clear and thoroughly appreciative description of Edison's carbon telephone, and published it in the printed reports of his lecture which appeared in the public journals. The beautiful results shown since the beginning of the present year by Mr. Hughes with his microphone were described by himself in such a manner as to leave no doubt but that he had worked them out quite independently, and that he had not the slightest intention of appropriating any credit due to Mr. Edison. It does seem to me that the physical principle used by Edison in his carbon telephone and by Hughes in the microphone is one and the same, and that it is the same as that used by M. Clérac, of the French "Administration des Lignes Télégraphiques," in the "variable resistance carbon tubes," which he had given to Mr. Hughes and others for important practical applications as early as 1866, and that it depends entirely on the fact long ago pointed out by Du Moncel, that increase of pressure between two conductors in contact produces diminution of electric resistance between them.

I cannot but think that Mr. Edison will see that he has let himself be hurried into an injustice, and that he will therefore not rest until he retracts his accusations of bad faith publicly and amply as he made them. WILLIAM THOMSON

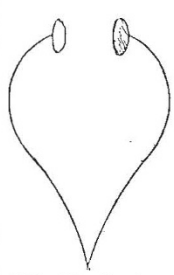
Yacht *Lalla Rookh*, Cowes, July 30

IT may be of interest at the present time to recall the fact that the word "microphone" was first employed by Sir Chas. Wheatstone upwards of fifty years ago. In a paper entitled "Experiments on Audition," published in the *Quarterly Journal of Science* for 1827, Wheatstone remarks:—"The great intensity with which sound is transmitted by solid rods at the same time that its diffusion is prevented affords a ready means of effecting this purpose [augmenting the loudness of external sounds], and of constructing an instrument which from its rendering audible the weakest sounds may with propriety be named a microphone." As the original paper may not be readily accessible, an extract from it is appended to this letter, wherein will be found a description of the simple arrangement proposed by Wheatstone—it is in fact a metallic binaural stethoscope—together with some experiments with the instrument given by the author. The entire paper will appear in the republication of Wheatstone's scientific papers, which the Physical Society will shortly issue, and the instrument itself can be obtained for a trifling sum from Mr. Yeates, of King Street, Covent Garden.

Monkstown, Dublin, July 29 W. F. BARRETT

"Procure two flat pieces of plated metal, each sufficiently large to cover the external ear, to the form also of which they may be adapted; on the outside of each plate, directly opposite the meatus, rivet a rod of iron or brass wire about 16 inches in length, and one-eighth of an inch in diameter, and fasten the two rods together at their unfixed extremities, so as to meet in a single point.

The rods must be so curved, that when the plates are applied to the ears, each rod may at one end be perpendicularly inserted into its corresponding plate, and at the other end may meet before the head in the plane of the medial line.



Wheatstone's microphone, 1827.

The spring of the rods will be sufficient to fix the plates to the ears; but for greater security ribands may be attached to each rod near its insertion in the plate, and be tied behind the head. A more simple instrument may be constructed to be applied to one ear only, by inserting a straight rod perpendicularly into a similar plate to those described above.

The microphone is calculated only for hearing sounds when it is in immediate contact with sonorous bodies; when they are diffused by their transmission through the air this instrument will not afford the slightest assistance. It is not my intention in this place to detail all the various experiments which may be made with this instrument; a few will suffice to enable the experimenter to vary them at his pleasure:—

1. If a bell be rung in a vessel of water and the point of the microphone be placed in the water at different distances from the bell, the difference of intensity will be very sensible.

2. If the point of the microphone be applied to the sides of a vessel containing a boiling liquid, or if it be placed in the liquid itself, the various sounds which are rendered may be heard very distinctly.

3. The instrument affords a means of ascertaining, with considerable accuracy, the points of a sonorous body at which the intensity of vibration is the greatest or least; thus, placing its point on different parts of the sounding-board of a violin or guitar whilst one of its strings is in vibration, the points of greatest and least vibration are easily distinguished.

4. If the stem of a sounding tuning-fork be brought in contact with any part of the microphone, and at the same time a musical sound be produced by the voice, the most uninitiated ear will be able to perceive the consonance or dissonance of the two sounds; the roughness of discords and the beatings of imperfect consonances are thereby rendered so extremely disagreeable, and form so evident a contrast to the agreeable harmony and smoothness of two perfectly consonant sounds, that it is impossible that they can be confounded."—*Quarterly Journal of Science*, 1827, Part II.

The Meteor Shower of Aquarids (July)

ON July 27 ninety-three shooting stars were seen here, between 10h. 30m. and 14h. 30m., which, after making allowance for time occupied in charting the paths, is equivalent to about twenty-nine per hour for one observer. There was a rich shower of *Aquarids* from a point near μ Aquarii, at R.A. 343°, 14° S. declination, which gave twenty-two meteors. These were rather bright, not very swift, with moderately long paths (averaging 17°), and quite devoid of streaks. I had seen about five meteors of this system on the preceding night, and on the 28th I watched a very hazy condition of sky—in which the stars shone dimly—for four hours, and of forty-four meteors seen five or six others were *Aquarids*. This active shower was well seen by Capt. Tupman on July 27, 1870, with an accurately-defined radiant at 340°—14°, from fourteen meteors (see No. 43 of his catalogue), and on the four following nights he traced about forty-seven others from the same shower, though the centre seemed a little further south, at 340°—19° on the 28th. On the 27th he recorded seven meteors of this stream within the twenty-one minutes, from 14h. 3m. to 14h. 24m. It was also seen by me, at 342°—12° (ten meteors), on August 3-17 last year; and Schmidt gives radiants at 337°—11° for July 20-31, and at 344°—11° for August. Neumayer, in the southern hemisphere, also has a position at 337°—10° (July), and Heis at 339°—10° for July 27-31. The average centre from these eight independent determinations is at 340°—13° for this important shower, which evidently comes to a strong maximum on about July 27-29. The end of July has long been known as a meteor-epoch of considerable intensity, with a maximum, according to Quetelet, between the 27th and 29th, which is thus amply confirmed by recent observations, and proves these *Aquarids* to be but little less in importance to the annually-recurring showers of *Lyrids*, *Orionids*, *Taurids*, and *Geminids*.

It should be pointed out that, in future observations of this special shower, care must be taken not to confuse it with other contemporary showers in Aquarius. There are two radiants on or near the equator in about R.A. 334° and 349°, and one (of very slow meteors) at about 336°—6°, also a fourth at 326°—12° (mean position of five radiants seen by Schmidt and Tupman). They are distinct showers, though separated with difficulty, owing to proximity of position; and it is interesting to note that, if we average them with the strong radiant at 340°—13° referred to above, we have a central radiant at 337°—6°, which coincides exactly with Mr. Greg's position for the *Aquarids* (Nos. 109 and 137 in his catalogue of 1876), which apparently continue from July 5 to October 31. W. F. DENNING

Ashleydown, Bristol, July 29

P.S.—My observations were continued on the night of July 30, when seventy-six shooting stars were seen in four hours; thirteen of these were *Aquarids*, and seven of them visible in the half an hour preceding midnight, after which few were observed. From this I infer that the maximum had probably occurred on the morning of the 30th, when, unfortunately, a thick haze prevented work.—W. F. D.

Physical Science for Artists

WILL you permit me, through your columns, to tell Mr. Abbay that the phenomena—"les rayons de crépuscule"—he