necessary to enter; but certainly Prof. J. J. Thomson has recognised the important part played by the residual gas, for example, in his lecture reported in NATURE of March 22, 1906. So far as I have yet been able to see, the action of the residual gas in the passage of large currents is much the same whether a Wehnelt kathode or an ordinary electrode is used. There appears to be a definite pressure at which the conductivity is a maximum, and a steady diminution of conductivity when this pressure is either increased or diminished. I do not think, with large currents at least, there is a sudden drop in the discharge current when the pressure is gradually reduced. Of course in the experiment I quoted there was a sudden cessation of the current, but then there is a sudden absorption of the residual gas when the calcium volatilises. The practical difficulties in the way of maintaining a high vacuum in an apparatus containing incandescent bodies by ordinary methods probably led to the earlier view that it was possible to make a vacuum a good conductor by use of an incandescent kathode.

F. SODDY.

British Association Seismology.

AN ancient Bogie has again appeared upon the scene. The object it has in view is to show that the seismological work done by the British Association is practically useless. It owes its existence to Prof. Bruno Weigand, of the Strassburg Kais. Hauptstation für Erdbebenforschung, and it was introduced to the notice of seismologists as a "Begrüssung" at the second International Seismological Conference. On this occasion, as a welcome to the British and other delegates, Dr. Weigand dilated at considerable length upon the defects of the instruments used by those who had kindly cooperated with the British Association. At Strassburg a Milne pendulum did not record so many earthquakes as a pendulum of the Reubeur-Ehler type, and the records from the first of these instruments indicated very late commencements.

This statement, which month after month and year after year Strassburg has published in the form of registers, has just been emphasised in two new works on seismology, "La Science séismologique," by Comte de Montessus de Ballore, and "Earthquakes," by Prof. W. H. Hobbs. These gentlemen, who I do not think claim to have any practical acquaintance with seismology, candidly tell us that their information came from others. What Dr. Weigand has said about his experiences at Strassburg is no doubt absolutely correct. It is not, however, sufficiently complete; he ought to have added that, although records were not being obtained at Strassburg, they were being obtained from similar instruments in Britain and at stations in other parts of the world. As to whether a seismograph gives satisfactory results or not depends upon its foundation, its adjustment, and, amongst other things, upon the light which is used for photographic purposes. If the light is too high, halation steps in, and all small vibrations are eclipsed in a broadened line.

As Dr. Weigand correctly points out, a factor of great importance connected with the working of a seismograph is the speed with which record-receiving surfaces move. In the early form of the Milne instrument, unless great care was exercised with regard to the light and adjustment of the boom, in consequence of the slowness with which the paper moved, very small earthquakes or preliminary tremors might be lost by the thickening of the line. In the modern form of record-receiving surface, now in use for some years, where the paper moves at 24 cm. per hour, nothing of this sort takes place. The seismograph remains exactly as it was first designed, and with its new recording surface yields results as useful and accurate as those obtained from any other type of instrument, and this it does at a cost of less than 3l. per annum. An instrument of higher sensibility than the Milne pendulum cannot be used on soft ground, whilst one which uses a very large quantity of photographic paper per year is beyond the means of small observatories. I am quite content to continue with the instrument I now possess, and, in spite of all criticism, I have no desire to change the same.

JOHN MILNE.

Shide, December 30, 1907.

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The Photoelectric Property of Selenium.

IN the letter which appeared in NATURE of December 26, Prof. Minchin does not state what kind of air-pump he used to exhaust the tube containing the light-sensitive selenium "bridge." If he used a mercurial pump, the presence of mercury vapour would explain the great fall in resistance observed.

In a paper published many years ago (Proceedings of the Royal Society, 1876-7, vol. xxv., p. 22), I showed that mercury combines at ordinary temperatures with selenium, producing a superficial film of comparatively low resistance. This effect is produced with vitreous selenium as well as with the granular or metallic form.

Selenium converted from the vitreous to the metallic form, in a vacuum free from the vapour of mercury, behaves like selenium rendered light-sensitive in the air in the ordinary way (Draper and Moss, Transactions of the Royal Irish Academy, 1876, vol. xxvi., p. 231). A specimen prepared *in vacuo* was found to have a high resistance, attributable, no doubt, to its spongy form; it was, however, highly sensitive to light.

RICHARD J. MOSS.

The Laboratory, Royal Dublin Society, December 27, 1907.

PROF. MINCHIN'S observation (p. 173) that the resistance of his selenium cells, or "bridges," when placed *in vacuo*, becomes enormously diminished is strongly suggestive of internal contact or short circuit, possibly brought about mechanically by the expansion of a small body of confined air in some part of the arrangement. Such short circuits occur not infrequently under ordinary conditions, and may generally be burnt out, and the cell restored to its original state, by the application for a moment of an E.M.F. of 50 volts or 100 volts.

Selenium cells have often been tested in a vacuum. They are supplied commercially, enclosed in highly exhausted glass tubes, by Dr. Ruhmer, of Berlin.

SHELFORD BIDWELL.

Beechmead, Oatlands Chase, Weybridge,

December 30, 1907.

Echelon Spectroscope.

WHILST employing a thirty-three plate echelon spectro-scope, constructed by Messrs. Adam Hilger for Prof. Schuster, my attention has been directed to a feature of the instrument which needs to be considered in drawing conclusions as to the nature of the light. Using an Arons mercury lamp as the source of light, the bright green line, for example, is resolved by the echelon into a bright and broad principal line with narrower companion lines on either side, and the principal line sometimes shows a narrow dark line not far from its centre.

Like others who seem to have observed the same effect, I supposed that the principal line showed reversal until I found that, on rotating the echelon slowly about a vertical axis, the dark line moves across the broad bright line, and disappears at the side; then another dark line appears at the opposite side, moves across, and disappears like the first; and so on.

These effects are probably produced by interference bands that have not been considered in the theory of the echelon, but have been described by Gehrccke ("Über eine Interferenzerscheinung am Stufengitter," *Annalen der Physik*, xviii., p. 1074, 1905).

If the echelon is tilted about a horizontal axis, parallel to the plates, these secondary bands become more inclined to the vertical, that is, to the direction of the slit, than the ordinary spectrum lines, and their mutual intersection gives to the spectrum lines a screw-like appearance.

A further investigation of these bands is being made, and it is hoped shortly to publish additional details of their behaviour that may help to explain their origin.

H. STANSFIELD.

The University, Manchester, December 26, 1907.

A Point in the Mathematical Theory of Elasticity.

PROF. PEARSON has recently made a statement which if correct is of very great importance to engineers. He declares that the distribution of the stresses due to the water pressure on, and the weight of, a dam is entirely different in the case of a thin slab cut from the dam