that in the deep stillness of the night, when bright streamers dart rapidly across the sky or brilliant curtains wave above the head, one almost expects to hear a sound; but I cannot think that all the observers have been deceived.

It would appear that a sound is heard only in brilliant displays in which there is a lively motion. The actual heights of the visible auroral curtains or streamers which have been measured are generally greater than sixty miles, and of course any sound produced sixty miles away would not be heard. Further, the sound would require several minutes to travel such a distance, but various observers state that the sight of the special moving feature of the display is simultaneous with the hearing of the sound. As the "curtain" approaches, the sound increases in intensity, and as it moves away, the sound falls off. It is clear then that the immediate source of the sound which one hears need not be where the visible portion of the aurora is located; indeed it cannot ordinarily be there.

But one need not be where the lightning strikes to be affected by it. Even at a considerable distance one may be severely "shaken up" by the so-called return shock, which is due to electric induction.

Now the aurora is an electrical phenomenon, probably due to electrified particles projected from the sun. When these enter our atmosphere they excite the luminosity which we see. Their motion alters the earth's magnetic field and produces what is known as a magnetic storm. When the aurora shows rapid motion, there must be rapid changes in the electrification of the air, and these changes induce rapid changes in the electrification of the surrounding space, even at a considerable distance. Possibly these changes in the space about us give rise to something similar to a brush discharge from a body charged to a high potential. The sound which the aurora gives out is similar to that of a brush discharge.